nationalgrid

# **Rhode Island Technical Reference Manual**

For Estimating Savings from Energy Efficiency Measures

2016 Program Year

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## Introduction

This *Rhode Island Technical Reference Manual* ("TRM") documents for regulatory agencies, customers, and other stakeholders the methodologies and assumptions used by National Grid to estimate the savings, including reductions in energy and demand consumption and other resource and non-energy impacts, attributable to its electric and gas energy efficiency programs. This reference manual provides methods, formulas and default assumptions for estimating energy, peak demand and other resource and non-energy impacts from efficiency measures.

Within this TRM, efficiency measures are organized by the sector for which the measure is eligible and by the primary energy source associated with the measure. The two sectors are Residential and Commercial & Industrial ("C&I"). The primary energy sources addressed in this TRM are electricity and natural gas.

Each measure is presented in its own section as a "measure characterization." The measure characterizations provide mathematical equations for determining savings (algorithms), as well as default assumptions and sources, where applicable. In addition, any descriptions of calculation methods or baselines are provided as appropriate. The parameters for calculating savings are listed in the same order for each measure.

Algorithms are provided for estimating annual energy and peak demand impacts for primary and secondary energy sources if appropriate. In addition, algorithms or calculated results may be provided for other non-energy impacts (such as water savings or operation and maintenance cost savings). Assumptions are based on Rhode Island data where available. Where Rhode Island-specific data is not available, assumptions may be based on: 1) manufacturer and industry data, 2) a combination of the best available data from jurisdictions in the same region, or 3) engineering judgment to develop credible and realistic factors.

The TRM is reviewed and updated annually to reflect changes in technology, baselines and evaluation results.

## The TRM in the Context of Energy Efficiency Programs

### Overview

The purpose of this section is to show how the TRM fits into the process of administering energy efficiency programs in Rhode Island. This section explains how the TRM is connected to the following efforts:

- Planning,
- Annual reporting,
- Updates to PA tracking systems,
- Evolution of program and measure cost effectiveness analysis tools,
- Evaluation, Measurement and Verification ("EM&V"),
- Quality control.

### **Planning and Reporting**

National Grid is submitting this fifth version of the RI TRM (the 2016 TRM) to the stakeholders along with its Energy Efficiency Program Plan ("EE Program Plan") for 2016.

The RI TRM provides regulators and stakeholders with documentation of the assumptions and algorithms that National Grid will use in planning and reporting its energy savings for 2016. It can also be used to support qualification in ISO-New England Forward Capacity Market Auctions. However, due to the nature of planning, not all planning assumptions – such as those for Commercial and Industrial programs – are documented in this TRM. For these areas, the algorithms used to calculate planned savings are presented.

### **Updates to Program Administrator Tracking Systems**

National Grid maintains a tracking system that contains the energy efficiency data that it uses to meet its annual reporting to the RI PUC. The current design of the tracking system influences the types of assumptions and algorithms that appear in this TRM. The current algorithms leverage inputs that National Grid collects.

### **Evolution of Program and Measure Cost Effectiveness Analysis Tools**

The program and measure cost effectiveness analysis tools are Microsoft<sup>®</sup> Excel<sup>®</sup> workbooks used by National Grid to ensure that the measures and programs that they implement meet the cost effectiveness requirements defined by the Rhode Island PUC in Docket 4443. National Grid also uses the output from the cost effectiveness analysis tools to develop the input (data, tables, and graphs) for its EE Program Plans and Year-End Reports. National Grid envisions aligning the measure names and the categorization of measures in the TRM with the measure names and categorization of measures in the cost effectiveness analysis tools either directly, or through the use of a translation tool.

### **Evaluation, Measurement and Verification**

Evaluation, Measurement and Verification ("EM&V") ensures that the programs are evaluated, measured, and verified in a way that provides confidence to the public at large that the savings are real and in a way that enables National Grid to report those savings to the EERMC and RI PUC with full confidence.

The 2016 Rhode Island TRM will be updated with any updates to assumptions and algorithms due EM&V results from the time when it and the 2016 EE Program Plan are submitted.

A secondary goal of creating a TRM is to identify areas where savings calculations can be improved. The TRM will inform future EM&V planning as a means to make these improvements.

For its Rhode Island programs, National Grid may use evaluation results from other jurisdictions. For some of these, Rhode Island contributed sites and/or budgets. For others, the application of results from other jurisdictions is considered based on how similar the programs, delivery, and markets are to those in Rhode Island.

## **Quality Control**

Regulators and stakeholders can use the TRM to confirm that savings inputs and calculations are reasonable and reliable. However, the TRM cannot be used by regulators and stakeholders to replicate the Company's reported savings. The TRM does not provide regulators and stakeholders with data inputs at a level that is detailed enough to enable replication of the savings reported by PAs. These calculations occur within tracking systems, within separate Excel workbooks, and within cost effectiveness analysis tools. However, in the event that regulators and stakeholders request that PAs provide tracking system details, the reproduction of reported data will be possible using the TRM.

## TRM Update Process

### Overview

This section describes the process for updating the TRM. The update process is synchronized with the filing of EE Program Plans.

Updates to the TRM can include:

- additions of new measures,
- updates to existing TRM measures due to:
  - o changes in baseline equipment or practices, affecting measure savings
  - o changes in efficient equipment or practices, affecting measure savings
  - changes to deemed savings due the revised assumptions for algorithm parameter values (e.g., due to new market research or evaluation studies) o other similar types of changes,
- updates to impact factors (e.g., due to new impact evaluation studies),
- discontinuance of existing TRM measures, and
- updates to the glossary and other background material included in the TRM.

Each TRM is associated with a specific program year, which corresponds to the calendar year. The TRM for each program year is updated over time as needed to both plan for future program savings and to report actual savings.

### **Key Stakeholders and Responsibilities**

Key stakeholders and their responsibilities for the TRM updates are detailed in the following table.

Stakeholder	Responsibilities
National Grid	<ul><li>Identify and perform needed updates to the TRM</li><li>Provide TRM to interested stakeholders</li></ul>
Rhode Island EERMC and Division of Public Utilities and Carriers	<ul> <li>In 2012, the EERMC commissioned the Natural Gas Opportunities Report</li> <li>Review; suggest modifications; and accept TRM</li> <li>Assure coordination with National Grid submissions of program plans and reported savings</li> </ul>
Jointly	<ul> <li>Administrative coordination of TRM activities, including:</li> <li>Assure collaboration and consensus regarding TRM updates</li> <li>Assure updates are compiled and incorporated into the TRM</li> <li>Coordinate with related program activities (e.g., evaluation and program reporting processes)</li> </ul>

## TRM Update Cycle

The description below indicates the main milestones of the TRM update cycle over a period of two years. The identifier "program year" or "PY" is used to show that this cycle will be repeated every year. For example, for the 2017 Program Year, compilation of updates will begin after the 2016 TRM is completed in October 2015, and will continue through September 2016, for submission in November 2016.

## September PY-2 to September PY-1: The PY TRM will be updated as needed based on evaluation studies and any other updates.

After the PY-1 TRM has been filed, there may be updates to the TRM. The most common updates to the TRM will result from new evaluation studies. Results of evaluation studies will be integrated into the next version of the TRM as the studies are completed. Other updates may include the results of group discussions to adopt latest research or the addition or removal of energy efficiency measures

## November (PY-1) prior to program year: The PY TRM is filed with National Grid's PY EE program plan

The PY TRM is submitted to the PUC jointly with National Grid's EE program plan. With regard to the program plans, the TRM is considered a "planning document" in that it provides the documentation for how the PAs *plan* to count savings for that program year. The TRM is not intended to fully document how the PAs develop their plan estimates for savings.

### January PY: National Grid begins to track savings based on the PY TRM

Beginning in January PY, the PAs will track savings for the PY based on the PY TRM.

## Measure Characterization Structure

This section describes the common entries or inputs that make up each measure characterization. A formatted template follows the descriptions of each section of the measure characterization.

Source citations: The source of each assumption or default parameter value should be properly referenced in a footnote.

**<u>Applicability:</u>** All Measures shown within the 2016 TRM are active for the 2016 Program Year: from 1/1/2016 to 12/31/2016

#### Measure Description Overview

This section will include a plain text description of the efficient and baseline technology and the benefit(s) of its installation, as well as subfields of supporting information including:

**Fuel:** The fuel against which savings are being claimed, and the program from which EE incentives are being drawn

Sector: Indicates whether measure is Residential, Income Eligible or Commercial and Industrial

Project Type: Indicates if measure is Retrofit or New Construction / Time of Replacement

**Category:** Indicates the measure category, for example: Lighting, HVAC, Hot Water, Products, Food Service, Compressed Air, Motors/Drives, Refrigeration, Behavior, Custom, etc

Type and Sub-type: Further measure classification for purposes of sorting measures

**Program Name:** The current program name under which the measure is being delivered.

**Measure Name:**\_A single device or behavior may be analyzed as a range of measures depending on a variety of factors which largely translate to where it is and who is using it. Such factors include hours of use, location, and baseline (equipment replaced or behavior modified). For example, the same screw-in compact fluorescent lamp will produce different savings if installed in an emergency room waiting area than if installed in a bedside lamp.

Measure Description: Description of the energy efficiency measure, its benefits, and applications.

**Baseline Description:** Description of the assumed equipment/operation efficiency in the absence of program intervention. Multiple baselines will be provided as needed, e.g., for different markets. Baselines may refer to reference tables or may be presented as a table for more complex measures)

**Savings Principle:** The means by which the measure saves energy relative to the baseline. Description of the assumed or calculated equipment/operation efficiency from which the energy and demand savings are determined. The high efficiency case may be based on specific details of the measure installation, minimum requirements for inclusion in the program, or an energy efficiency case based on historical participation. It may refer to tables within the measure characterization or in the appendices or efficiency standards set by organizations such as ENERGY STAR<sup>®</sup> or the Consortium for Energy Efficiency

**Savings Calculation method:** How the savings values are determined; in most cases, values are either deemed or calculated

Savings unit: required minimum unit / characteristic for claiming listed savings values

#### **Savings**

This section includes various information on the measure savings and how they are determined.

- Summary Average Gross Savings per Unit by Program: This table summarizes the resource savings (kWh, kW, MMBtu) of all efficiency offerings within a measure category via a weighted average of their savings. This is only for illustrating savings and does not correspond to how savings are tracked
  - **Program:** This describes the programs in which the measures are offered. Some measures are offered in multiple program

#### Sector and Program name mapping will be as follows:

Sector	Full Program Name
Residential – Electric	EnergyStar® Homes
	EnergyStar® HVAC
	EnergyWise
	EnergyWise Multifamily
	EnergyStar® Lighting
	Home Energy Reports
	EnergyStar® Products
Income Eligible – Electric	Single Family Appliance Management
	Income Eligible Multifamily
Commercial & Industrial –	Commercial New Construction
Electric	
	Commercial Retrofit
	Direct Install
Residential – Gas	EnergyStar® Heating System
	EnergyWise
	EnergyWise Multifamily
	Home Energy Reports
	Residential New Construction
Income Eligible – Gas	Single Family Appliance Management
	Income Eligible Multifamily
Commercial & Industrial – Gas	Commercial New Construction
	Commercial Retrofit
	Direct Install
	Commercial & Industrial Multifamily

- Algorithm Type: This section describes which of four methods of savings calculation applies to a measure
  - o Deemed: The same savings are allocated to every unit of a measure
  - Engineering Algorithm with Deemed Inputs: Measure savings are calculated with an engineering formula, the inputs of which are constant for all units of a measure.
  - Engineering Algorithm with Site Specific Inputs: Measure savings are calculated with an engineering formula, the inputs of which depend on data from the installation site.
  - Custom: Each unit of a measure receives a unique savings calculation that depends on site specific data.
- Units: This section describes what is installed or affected by an efficiency measure (eg. a boiler or a participant). It defines the quantity counted for savings.
- Algorithm: This section will describe the method for calculating the primary energy savings in appropriate units, i.e., kWh for electric energy savings or MMBtu for natural gas energy savings. The savings algorithm will be provided in a form similar to the following

 $\Delta kWh = \Delta kW \times Hours$ 

Similarly, the method for calculating electric demand savings will be provided in a form similar to the following:

 $\Delta kW = (Watts_{BASE} - Watts_{EE})/1000$ 

Below the savings algorithms, a table contains the definitions (and, in some cases, default values) of each input in the equation(s). The inputs for a particular measure may vary and will be reflected as such in this table (see example below).

ΔkWh	=	gross annual kWh savings from the measure
$\Delta kW$	=	gross connected kW savings from the measure
Hours	Ш	average hours of use per year
Wattsbase	=	baseline connected kW
Wattsee	Ш	energy efficient connected kW

- **Hours**: The operating hours for equipment that is either on or off, or equivalent full load hours for technologies that operate at partial loads, or reduced hours for controls. Reference tables will be used as needed to avoid repetitive entries.
- **Measure Gross Savings per Unit:** This table summarizes the unit resource impacts of each efficiency offering within a measure category (e.g., the savings for boilers of different efficiencies and ratings in the Boiler measure category). The source for each value is referenced.
- Non-Energy Impacts: This refers the reader to tables in the Appendix that describe

non-energy impacts associated with a given efficiency measure. If the measure has no NEIs, the entry is "N/A."

#### Impact Factors for Calculating Adjusted Gross Savings:

This section includes a table of impact factor values for adjusting gross savings and calculating lifetime savings. Sources are referenced. Impact factors (free ridership, spillover and/or net-togross ratio) for calculating net savings from adjusted gross savings are in Appendix B.

• **Measure Life:** Measure Life includes equipment life and the effects of measure persistence. Equipment life is the number of years that a measure is installed and will operate until failure. Measure persistence takes into account business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued.

Other impact factors are defined in the next section.

## Impact Factors for Calculating Adjusted Gross and Net Savings

National Grid uses the algorithms in the Measure Characterization sections to calculate the gross savings for energy efficiency measures. Impact factors are then applied to make various adjustments to the gross savings estimate to account for the performance of individual measures or energy efficiency programs as a whole in achieving energy reductions as assessed through evaluation studies. Impacts factors address both the technical performance of energy efficiency measures and programs, accounting for the measured energy and demand reductions realized compared to the gross estimated reductions, as well as the programs' effect on the market for energy efficient products and services.

This section describes the types of impact factors used to make such adjustments, and how those impacts are applied to gross savings estimates. Definitions of the impact factors and other terms are also provided in the Glossary (Appendix F).

## **Types of Impact Factors**

The impact factors used to adjust savings fall into one of two categories:

Impact factors used to adjust gross savings:

- In-Service Rate ("ISR")
- Savings Persistence Factor ("SPF")
- Realization Rate ("RR")
- Summer and Winter Peak Demand Coincidence Factors ("CF").

Impact factors used to calculate net savings:

- Free-Ridership ("FR") and Spillover ("SO") Rates
- Net-to-Gross Ratios ("NTG").

The **in-service rate** is the actual portion of efficient units that are installed. For example, efficient lamps may have an in-service rate less than 1.00 since some lamps are purchased as replacement units and are not immediately installed. The ISR is 1.00 for most measures.

The **savings persistence factor** is the portion of first-year energy or demand savings expected to persist over the life of the energy efficiency measure. The SPF is developed by conducting surveys of installed equipment several years after installation to determine the actual operational capability of the equipment. The SPF is 1.00 for most measures.

In contrast to savings persistence, *measure persistence* takes into account business turnover, early retirement of installed equipment, and other reasons the installed equipment might be removed or discontinued. Measure persistence is generally incorporated as part of the measure life, and therefore is not included as a separate impact factor.

The **realization rate** is used to adjust the gross savings (as calculated by the savings algorithms) based on impact evaluation studies. The realization rate is equal to the ratio of measure savings developed from an impact evaluation to the estimated measure savings derived from the savings algorithms. The realization rate does not include the effects of any other impact factors. Depending on the impact evaluation study, there may be separate realization rates for energy (kWh), peak demand (kW), or fossil fuel energy (MMBtu).

A **coincidence factor** adjusts the connected load kW savings derived from the savings algorithm. A coincidence factor represents the fraction of the connected load reduction expected to occur at the same time as a particular system peak period. The coincidence factor includes both coincidence and diversity factors combined into one number, thus there is no need for a separate diversity factor in this TRM.

Coincidence factors are provided for the on-peak period as defined by the ISO New England for the Forward Capacity Market ("FCM"), and are calculated consistently with the FCM methodology. Electric demand reduction during the ISO New England peak periods is defined as follows:

- <u>Summer On-Peak</u>: average demand reduction from 1:00-5:00 PM on non-holiday weekdays in June July, and August
- <u>Winter On-Peak</u>: average demand reduction from 5:00-7:00 PM on non-holiday weekdays in December and January

The values described as Coincidence Factors in the TRM are not always consistent with the strict definition of a Coincidence Factor (CF). It would be more accurate to define the Coincidence Factor as "the value that is multiplied by the Gross kW value to calculate the average kW reduction coincident with the on-peak periods." A coincidence factor of 1.00 may be used because the coincidence is already included in the estimate of Gross kW; this is often the case when the "Max kW Reduction" is not calculated and instead the "Gross kW" is estimated using the annual kWh reduction estimate and a loadshape model.

A **free-rider** is a customer who participates in an energy efficiency program (and gets an incentive) but who would have installed some or all of the same measure(s) on their own, with no change in timing of the installation, if the program had not been available. The **free-ridership rate** is the percentage of savings attributable to participants who would have installed the measures in the absence of program intervention.

The **spillover rate** is the percentage of savings attributable to a measure or program, but additional to the gross (tracked) savings of a program. Spillover includes the effects of 1) participants in the program who install additional energy efficient measures outside of the program as a result of participating in the program, and 2) non-participants who install or influence the installation of energy efficient measures as a result of being aware of the program. These two components are the **participant spillover** (SOP) and **non-participant spillover** (SONP).

The **net savings** value is the final value of savings that is attributable to a measure or program. Net savings differs from gross savings because it includes the effects of the free-ridership and/or spillover rates.

The **net-to-gross** ratio is the ratio of net savings to the gross savings adjusted by any impact factors (i.e., the "adjusted" gross savings). Depending on the evaluation study, the NTG ratio may be determined from the free-ridership and spillover rates, if available, or it may be a distinct value with no separate specification of FR and SO values.

## Standard Net-to-Gross Formulas

The TRM measure entries provide algorithms or methodologies for calculating the gross energy and demand savings for each category of efficiency measures. The following standard formulas show how the impact factors are applied to calculate the net savings. These are the calculations used by National Grid to track and report gross and net savings for its energy efficiency programs in Rhode Island.

- <u>Calculation of Net Annual Electric Energy Savings</u> net\_kWh = gross\_kWh × SPF × ISR x RRE × NTG
- <u>Calculation of Net Summer Electric Peak Demand Coincident kW Savings</u>  $net_kWsp = gross_kW \times SPF \times ISR \times RRsp \times CFsp \times NTG$
- <u>Calculation of Net Winter Electric Peak Demand Coincident kW Savings</u>  $net_kWwp = gross_kW \times SPF \times ISR \times RRwp \times CFwp \times NTG$
- <u>Calculation of Net Annual Natural Gas Energy Savings</u> net\_MMbtu = gross\_MMBtu × SPF × ISR × RRE × NTG

Where:

Gross\_kWh = Gross Annual kWh Savings net\_kWh = Net Annual kWh Savings Gross\_kWsp = Gross Connected kW Savings (summer peak) Gross\_kWwp = Gross Connected kW Savings (winter peak) net\_kWsp = Adjusted Gross Connected kW Savings (winter peak) net\_kWwp = Net Coincident kW Savings (winter peak) Gross\_MMBtu = Gross Annual MMBtu Savings net\_MMBtu = Net Annual MMBtu Savings SPF = Savings Persistence Factor ISR = In-Service Rate CFsp = Peak Coincidence Factor (summer peak) CFwp = Peak Coincidence Factor (winter peak) RRE = Realization Rate for electric energy (kWh) RRsp = Realization Rate for summer peak kW RRwp = Realization Rate for winter peak kW NTG = Net-to-Gross Ratio FR = Free-Ridership Factor SOP = Participant Spillover Factor SONP = Non-Participant Spillover Factor

Depending on the evaluation study methodology:

- NTG is equal to (1 FR + SOP + SONP), or
- NTG is a single value with no distinction of FR, SOP, SONP, and/or other factors that cannot be reliably isolated.

## Measure Characterizations

TRL Reference Number	RI_0398
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Appliances
Туре	Dehumidifiers
Sub-type	Dehumidifier
Program Name	EnergyStar Products
Measure Name	Dehumidifier
Measure Description	The Installation of high efficiency dehumidifiers and the turn-in of existing inefficienct dehumidifyers.
Baseline Description	Standard efficiency.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> replacement unit with an efficiency of 1.47 L/kWh. The high efficiency case is an ENERGY STAR <sup>®</sup> replacement unit with an efficiency of 1.47 L/kWh.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Per dehumidifer
	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
Savings Equation	Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Llouro	
Hours	N/A #N/A
Hours Source	
Hours source note	#N/A
kWh/yr Savings	73
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction kW reduction source	0.042 Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A
	0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note RR demand (RRd) winter peak	#N/A 1.00

#N/A
#N/A
1.00
#N/A
#N/A
0.90
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.50
0.00
0.00
0.50
#N/A
#N/A
\$ 34 per measure
#N/A
#N/A
\$ 30 per measure

Fuel       Electric         Sector       Residential         Project Type       New Construction         Category       Appliances         Type       Dehumidifiers         Sub-type       Dehumidifier         Program Name       EnergyStar Products         Measure Name       Dehumidifier Recycling         Measure Description       Recycling of old dehumidifiers         Baseline Description       Operating inefficient unit.         Savings Principle       Recycling of inefficient unit.         Savings viniciple       Recycling of inefficient unit.         Savings vinicy acluation method       Deemed         Savings structure       Per dehumidifer         Savings Equation       Where:         Qty = Total number of units.       Delta kWh = Qty × deltakWh         Gross kWH = Qty × deltakW       Where:         Delta kWh = Deemed average annual kWh reduction per unit.       Delta kW = Deemed average kW reduction per unit.         Hours       N/A         Hours Source       #N/A         KWh/yr savings       196         KWh/yr savings source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KWreduction       0.11		
Sector         Residential           Chegory         Applances           Type         Dehumidifiers           Sub-Type         Dehumidifiers           Sub-Type         Debumidifiers           Sub-Type         Debumidifiers           Sub-Type         Debumidifiers           Messure Description         Recycling of old dehumidifiers           Sacken Description         Deparating inficient unit.           Saring Suring zaciulation method         Beened           Savings trapication         Deparating inficient unit.           Savings trapication         Deparating inficient unit.           Savings trapication         Deparating inficient unit.           Savings trapication         Where:           Savings trapication         Where:           Savings trapication         Where:           Delta KWh = Deemed average annual KWh reduction per unit.           Hours Source         BN/A           Hours Source         BN/A           Whyfr savings source         BN/A           Whyfr savings source         BN/A           Wreduction source         BN/A           Wreduction source         BN/A           Wreduction source         BN/A           Wreduction source         BN/A	TRL Reference Number	RI_0436
Project Type         New Construction           Creagony         Appliances           Type         Dehundifier           Sub-type         Dehundifier           Sub-type         Dehundifier           Wasarro Description         Becycling of duehundifiers           Masarro Description         Becycling of indehundifiers           Masarro Description         Becycling of indehundifiers           Masarro Description         Becycling of indicent unit.           Savings Suring Suring Calculation method         Demend           Savings Suring Suring Calculation method         Beened           Savings Suring Suring Calculation method         Demend           Savings Suring Suring Calculation method         Demend           Savings Suring S		
Category         Applances           Type         Dehumidifiers           Sub-type         Dehumidifiers           Sub-type         Dehumidifiers           Wasaure Description         Becycling of dehumidifiers           Baseline Description         Operating inefficient unit.           Savings Principle         Becycling of dehumidifiers           Savings suint         Per dehumidifier           Savings suint         Per dehumidifier           Savings figuation         Quer statumidifier           Savings figuation         Where:           Detat WM - Deemed average annual kWh reduction per unit.         Detat XW - Deemed average tw/ reduction per unit.           Hours Source         #K/A           Hours Source         #K/A           Hours Source         #K/A           Wr eduction source		
Type         Dehumidifier           Ski-type         Dehumidifier           Program Name         EnergyStar Products           Messure Description         Recycling of did dehumidifiers           Baseline Description         Operating inefficient unit.           Goorg Principal         Recycling of did dehumidifiers           Savings structure         Per dehumidifier           Savings structure         Per dehumidifier           Savings figure         Gross KWh = Qty editakWh           Gross KWh = Qty editakWh         Gross KWh = Qty editakWh           Savings Equation         Where: Qty = Total number of units. Deta KW = Deemed average annual KWh reduction per unit.           Hours Source         N/A           Hours Source         HV/A           Whyfyr savings source         HV/A           Whyfyr savings note         HV/A           Wr eduction note         HV/A           O         O		
Sub type         Dehumülfler           Program Name         EnergyStar Products           Messure Name         Dehumüdfler Recycling           Messure Description         Recycling of old dehumüdflers           Savings Frinciple         Recycling of ind ficture unit.           Energy Startings calculation method         Deenting method           Savings Inficiple         Recycling of indficient unit.           Savings Calculation method         Deenting           Savings Inficiple         Recycling of indficient unit.           Op =1 KWh - Deemed average annual kWh reduction per unit.         Deta KWh - Deemed average NW reduction per unit.           Hours Source         MVA         Messure and WVA           KWh/ry Savings ource         #W/A         Messure and WVA           KWh/ry Savings note         #W/A         Messure and WVA           KWrduction note         #W/A         Messure and WVA           KW reduction source         #W/A         Messure and WVA           KW reduction note         #W/A         Messure and WVA           KW reduction note         #W/A         M		
Program         Energystar Products           Measure Description         Dehundidfer Recycling           Measure Description         Operating inefficient unit.           Savings Stringtople         Recycling of old dehundidfiers           Savings Stringtople         Recycling inefficient unit.           Savings Stringtople         Recycling in efficient unit.           Detta KWh = Deemed average annual KWh reduction per unit.         Detta KWh = Deemed average kW reduction per unit.           Hours         N/A         N/A           Hours source         MK/A         N/A           Whyfyr savings note         MK/A         N/A           WW reduction source         MK/A         N/A           WW reduction source         MK/A         N/A           WW reduction source         MK/A         N/A           Sa Hat MMButyr savings source         MK/A         N/A <t< td=""><td></td><td></td></t<>		
Measure Name         Dehumidifier Recycling of ald dehumidifiers           Baseline Description         Description (International Content on the International Content on the Internatin International Content on International Content on Int		
Messure Description     Acycling of old dehumidifiers     Baseline Description     Operating indificient unit.     Baseline Description     Acycling of inefficient unit.     Cress Swings calculation method     Deered     Savings calculation method     Deered     Savings and     Per dehumidifor     Gross SW = Qty < deltaWh     Gross SW = Qty < deltaWh     Gross SW = Qty < deltaWh     Savings calculation     Delta Wh = Deemed average annual Wh reduction per unit.     Delta Wh = Deemed average annual Wh reduction per unit.     Delta Wh = Deemed average annual Wh reduction per unit.     Delta Wh = Deemed average annual Wh reduction per unit.     Delta Wh = Deemed average annual Wh reduction per unit.     Delta Wh = Deemed average annual Wh reduction per unit.     Delta Wh = Deemed average annual Wh reduction per unit.     Delta Wh = Deemed average annual Wh reduction per unit.     Nours Surce     MN/A     Mours Source     MN/A     Mours Source     MN/A     MN/A     Mours     MN/A	-	
Baseline Description         Operating inefficient unit.           Savings Principle         Recycling of inefficient unit.           Savings Vinigs calculation method         Decmed           Savings Vinigs Calculation method         Decmed           Savings Vinigs Calculation method         Decmed           Savings Vinigs Calculation method         Gress KW = Cty x deltakWh           Gress KW = Cty x deltakW         Orse Total number of units.           Deta KW = Decmed average annual KWh reduction per unit.         Deta KW = Decmed average NW reduction per unit.           Hours         N/A           Hours Source         M/A           Hours Source note         M/A           KWh/ry Savings Source         N/A           KWh/ry Savings Source         M/A           KW reduction source         M/A           KW reduction note         M/A           KW reduction note         M/A           Gas Heat MMBtu/ry savings note         M/A           KW reduction source         M/A           Gas Heat MMBtu/ry	Measure Name	
Savings Principle         Recycling of inefficient unit.           Energy Savings calculation method         Deemed           Savings unit         Per dehumidifer           Gross KW = Qty x deltakWh         Gross KW = Qty x deltakW           Savings Equation         Where:           Qty = Total number of units.         Delta kW = Deemed average annual kWh reduction per unit.           Hours         N/A           Hours Source (M)         M/A           Hours source note (M)/A         M/A           Hours source note (M)/A         M/A           Wreduction source (M)/A         M/A           Wreduction source (M)/A         M/A           Wreduction source (M)/A         M/A           Savings Source (M)/A         M/A           Sa Hast MMBtu/ry savings note (M)/A         M/A           Savings Source (M)/A         M/A           Wreduction source (M)/A         M/A           Sa Hast MMBtu/ry savings note (M)/A         M/A           Sa Hast MMBtu/ry savings note (M)/A         M/A           Oli MMBtu/ry savings note (M)/A         M/A           Propane MMB		
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Savings unit         Per dehumidifer           Gross KW = Qty × deltaWh         Gross kW = Qty × deltaWh           Savings Equation         Where:           Qty = Total number of units.         Delta kWh = Deemed average annual Wh reduction per unit.           Hours Source         N/A           Hours Source         N/A           Mours Source and M/A         M/A           Why Fy savings         196           Why Savings source         N/A           Why reduction source         N/A           Wr reduction source         N/A           Wr reduction source         N/A           Wir reduction source         N/A           Wir Aduction note         HIVA           Gas Heat MMBtu/yr savings source         HIVA           Oil MMBtu/yr savings source         HIVA           Oil MMBtu/yr savings onte         HIVA           Oil MMBtu/yr savings onte         HIVA           Oil MMBtu/yr savings onte         HIVA           Gas Heat MMBtu/yr savings onte         HIVA           More Source         HIVA           Gas Heat MMBtu/yr savings onte         HIVA           Oil MMBtu/yr savings onte         HIVA           Dil MMBtu/yr savings onte         HIVA           Fropane MMBtu/yr savings		
Gross KWP = Qty × deltakWh         Gross KW = Qty × deltakW         Where:         Qty = Total number of units.         Detta KW = Deemed average annual KWh reduction per unit.         Mours       N/A         Hours Source       HIV/A         Mours Source note       HIV/A         Multi Source NVA       HIV/A         Mours Source NVA       HIV/A         Mours Source HIV/A       HIV/A         Mours Source HIV/A       HIV/A         Why reduction source HIV/A       HIV/A         KWh/ry savings source HIV/A       HIV/A         KW reduction source HIV/A       HIV/A         KW reduction source HIV/A       HIV/A         KW reduction source HIV/A       HIV/A         Gas Heat MMBtu/ry savings ource HIV/A       Gas Heat MMBtu/ry savings ource HIV/A         Gil MMBtu/ry savings note HIV/A       HIV/A         Oll MMBtu/ry savings note HIV/A       HIV/A         Oll MMBtu/ry savings source HIV/A       HIV/A         Propane MMBtu/ry savings note HIV/A       HIV/A         Propane MMBtu/ry savings note HIV/A       HIV/A         Did MMBtu/ry savings note HIV/A       HIV/A         Did MMBtu/ry savings note HIV/A       HIV/A         HIV/A       HIV/A       HIV/A		
Savings Equation         Gross KW = Qty × deltakW           Where:         Delta KMh = Deemed average annual KWh reduction per unit.           Delta KWh = Deemed average KW reduction per unit.         Delta KWh = Deemed average KW reduction per unit.           Hours         NA           Hours Source         #N/A           Hours source note         #N/A           Wh/hyr savings source         #N/A           Wh/hyr savings source         #N/A           Wr reduction         0.114           KW reduction source         #N/A           Wr eduction source         #N/A           KW reduction source         #N/A           KW reduction source         #N/A           Cas Heat MMBtu/yr savings ource         #N/A           Cas Heat MMBtu/yr savings ource         #N/A           Ci Sa Hat MMBtu/yr savings ource         #N/A           Ci MMBtu/yr savings source	Savings unit	
Savings Equation         Where:           City = Total number of units.           Detta kWn = Deemed average annual kWn reduction per unit.           Detta kWn = Deemed average kW reduction per unit.           Hours Source         MNA           Hours Source note         MNA           KWh/ry savings source         MNA           KWh/ry savings note         MNA           KWh/ry savings note         MNA           KW reduction source         N/A           KW reduction note         N/A           KW reduction note         N/A           Gas Heat MMBtu/ry savings note         MNA           HOpane MMBtu/ry savings note		
Savings Equation              Qty = Total number of units. Detta KW = Deemed average annual KWh reduction per unit. Detta KW = Deemed average KW reduction per unit.           Hours Source         N/A           Hours Source note         MN/A           KWh/yr Savings         196           KWh/yr savings source         MN/A           KWh/yr savings source         MN/A           KWh/yr savings note         MN/A           KW reduction         0.114           KW reduction source         MN/A           KW reduction note         MN/A           Gas Heat MMBtu/yr savings note         MN/A           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings         0           Oil MMBtu/yr savings note         MN/A           Gas Heat MMBtu/yr savings note         MN/A           Oil MMBtu/yr savings note         MN/A           Oil MMBtu/yr savings note         MN/A           Propane MMBtu/yr savings note         N/A           In service rate tots         N/A           Savings Persistence Factor Noree         N/A		Gross kW = Qty × deltakW
Savings Equation              Qty = Total number of units. Detta KW = Deemed average annual KWh reduction per unit. Detta KW = Deemed average KW reduction per unit.           Hours Source         N/A           Hours Source note         MN/A           KWh/yr Savings         196           KWh/yr savings source         MN/A           KWh/yr savings source         MN/A           KWh/yr savings note         MN/A           KW reduction         0.114           KW reduction source         MN/A           KW reduction note         MN/A           Gas Heat MMBtu/yr savings note         MN/A           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings         0           Oil MMBtu/yr savings note         MN/A           Gas Heat MMBtu/yr savings note         MN/A           Oil MMBtu/yr savings note         MN/A           Oil MMBtu/yr savings note         MN/A           Propane MMBtu/yr savings note         N/A           In service rate tots         N/A           Savings Persistence Factor Noree         N/A		
Aty = Total number of units.           Deta KWh = Deemed average annual KWh reduction per unit.           Hours Source         N/A           Hours Source note         RN/A           KWh/yr savings         196           KWh/yr savings source         RN/A           KWh/yr savings source         RN/A           KWh/yr savings source         RN/A           KWh/yr savings source         RN/A           KW reduction source         RN/A           KW reduction source         RN/A           KW reduction source         RN/A           Gas Heat MMBtu/yr savings note         RN/A           Propane MMBtu/yr savings note         RN/A           Fergence(s) & table(s) notes         0           measure life note         N/A           Inservice rate note         N	Savings Equation	Where:
Delta WW = Deemed average annual WWh reduction per unit.           Hours         N/A           Hours Source         #N/A           Hours Source note         #N/A           KWh/y savings         196           KWh/y savings note         #N/A           KWh/y savings note         #N/A           KWh/y savings note         #N/A           KW reduction not         0.114           KW reduction note         #N/A           Gas Heat MMBtu/yr savings ource         #N/A           Gas Heat MMBtu/yr savings ource         #N/A           Gas Heat MMBtu/yr savings ource         #N/A           Gas Heat MMBtu/yr savings note         #N/A           Gi MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Frepane MMBtu/yr savings	Savings Lyuation	
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kWh/yr savings note       #N/A         kWh/yr savings note       #N/A         kW reduction       0.114         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oll MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         measure life       5         measure life       5         measure life source       #N/A         In-service rate (SR)       1.00         In-service rate (SR)       1.00         In-service rate (SP)       1.00         In-service rate (SP)       1.00         Savings Persistence Factor Source       #N/A         Savings Persistence Factor Source       #N/A         Re nore       #N/A         Re nore <td>Hours source note</td> <td>#N/A</td>	Hours source note	#N/A
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Coincidence factor (CF) summer peak 0.85	· · · · · · · · · · · · · · · · · · ·	
CF summer peak source #N/A		
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1.00
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#N/A
\$ 50 per measure
#N/A
#N/A
\$30 per measure

TRL Reference Number	RI_0432
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Appliances
Туре	Clothes Dryers
Sub-type	Dryer
Program Name	EnergyStar Products
Measure Name	EnergyStar Dryer
Measure Description	The installation of an EnergyStar clothes dryer .
Baseline Description	A new electric dryer.
Savings Principle	An EnergyStar electric dryer.
Energy Savings calculation method	Deemed
Savings unit	Installed EnergyStar dryer.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	154
kWh/yr savings source	#N/A
	•
kWh/yr savings note	#N/A
kW reduction	0.053
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	SEDI HE Dryer Screening Ver.2 Using DOE2005.xls
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
seconder actor (er / summer peak	1

	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF summer peak source	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.90
CF winter peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.10
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.90
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 60 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 50 per measure

TRL Reference Number	RI_0282
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Appliances
Туре	Refrigerators
Sub-type	Refrigerator
Program Name	EnergyWise
Measure Name	EW SF Refrig rebate
Manaura Description	This measure covers the replacement of an existing inefficient refrigerator with a new efficient
Measure Description	refrigerator.
	For Top Ten <sup>®</sup> and Most Efficient <sup>®</sup> refrigerators, the baseline is a 50% mix of available Energy Star <sup>®</sup> and
Baseline Description	Federal standard compliant refrigerators. For Energy Star® refrigerators, the baseline is a refrigerator that
·	meets Federal standards.
	The high efficiency case is an Energy Star <sup>®</sup> refrigerator or a model that is ENERGY STAR <sup>®</sup> rated and
Savings Principle	included in the Most Efficient <sup>®</sup> or Top Ten USA <sup>®</sup> ranking.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency refrigerator.
	Gross kWh = Qty × (kWh_base - kWh_ee)
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	kWh_base = Deemed average demand per baseline unit.
	kWh_ee = Deemed average demand per high-efficiency unit.
	DeltakW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	770
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
kWh/yr savings note	#N/A
kW reduction	0.095
w reddellon	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
WW reduction note	
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Residential
measure life source	Refrigerator.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.

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RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.93
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI 0273
Fuel	Electric
	Residential
Sector Project Type	New Construction
	Appliances
Category	
Type	Recycling
Sub-type	Freezer Recycling
Program Name	EnergyStar Products
Measure Name	Freezer Recycling
Measure Description	The retirement of old, inefficient secondary refrigerators and freezers.
Baseline Description	The baseline efficiency case is an old, inefficient secondary working refrigerator or freezer. Estimated average usage is based on combined weight of freezer energy use and refrigerator energy use.
Savings Principle	The high efficiency case assumes no replacement of secondary unit.
Energy Savings calculation method	Deemed
Savings unit	Removal of existing refrigerator or freezer.
	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	The average annual operating hours are 8760 hours/year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	663
	NMR Group, Inc. (2011). Massachusetts Appliance Turn-In Program Evaluation Integrated Report Findings
kWh/yr savings source	– FINAL. Prepared for National Grid, NSTAR Electric, Cape Light Compact, and Western Massachusetts
kvvii, yr savnigs soaree	Electric Company.
kWh/yr savings note	#N/A
kW reduction	0.082
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
WW reduction note	
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	8
measure life source	NMR Group, Inc. (2011). Massachusetts Appliance Turn-In Program Evaluation Integrated Report Findings – FINAL. Prepared for National Grid, NSTAR Electric, Cape Light Compact, and Western Massachusetts
	Electric Company.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.

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RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.93
	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF winter peak source	Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	172.53
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.41
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.59
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 175 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 55 per measure

TRL Reference Number	RI 0267
	Electric
Fuel	
Sector	Residential
Project Type	New Construction
Category	Appliances
Type	Freezers
Sub-type	Freezer
Program Name	EnergyStar Products
Measure Name	Freezers
Measure Description	This measure covers the replacement of an existing inefficient freezer with a new efficient freezer.
Baseline Description	For Top Ten <sup>®</sup> and Most Efficient <sup>®</sup> refrigerators, the baseline is a 50% mix of available Energy Star <sup>®</sup> and Federal standard compliant freezers. For Energy Star <sup>®</sup> refrigerators, the baseline is a freezer that meets Federal standards.
Savings Principle	The high efficiency case is an Energy Star <sup>®</sup> freezer or a model that is ENERGY STAR <sup>®</sup> rated and included in the Most Efficient <sup>®</sup> or Top Ten USA <sup>®</sup> ranking.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency freezer.
	Gross kWh = Qty × (kWh_base - kWh_ee) Gross kW = Qty × deltakW Where:
Savings Equation	Qty = Total number of units. kWh_base = Deemed average demand per baseline unit. kWh_ee = Deemed average demand per high-efficiency unit. DeltakW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	49
kWh/yr savings source	Environmental Protection Agency (2012). Freezers Qualified Product List. July 18, 2012. Average of all units in category
kWh/yr savings note	#N/A
kW reduction	0.006
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	11
measure life source	Environmental Protection Agency (2011). Life Cycle Cost Estimate for ENERGY STAR Freezer. Accessed 9/7/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A

r	
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF summer peak source	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.93
	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF winter peak source	Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.35
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.65
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 50 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 50 per measure

•

TRL Reference Number	RI_0426
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Appliances
Туре	Clothes Dryers
Sub-type	Dryer
Program Name	EnergyStar Products
Measure Name	Super Efficient Dryer
Measure Description	The installation of a clothes dryer promoted by the Super Efficient Dryer Initiative.
Baseline Description	A new electric dryer.
Savings Principle	A super efficient electric dryer such as those promoted through the Super Efficient Dryer Initiative.
Energy Savings calculation method	Deemed
Savings unit	Installed super efficient dryer.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	241
kWh/yr savings source	SEDI HE Dryer Screening Ver.2 Using DOE2005.xls
kWh/yr savings note	#N/A
kW reduction	0.044
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	13
measure life source	SEDI HE Dryer Screening Ver.2 Using DOE2005.xls
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Mational Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
inter peak source	

National Grid assumption based on regional PA working groups.
0.73
The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
Administrators.
#N/A
1.00
The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
Administrators.
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 412 per measure
#N/A
#N/A
\$ 200 per measure

TRL Reference Number	RI_0012
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Building Shell
Туре	Insulation
Sub-type	Cooling
Program Name	Residential New Construction
Measure Name	Renovation Rehab Cooling
Measure Description	Renovation Rehab projects include the installation of roof, wall, and basement insulation
Baseline Description	The baseline case is the performance of the house before participation in the program
Savings Principle	The efficient case is the post-retrofit performance of a house participating the program
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Complete Renovation Rehab project
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
Savings Equation	Gross Winter kW = deltakW_wp_custom
	Gross MMBtu Gas = deltaMMBtu_Gas_custom
	Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Supplied by vendor
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Synapse (2012). A Preliminary Analysis of Energy Impacts from Partial Deep Energy Retrofit Projects in
	National Grid's Jurisdiction. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	#N/A
measure life note	Common measure life for insulation measures.
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
•	1.00
RR demand (RRd) winter peak	
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A Coincidence factors are sustem calculated based on project specific datail
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.

Coincidence factor (CF) winter peak	1.00
	#N/A
CF winter peak source	
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI_0013
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Building Shell
Туре	Insulation
Sub-type	DHW
Program Name	Residential New Construction
Measure Name	Renovation Rehab Heating
Measure Description	Renovation Rehab projects include the installation of roof, wall, and basement insulation
Baseline Description	The baseline case is the performance of the house before participation in the program
Savings Principle	The efficient case is the post-retrofit performance of a house participating the program
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Complete Renovation Rehab project
-	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW sp custom
Savings Equation	Gross Winter kW = deltakW wp custom
	Gross MMBtu Gas = deltaMMBtu_Gas_custom
	Gross MMBtu Oil = deltaMMBtu Oil custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Supplied by vendor
Gas Heat MMBtu/yr savings	
	-
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A 0
Oil MMBtu/yr savings	-
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	#N/A
measure life note	Common measure life for insulation measures.
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak source	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	
concluence ractor (cr) winter peak	1.00

CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

Sector Project Type Category Type	Electric Residential New Construction HVAC HVAC O&M Central AC Quality Install EnergyStar HVAC
Sector Project Type Category Type Sub-type Program Name	Residential New Construction HVAC HVAC O&M Central AC Quality Install
Project Type Category Type Sub-type Program Name	New Construction HVAC HVAC O&M Central AC Quality Install
Category Type Sub-type Program Name	HVAC HVAC O&M Central AC Quality Install
Type Sub-type Program Name	HVAC O&M Central AC Quality Install
Sub-type Program Name	Central AC Quality Install
Program Name	•
÷	
Wicubule Mullie	CoolSmart AC QIV ES
Measure Description	The verification of proper charge and airflow during installation of new Central AC system.
	The baseline efficiency case is a cooling system with SEER = 14.5 and EER = 12 not installed according to
	manufacturer specifications.
Savings Principle	The high efficiency case is the same cooling system installed according to manufacturer specifications.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Completed QIV on new AC system
Savings Equation	Gross kWh = Tons × (kBtu/hr per ton) × 1/SEER × Hours_C × %SAVE Gross kW = Tons × (kBtu/hr per ton) × 1/EER × %SAVE Where:
	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER = Seasonal Energy Efficiency Ratio of existing equipment Hours_C = Deemed average equivalent full load cooling hours 5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working groups. EER = Peak efficiency of existing equipment
Hours	The equivalent full load cooling hours are 360 hours/year.
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
	#N/A
:1 8	45
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.15
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kw reduction source	Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/vr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
	#N/A
	0
	#N/A
	#N/A
	0
	#N/A
	#N/A #N/A
	0
	18
measure life source	18 GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.25
Spill-Over (participant)	0.16
Spill-Over (non-participant)	0.00
Net-to-Gross	0.91
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 175 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 175 per measure
	1 to her measure

TRL Reference Number	RI_0163
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	HVAC 0&M
Sub-type	Central AC Quality Install
Program Name	EnergyStar HVAC
Measure Name	CoolSmart AC QIV NES
Measure Description	The verification of proper charge and airflow during installation of new Central AC system.
Baseline Description	The baseline efficiency case is a cooling system with SEER = 14.5 and EER = 12 not installed according to manufacturer specifications.
Savings Principle	The high efficiency case is the same cooling system installed according to manufacturer specifications.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Completed QIV on new AC system
	Gross kWh = Tons × (kBtu/hr per ton) × 1/SEER × Hours_C × %SAVE Gross kW = Tons × (kBtu/hr per ton) × 1/EER × %SAVE Where:
Savings Equation	<ul> <li>3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation.</li> <li>Prepared for NSTAR, National Grid, Connecticut Light &amp; Power and United Illuminating.</li> <li>12 kBtu/hr per ton = Conversion factor</li> <li>SEER = Seasonal Energy Efficiency Ratio of existing equipment</li> <li>Hours_C = Deemed average equivalent full load cooling hours</li> <li>5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working groups.</li> <li>EER = Peak efficiency of existing equipment</li> </ul>
Hours	The equivalent full load cooling hours are 360 hours/year.
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	49.8
Kwiiyyi Savings	
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.164
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kw reduction source	Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
	1.00
In-service rate (ISR)	
In-service rate (ISR) In-service rate source	
In-service rate (ISR) In-service rate source	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CE winter neek source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.25
Spill-Over (participant)	0.16
Spill-Over (non-participant)	0.00
Net-to-Gross	0.91
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 642 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 150 per measure
	17 200 ber mennen

TRL Reference Number	RI_0098
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Cooling
Sub-type	Central AC
Program Name	EnergyStar HVAC
Measure Name	CoolSmart AC SEER 16.0 EER 13
Measure Description	The purchase and installation of high efficiency central air-conditioning (CAC) unit rather than a standard CAC system, and/or to replace an existing inefficient CAC system.
Baseline Description	The baseline efficiency case is a blend of code-compliant central air-conditioning system with SEER = 13 and EER = 11. For early replacement installations, the baseline is a 10-12 year old HVAC unit with SEER = 10 and EER = 8.5.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified Central AC system.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency central AC system for cooling.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) Where:
Savings Equation	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment. SEER_ee = Seasonal Energy Efficiency Ratio of new equipment. Hours_C = Deemed average equivalent full load cooling hours
Hours	The equivalent full load cooling hours are 360 hours/year.
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	198.8
kWh/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
kWh/yr savings note	#N/A
kW reduction	0.55
kW reduction source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	#N/A 0
measure life	16 The Codmus Crown (2012), 2012 Desidential Useting, Water Vieting, and Cooling Equipment Evaluation.
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
measure life source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
measure life source measure life note	Net-to-Gross, Market Effects, and Equipment Replacement Timing. #N/A
	Net-to-Gross, Market Effects, and Equipment Replacement Timing.

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Massachusetts Common Assumption
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Massachusetts Common Assumption
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Massachusetts Common Assumption
Coincidence factor (CF) summer peak	0.25
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF summer peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF winter peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.28
Spill-Over (non-participant)	0.00
Net-to-Gross	0.86
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 942 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 250 per measure

TRL Reference Number	RI_0421
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Cooling
Sub-type	Central AC
Program Name	EnergyStar HVAC
Measure Name	CoolSmart AC SEER 18.0 EER 13
Measure Description	The purchase and installation of high efficiency central air-conditioning (CAC) unit rather than a standard CAC system, and/or to replace an existing inefficient CAC system.
Baseline Description	The baseline efficiency case is a blend of code-compliant central air-conditioning system with SEER = 13 and EER = 11. For early replacement installations, the baseline is a 10-12 year old HVAC unit with SEER = 10 and EER = 8.5.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified Central AC system.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency central AC system for cooling.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) Where:
Savings Equation	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment. SEER_ee = Seasonal Energy Efficiency Ratio of new equipment. Hours_C = Deemed average equivalent full load cooling hours
Hours	The equivalent full load cooling hours are 360 hours/year.
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	276.8
kWh/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
kWh/yr savings note	#N/A
kW reduction	0.55
kW reduction source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
kW reduction note	
	#N/A
Gas Heat MMBtu/yr savings	#N/A 0
Gas Heat MMBtu/yr savings	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A 0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	0         The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.         Prepared for the Massachusetts Program Administrators.         #N/A         0         #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A 0 #N/A #N/A 0 0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A 0 #N/A 4 N/A 0 #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A 0 #N/A #N/A 0 #N/A #N/A #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A 0 #N/A 0 #N/A 0 #N/A 0 0 4 #N/A 0 0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A 0 #N/A 0 #N/A 0 #N/A 16
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0 The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators. #N/A 0 #N/A 0 #N/A 0 #N/A 0 0 4 #N/A 0 0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0         The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.         Prepared for the Massachusetts Program Administrators.         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         0         16         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	0         The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.         Prepared for the Massachusetts Program Administrators.         #N/A         0         #N/A         D         #N/A         N/A         #N/A         N/A         Index         Prepared for the Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:         Net-to-Gross, Market Effects, and Equipment Replacement Timing.

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Massachusetts Common Assumption
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Massachusetts Common Assumption
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Massachusetts Common Assumption
Coincidence factor (CF) summer peak	0.25
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF summer peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF winter peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.28
Spill-Over (non-participant)	0.00
Net-to-Gross	0.86
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 942 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI_0166
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	HVAC 0&M
Sub-type	Heat Pump Quality Install
Program Name	EnergyStar HVAC
Measure Name	CoolSmart HP QIV ES
Measure Description	The verification of proper charge and airflow during installation of new Heat Pump systems.
Baseline Description	The baseline efficiency case is a heating and cooling system with SEER = 14.5, EER = 12 and HSPF = 8.2) not installed according to manufacturer specifications.
Savings Principle	The high efficiency case is the same heating and cooling system not installed according to manufacturer specifications.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Completed QIV on new heat pump system
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER × Hours_C + 1/HSPF × Hours_H) × %SAVE Gross kW = Tons × (kBtu/hr per ton) × max[(1/EER),(1/HSPF)] × %SAVE Where:
Savings Equation	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER = Seasonal Energy Efficiency Ratio of existing equipment HSPF = Heating efficiency of existing equipment Hours_C = Deemed average equivalent full load cooling hours Hours_H = Deemed average equivalent full load heating hours 5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working
	groups. EER = Peak efficiency of existing equipment
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
	4N / A
Hours source note	#N/A
Hours source note kWh/yr Savings	308
kWh/yr Savings	308 ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kWh/yr Savings kWh/yr savings source	308 ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr Savings kWh/yr savings source kWh/yr savings note	308 ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. #N/A
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         #N/A
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A         0         #N/A
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A         0         #N/A         10         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A         0         #N/A         0
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.21         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         #N/A         #N/A         #N/A         #N/A
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings note Propane MMBtu/yr savings note Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         #N/A         0         #N/A         0         1         #N/A         0         1         B         0         1         #N/A         #N/A         #N/A         #N/A         #N/A         0         #N/A         B         GDS Associates, Inc. (200
kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings note Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings Propane MMBtu/yr savings note Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	308         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0.22         ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.         #N/A         0         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         #N/A         0         18         GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.26
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.25
Spill-Over (participant)	0.16
Spill-Over (non-participant)	0.00
Net-to-Gross	0.91
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 175 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 175 per measure

TRL Reference Number	RI 0167
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	HVAC Q&M
Sub-type	Heat Pump Quality Install
Program Name	EnergyStar HVAC
Measure Name	CoolSmart HP QIV NES
Measure Description	The verification of proper charge and airflow during installation of new Heat Pump systems.
	The baseline efficiency case is a heating and cooling system with SEER = 14.5, EER = 12 and HSPF = 8.2) not
Baseline Description	installed according to manufacturer specifications.
	The high efficiency case is the same heating and cooling system not installed according to manufacturer
Savings Principle	specifications.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Completed QIV on new heat pump system
Savings and	
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER × Hours_C + 1/HSPF × Hours_H) × %SAVE Gross kW = Tons × (kBtu/hr per ton) × max[(1/EER),(1/HSPF)] × %SAVE
	Where:
	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
Savings Equation	12 kBtu/hr per ton = Conversion factor
5	SEER = Seasonal Energy Efficiency Ratio of existing equipment
	HSPF = Heating efficiency of existing equipment
	Hours_C = Deemed average equivalent full load cooling hours
	Hours_H = Deemed average equivalent full load heating hours
	5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working
	groups.
	EER = Peak efficiency of existing equipment
Heure	Equivalent full lead have and 1200 have (your far heating and 200 have (your far applied
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
Hours course note	#N/A
Hours source note	308
kWh/yr Savings	
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.22
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Gas Heat MMBtu/yr savings note	#N/A
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	#N/A 0
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 #N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	0 #N/A #N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	0 #N/A #N/A 0
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	0 #N/A #N/A 0 #N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0 #N/A #N/A 0 #N/A #N/A #N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0 #N/A #N/A 0 #N/A #N/A 0 18
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0 #N/A #N/A 0 #N/A #N/A 0
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0         #N/A         #N/A         0         #N/A         #N/A         18         GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	0         #N/A         #N/A         0         #N/A         #N/A         18         GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.26
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.25
Spill-Over (participant)	0.16
Spill-Over (non-participant)	0.00
Net-to-Gross	0.91
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 175 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 175 per measure

TRL Reference Number	RI 0099
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Cooling
Sub-type	Central AC
Program Name	EnergyStar HVAC
Measure Name	CS AC SEER =>14.5, EER =>12, NEW Estar The purchase and installation of high efficiency central air-conditioning (CAC) unit rather than a standard
Measure Description	CAC system, and/or to replace an existing inefficient CAC system.
Baseline Description	The baseline efficiency case is a blend of code-compliant central air-conditioning system with SEER = 13 and EER = 11. For early replacement installations, the baseline is a 10-12 year old HVAC unit with SEER = 10 and EER = 8.5.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified Central AC system.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency central AC system for cooling.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) Where:
Savings Equation	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment. SEER_ee = Seasonal Energy Efficiency Ratio of new equipment. Hours_C = Deemed average equivalent full load cooling hours
Hours	The equivalent full load cooling hours are 360 hours/year.
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	145.6
kWh/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
kWh/yr savings note	#N/A
kW reduction	0.409
kW reduction source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
1:6	#N/A
measure life note	
In-service rate (ISR)	1.00

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF summer peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF winter peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.35
Spill-Over (participant)	0.28
Spill-Over (non-participant)	0.00
Net-to-Gross	0.93
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 200 per measure

TDL Deference Number	RI 0100
TRL Reference Number Fuel	RI_0100 Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Type	Cooling
Sub-type	Central AC
Program Name	EnergyStar HVAC
Measure Name	Down Size 1/2 ton
Measure Description	Reduction in system size consistent with manual J calculations.
Baseline Description	The baseline efficiency case is a system that is not sized in accordance with a manual J calculation.
Savings Principle	The high efficiency case is a system that is sized in accordance with a manual J calculation.
Energy Savings calculation method	Deemed
Savings unit	Completed job (assume downsize 1/2 ton).
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Caula as Equation	Where:
Savings Equation	
1	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	203
	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
kWh/yr savings source	HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
	Company and United Illuminating;
kWh/yr savings note	#N/A
kW reduction	0.3
kw reduction	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
kW reduction source	HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
kw reduction source	Company and United Illuminating;
kW reduction note	#N/A
	0
Gas Heat MMBtu/yr savings	
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Gas Heat MMBtu/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor source	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
	Jinges

RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 120 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 100 per measure

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TRL Reference Number	RI 0173
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Motors
Sub-type	ECM Motor
Program Name	EnergyStar HVAC
Measure Name	ECM Gas Rebate
Measure Description	Installation of high efficiency motors on residential furnace fans, including electronically commutated motors (ECMs) or steady state brushless furnace fan motors.
Baseline Description	The baseline efficiency case is the installation of a furnace with a standard efficiency steady state motor.
Savings Principle	The high efficiency case is the installation an electronically commutated motor or brushless fan motor on a residential furnace.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency furnace fan motor.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = $Qty \times deltakWh$
	$Gross kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
	168
kWh/yr Savings	
kWh/yr savings source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
	Program Administrators of Massachusetts.
kWh/yr savings note	#N/A
kW reduction	
kW reduction source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
	Program Administrators of Massachusetts.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	-0.72
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
	0
Energy Reference(s) & table(s) notes	
Energy Reference(s) & table(s) notes measure life	18
measure life measure life source	Sachs, Harvey (2003). Energy Savings from Efficient Furnace Air Handlers in Massachusetts.
measure life measure life source measure life note	Sachs, Harvey (2003). Energy Savings from Efficient Furnace Air Handlers in Massachusetts. #N/A
measure life measure life source	Sachs, Harvey (2003). Energy Savings from Efficient Furnace Air Handlers in Massachusetts.

All installations have 100% in-service rate since programs include verification of equipment installations.
1.00
ŧN/A
Savings persistence is assumed to be 100%.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
ŧN/A
Realization rate is 100% since gross savings values are based on evaluation results.
0.00
Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
Program Administrators of Massachusetts.
ŧN/Ă
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Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
Program Administrators of Massachusetts.
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TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
(Memorandum), August 2015
#N/A
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TRL Reference Number	RI 0423
Fuel	Electric
Sector	Residential
	New Construction
Project Type	
Category	HVAC
Туре	Heat Pumps
Sub-type	Ductless
Program Name	EnergyStar HVAC
Measure Name	MiniSplit HP SEER 20, HSPF 11
Measure Description	The installation of a more efficient ENERGY STAR <sup>®</sup> rated Ductless MiniSplit system.
Baseline Description	The baseline efficiency case is a non- ENERGY STAR <sup>®</sup> rated ductless mini split heat pump with SEER 14,
	EER 8.5 and HSPF 8.2.
Savings Principle	The high efficiency case is a high-efficiency Ductless Mini Split System.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency ductless minisplit system.
	Gross kWh = deltakWh_ASHP + deltakWh_DuctSealing
	Gross kW = deltakW_ASHP + deltakW_DuctSealing
	Where:
Savings Equation	
	deltakWh_ASHP = Gross annual energy savings from equivalent ASHP unit.
	deltakWh_DuctSealing = Gross annual energy savings from Duct Sealing.
	deltakW_ASHP = Gross demand savings from equivalent ASHP unit.
	deltakW_DuctSealing = Gross demand savings from Duct Sealing.
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	330
kWh/yr savings source	#N/A
kWh/yr savings note	Calculated. Tonnage used in calculations is 1.25, as provided by Conservation Services Group
kW reduction	0.454
kW reduction source	#N/A
kW reduction note	Calculated. Tonnage used in calculations is 1.25, as provided by Conservation Services Group
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	1.00
Realization rate energy (RRe)	
Realization rate energy (RRe) RRe source	#N/A
	<pre>#N/A Realization rate is 100% since gross savings values are based on evaluation results.</pre>
RRe source RRe note	
RRe source	Realization rate is 100% since gross savings values are based on evaluation results.

RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.50
CF winter peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.45
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.62
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 700 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI_0164
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	HVAC 0&M
Sub-type	Central AC Quality Install
Program Name	EnergyStar HVAC
Measure Name	Rightsizing on ES Tier 2 14.5 12
Measure Description	Documentation that system size is in compliance with manual J calculations.
Baseline Description	The baseline efficiency case is a system that is not sized in accordance with a manual J calculation.
Savings Principle	The high efficiency case is a system that is sized in accordance with a manual J calculation.
Energy Savings calculation method	Deemed
Savings unit	Completed job compliant with Manual J sizing
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	123
	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
WM/b /ur souings course	HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
kWh/yr savings source	
	Company and United Illuminating;
kWh/yr savings note	#N/A
kW reduction	0.15
kW reduction source	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
	Company and United Illuminating;
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	KEMA (2013). Project 25 Prescriptive Gas Program Final Evaluation Report. Prepared for Massachusetts Energy Efficiency Program Administrators; Page 1-5
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor note	•
Realization rate energy (RRe)	Savings persistence is assumed to be 100%.
	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.

1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
0.26
ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
#N/A
0.00
ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.15
0.00
0.00
0.85
RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
Company and United Illuminating;
#N/A
\$ 300 per measure
#N/A
#N/A
\$ 300 per measure

TRL Reference Number	RI_0165
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	HVAC O&M
Sub-type	Central AC Quality Install
Program Name	EnergyStar HVAC
Measure Name	Rightsizing Top Tier 15/12.5
Measure Description	Documentation that system size is in compliance with manual J calculations.
Baseline Description	The baseline efficiency case is a system that is not sized in accordance with a manual J calculation.
Savings Principle	The high efficiency case is a system that is sized in accordance with a manual J calculation.
Energy Savings calculation method	Deemed
Savings unit	Completed job compliant with Manual J sizing
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	123
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
kWh/yr savings source	HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
	Company and United Illuminating;
kWh/yr savings note	#N/A
kW reduction	0.15
kW reduction source	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light Company and United Illuminating;
kW reduction note	#N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	0 KEMA (2013). Project 25 Prescriptive Gas Program Final Evaluation Report. Prepared for Massachusetts Energy Efficiency Program Administrators; Page 1-5
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	5 #N/A
Oil MMBtu/yr savings source	#N/A #N/A
Propane MMBtu/yr savings	4N/A 0
Propane MMBtu/yr savings source	0 #N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0 18
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
	incultation rate is 100% since gross savings values are based on evaluation results.

r	
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
Net-to-Gross source	HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
	Company and United Illuminating;
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 175 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 175 per measure

TRL Reference Number	RI_0105
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Cooling
Sub-type	Room AC
Program Name	EnergyStar Products
Measure Name	Room AC (10.8)
Manaura Description	The installation of ENERGY STAR <sup>®</sup> qualified room air conditioners. ENERGY STAR <sup>®</sup> qualified air
Measure Description	conditioners are typically 10% more efficient than models meeting federal standards.
	The baseline efficiency case is a window AC unit that meets the minimum federal efficiency standard for
Baseline Description	efficiency which currently is EER 9.8.
	The high efficiency level is a room AC unit meeting or exceeding the federal efficiency standard by 10% or
Savings Principle	more. Average size is 10,000 Btu and average EERs is 10.8.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency room air-conditioner.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakWh / Hours
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Deemed average annual kWh reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	43
kWh/yr savings source	energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerRoomAC.xls.
kWh/yr savings note	#N/A
kW reduction	0.123
kw reddellon	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
WW reduction note	#N/A
kW reduction note	
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Room Air
measure life source	Conditioner.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	1.00
Realization rate energy (RRe)	Second Action Control of Control
RRe source	#N/A
	#N/A National Grid assumption based on regional PA working groups. 1.00

RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF winter peak source	Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.36
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.64
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 42 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 25 per measure

TRL Reference Number	RI 0171
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Motors
Sub-type	ECM Motor
Program Name	EnergyStar HVAC
Measure Name	Furnace ECM
	Installation of high efficiency motors on residential furnace fans, including electronically commutated
Measure Description	motors (ECMs) or steady state brushless furnace fan motors.
Baseline Description	The baseline efficiency case is the installation of a furnace with a standard efficiency steady state motor.
Savings Principle	The high efficiency case is the installation an electronically commutated motor or brushless fan motor on a residential furnace.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency furnace fan motor.
Savings and	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_sp_custom
	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	Gross Wiviblu_Propane - Qty × deitawiviblu_Propane
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	168
Kvvii/ yi Saviiigs	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
kWh/yr savings source	Program Administrators of Massachusetts.
kWh/yr savings note	#N/A
kW reduction	0.124 Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
kW reduction source	Program Administrators of Massachusetts.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
	7.22
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace.
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0 #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0 #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0 #N/A #N/A #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0 #N/A #N/A 0
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0 #N/A #N/A 0 18
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace. #N/A 0 #N/A #N/A 0 18 Sachs, Harvey (2003). Energy Savings from Efficient Furnace Air Handlers in Massachusetts.

nd Gas
nd Gas
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TDI Deference Number	DI 011C
TRL Reference Number	RI_0116
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heat Pumps
Sub-type	Air Source
Program Name	EnergyStar HVAC
Measure Name	Heat Pump SEER 16.0 EER 12 HSPF 8.5
Measure Description	The purchase and installation of high efficiency residential heat pump system rather than a standard
	HVAC system, or to replace an existing inefficient HVAC system.
Baseline Description	The baseline efficiency case is a residential heat pump with EER = 11.85, SEER = 14 and HSPF = 8.2. For early replacement installations, the baseline is a 10-12 year old HVAC unit with SEER = 10, EER = 8.5 and HSPF = 7.0.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified air-source heat pump.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiecny air-source heat pump system for heating.
	Instance ingri chicicity all'source near parity system for nearing.
	Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + (1/HSPF_base - 1/HSPF_ee) × Hours_H] Gross kW = Tons × (kBtu/hr per ton) × max[(1/SEER_base - 1/SEER_ee),(1/HSPF_base - 1/HSPF_ee)] Where:
Savings Equation	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment. SEER_ee = Seasonal Energy Efficiency Ratio of new equipment. Hours_C = Deemed average equivalent full load cooling hours HSPF_base = Heating efficiency of baseline equipment.
Hours	HSPF_ee = Heating efficiency of new equipment. Hours_H = Deemed average equivalent full load heating hours Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	450.3
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.31
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.

measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.23
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF summer peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.53
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF winter peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.35
Spill-Over (participant)	0.28
Spill-Over (non-participant)	0.00
Net-to-Gross	0.93
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 549 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 250 per measure
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TRL Reference Number	RI 0422
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Type	Heat Pumps
Sub-type	Air Source
Program Name	EnergyStar HVAC
Measure Name	Heat Pump SEER 18.0 HSPF 9.6
Measure Description	The purchase and installation of high efficiency residential heat pump system rather than a standard HVAC system, or to replace an existing inefficient HVAC system.
Baseline Description	The baseline efficiency case is a residential heat pump with EER = 11.85, SEER = 14 and HSPF = 8.2. For early replacement installations, the baseline is a 10-12 year old HVAC unit with SEER = 10, EER = 8.5 and HSPF = 7.0.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified air-source heat pump.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiecny air-source heat pump system for heating.
Savings Equation	Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + (1/HSPF_base - 1/HSPF_ee) × Hours_H] Gross kW = Tons × (kBtu/hr per ton) × max[(1/SEER_base - 1/SEER_ee),(1/HSPF_base - 1/HSPF_ee)] Where: 3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment. SEER_ee = Seasonal Energy Efficiency Ratio of new equipment. Hours_C = Deemed average equivalent full load cooling hours HSPF_base = Heating efficiency of baseline equipment. HSPF_ee = Heating efficiency of new equipment. Hours_H = Deemed average equivalent full load heating hours
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	1077.8
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.36
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.

measure internation in service rate (ISR) 1.00 In-service rate source #N/A Savings Persistence Factor (SP) 1.00 Savings Persistence Factor orbet Savings Persistence Factor orbet Realization rate is 100% since gross savings values are based on evaluation results. RR deman (RRd) summer peak Rd deman (RRd) winter peak Savings Peak source #N/A RRd winter peak source #N/A RRd winter peak source #N/A RRd winter peak source #N/A RRd winter peak source #N/A Cf summer peak note Cf summer peak note Cf winter peak source #N/A Cf summer peak source #N/A Cf summer peak source #N/A Cf summer peak note Cf winter peak note Cf winter peak note Cf winter peak note Cf winter peak source #N/A Cf summer peak source #N/A Cf summer peak source #N/A Cf summer peak source #N/A Cf summer peak note Cf winter peak note MI/A Concidence factor (Cf) winter peak 0.03 Cf winter peak source #N/A Cf summer peak source #N/A Cf summer peak source #N/A Concidence factor (Cf) winter peak 0.00 Cf winter peak source #N/A Cf summer peak source #N/A Cf source MI/A Concidence factor (Cf) winter peak 0.00 Cf winter peak source MI/A Cf savings source / description N/A Cf cost savings note MI/A Cf cost savings note MI/A Cf cost savings note MI/A Cf cos		
In service rate source         HV/A           In service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor source         HV/A           Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Relatation rate energy (RRP)         1.00           Re source         HV/A           Resource         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net to-Gross, Market Effects, and Equipment Replacement Timing.           CF winter peak note<	measure life note	#N/A
Inservice rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor (SPF)         1.00           Savings Persistence Factor source         MN/A           Realization rate energy (RRe)         1.00           Resource         EN/A           Restructe energy (RRe)         1.00           Resource         EN/A           Resource         EN/A           Restructer         Realization rate is 100% since gross savings values are based on evaluation results.           Rd emand (Rdd) summer peak         1.00           Rd summer peak source         EN/A           Rd dwinter peak source         EN/A           CG summer peak note         Expland Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.           CF summer peak note         EN/A           Coincidence factor (CF) winter peak         0.03           CF winter peak note         EN/A           CF winter peak note         EN/A           Maret Sa		
Savings Persistence Factor (SPF)         1.00           Savings Persistence Factor source         MN/A           Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate energy (RRe)         1.00           RRe note         RN/A           RRe note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) summer peak         1.00           Rd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           Rd winter peak source         MN/A           Rd dwinter peak source         MN/A           Rd dwinter peak source         MN/A           Rd dwinter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.23           CF summer peak note         Metto-Gross, Market Effects, and Equipment Replacement Timing.           CF summer peak note         MN/A           Rder source         NN/A           Coincidence factor (CF) winter peak         0.53           CF winter peak note         MN/A           Mater Savings allons/yr         0.00           Sever savings Source         MN/A	In-service rate source	#N/A
Savings Persistence Factor source         #N/A           Savings Persistence Factor note         Savings persistence factor note           Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate energy (RR)         1.00           RRe source         #N/A           RRe note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (Rd) summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (Rd) winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Rd winter peak source         #N/A           Rd winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.23           CF summer peak source         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:           CF winter peak note         #N/A           CG summer peak note         #N/A           Water Savings: galons/yr         0.00           Sever savings: Source         #N/A           Annual S savings source / description         #N/A           Annual S savings source / description         #N/A           Annual S savings source /	In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate energy (RRe)         1.00           Res source         #N/A           Rest note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (Rdd) summer peak         1.00           RR demand (Rdd) winter peak         0.0           Crisingter erak note         Realization rate is 100% since gross savings values are based on evaluation results.           Crisingter erak note         Realization rate is 100% since gross savings values are based on evaluation results.           Crisingter erak note         RN/A           Crisingter erak note         RN/A           Coincidence factor (CF) summer peak         0.53           CF winter peak note         HN/A           CF winter peak note         HN/A           Water / Sever savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Ann	Savings Persistence Factor (SPF)	1.00
Realization rate energy (RRe)         1.00           RRe source         MN/A           RRe note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           RR demand (RRd) winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           RR demand (RRd) winter peak         0.23           Coincidence factor (CF) summer peak         0.23           CF summer peak note         The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net.to-Gross, Market Effects, and Equipment Replacement Timing.           CF winter peak note         #N/A           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water / Sewer savings note         #N/A           Annual S savings source/ description         #N/A           Annual S savings note         #N/A<	Savings Persistence Factor source	#N/A
RHE source         #N/A           RR note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RRd winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.23           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.53           CF winter peak note         #N/A           Coincidence factor (CF) winter peak         0.53           CF winter peak note         #N/A           Water / Swer savings igalions/yr         0.00           Swere savings igalions/yr         0.00           Swere savings note         #N/A           Annual S savings source / description         #N/A           Annual S savings note         #N/A           Annual S savings note         #N/A           One time \$ savings note         #N/A           One time \$ savings note	Savings Persistence Factor note	Savings persistence is assumed to be 100%.
RRe note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) summer peak Note         NN/A           Rd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           RRd winter peak source         NN/A           RRd winter peak source         NN/A           RRd winter peak source         RN/A           Coincidence factor (CF) summer peak         0.23           Coincidence factor (CF) winter peak         0.23           CF summer peak note         RN/A           CF summer peak note         NN/A           CF summer peak note         Net-to-Gross, Market Effects, and Equipment Replacement Timing.           CF winter peak note         MN/A           CF winter peak note         MN/A           Water savings: gallons/yr         0.00           Sever savings gallons/yr         0.00           Water / Sever savings source         MN/A           Annual S savings note         MN/A           Annual S savings note         MN/A           Annual S savings source/description         MN/A           Annual S savings source/description         MN/A           Annual S savings note         MN/A	Realization rate energy (RRe)	1.00
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RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.23         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.53         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.53         CF winter peak note       #N/A         Sever savings: gallons/yr       0.00         Sever savings: sollons/yr       0.00         Water / Sever savings Source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Splil-Over (non-participant)       0.28         Splil-Over (non-participant)       0.28	RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
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RR demand (RRd) winter peak       1.00         RRd winter peak source       HN/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.23         CF summer peak source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         CF summer peak note       HN/A         Coincidence factor (CF) winter peak       0.53         CF winter peak source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         CF winter peak note       HN/A         Water savings: gallons/yr       0.00         Sewer savings: Source       HN/A         Mater / Sewer savings note       HN/A         Annual S savings note       HN/A         Annual S savings note       HN/A         One time S savings note       HN/A <td>RRd summer peak source</td> <td>#N/A</td>	RRd summer peak source	#N/A
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       D.23         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.53         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.53         CF winter peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water Savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Sever savings source       #N/A         Maxing Savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time \$ savings note       #N/A         Splil-Over (non-participant)       0.28	RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd winter peak note     Realization rate is 100% since gross savings values are based on evaluation results.       Coincidence factor (CF) summer peak     0.23       CF summer peak source     The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.       CF summer peak note     #N/A       Coincidence factor (CF) winter peak     0.53       CF winter peak note     #N/A       CF winter peak note     #N/A       Water savings; gallons/yr     0.00       Sewer savings: gallons/yr     0.00       Water savings; gallons/yr     0.00       Water / Sewer savings Source     #N/A       Annual \$ savings     0.00       One time \$ savings note     #N/A       Spill-Over (participant)     0.28       Spill-Over (participant)     0.28       Spill-	RR demand (RRd) winter peak	
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CF summer peak source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.53         CF winter peak source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (parcitipant)       0.28         Spill-Over (parcitipant)       0.28         Spill-Over (non-participant)       0.28         Spill-Over (non-participant)       0.20         Net-to-Gross source       Met-to-Gross, Market Effects, and Equipment Replacement Timing.	RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
CF summer peak source       Net-to-Gross, Market Effects, and Equipment Replacement Timing.         CF summer peak note       #W/A         Coincidence factor (CF) winter peak       0.53         CF winter peak source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         CF winter peak note       #W/A         Water savings: gallons/yr       0.00         Sewer savings: source       #N/A         Water / Sewer savings source       #N/A         Annual S savings note       #W/A         Annual S savings note       #N/A         One time § savings note       #N/A         One time § savings note       #N/A         One time § savings note       #N/A         Pre-er-Ridership       0.35         Spill-Over (participant)       0.28         Spill-Over (non-participant)       0.00         Net-to-Gross       0.93         Net-to-Gross source       #N/A         Re-e-Ridership       0.93         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1000 per measure         Gross Measure TRC unit       \$ 1000 per measure         Gross Measure TRC conte       #N/A	Coincidence factor (CF) summer peak	
Ret-Co-Gross, Market Effects, and Equipment Replacement Timing.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.53         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings source       #N/A         Water savings source       #N/A         Market Effects, and Equipment Replacement Timing.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings source       #N/A         Water / Sewer savings Source       #N/A         Manual S savings       0.00         Annual S savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)       0.28 </td <td></td> <td>The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:</td>		The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.53         CF winter peak source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.28         Spill-Over (non-participant)       0.28         Spill-Over (non-participant)       0.20         Net-to-Gross source       The Cadmus Group (20	CF summer peak source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
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One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.35Spill-Over (participant)0.28Spill-Over (non-participant)0.00Net-to-Gross0.93Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross Measure TRC unit\$ 1000 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A		
Free-Ridership0.35Spill-Over (participant)0.28Spill-Over (non-participant)0.00Net-to-Gross0.93Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross note#N/AGross Measure TRC unit\$ 1000 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A		#N/A
Free-Ridership0.35Spill-Over (participant)0.28Spill-Over (non-participant)0.00Net-to-Gross0.93Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross note#N/AGross Measure TRC unit\$ 1000 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings note	#N/A
Spill-Over (participant)       0.28         Spill-Over (non-participant)       0.00         Net-to-Gross       0.93         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross note         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1000 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A		
Spill-Over (non-participant)       0.00         Net-to-Gross       0.93         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1000 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A		
Net-to-Gross       0.93         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1000 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A		
Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.Net-to-Gross note#N/AGross Measure TRC unit\$ 1000 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A		
Net-to-Gross source     Net-to-Gross, Market Effects, and Equipment Replacement Timing.       Net-to-Gross note     #N/A       Gross Measure TRC unit     \$ 1000 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A		
Gross Measure TRC unit\$ 1000 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Net-to-Gross source	
Gross Measure TRC unit\$ 1000 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Net-to-Gross note	#N/A
Gross Measure TRC source #N/A Gross Measure TRC note #N/A		
Gross Measure TRC note #N/A		

TRL Reference Number	RI_0424
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	HVAC 0&M
Sub-type	Central AC Quality Install
Program Name	EnergyStar HVAC
Measure Name	Mini Split Heat Pump QIV
Measure Description	The verification of proper charge and airflow during installation of new Central AC system.
	The baseline efficiency case is a cooling system with SEER = 14.5 and EER = 12 not installed according to
Baseline Description	manufacturer specifications.
Savings Principle	The high efficiency case is the same cooling system installed according to manufacturer specifications.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Completed QIV on new AC system
	Gross kWh = Tons × (kBtu/hr per ton) × 1/SEER × Hours_C × %SAVE Gross kW = Tons × (kBtu/hr per ton) × 1/EER × %SAVE Where:
Savings Equation	<ul> <li>3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation.</li> <li>Prepared for NSTAR, National Grid, Connecticut Light &amp; Power and United Illuminating.</li> <li>12 kBtu/hr per ton = Conversion factor</li> <li>SEER = Seasonal Energy Efficiency Ratio of existing equipment</li> <li>Hours_C = Deemed average equivalent full load cooling hours</li> <li>5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working groups.</li> <li>EER = Peak efficiency of existing equipment</li> </ul>
Hours	The equivalent full load cooling hours are 360 hours/year.
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	51
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kWh/yr savings source	Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.082
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	0
measure life source	#N/A
measure life note	#N/A #N/A
In-service rate (ISR)	0.00
In-service rate source	#N/A
In-service rate note	#N/A
Savings Persistence Factor (SPF)	0.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A

Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.00
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 175 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 175 per measure

TRL Reference Number	RI_0121
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heat Pumps
Sub-type	Ductless
Program Name	EnergyStar HVAC
Measure Name	Mini Split HP SEER 18.0 HSPF 9
Measure Description	The installation of a more efficient ENERGY STAR® rated Ductless MiniSplit system.
	The baseline efficiency case is a non- ENERGY STAR® rated ductless mini split heat pump with SEER 14,
Baseline Description	EER 8.5 and HSPF 8.2.
Savings Principle	The high efficiency case is a high-efficiency Ductless Mini Split System.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency ductless minisplit system.
Savings and	Gross kWh = deltakWh_ASHP + deltakWh_DuctSealing
	Gross kW = deltakWASHP + deltakWDuctSealing
	Gross kw = deitakw_ASHP + deitakw_DuctSealing
	Where:
Savings Equation	
	deltakWh_ASHP = Gross annual energy savings from equivalent ASHP unit.
	deltakWh_DuctSealing = Gross annual energy savings from Duct Sealing.
	deltakW_ASHP = Gross demand savings from equivalent ASHP unit.
	deltakW_DuctSealing = Gross demand savings from Duct Sealing.
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	286
kWh/yr savings source	#N/A
kWh/yr savings note	Calculated. Tonnage used in calculations is 1.25, as provided by Conservation Services Group
kW reduction	
kW reduction source	#N/A
kW reduction note	Calculated. Tonnage used in calculations is 1.25, as provided by Conservation Services Group
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Source Development Factor (CDF)	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
	Savings persistence is assumed to be 100%.
Savings Persistence Factor note	
Savings Persistence Factor note Realization rate energy (RRe)	1.00
Realization rate energy (RRe)	1.00
Realization rate energy (RRe) RRe source	1.00 #N/A
Realization rate energy (RRe) RRe source RRe note	1.00 #N/A Realization rate is 100% since gross savings values are based on evaluation results.

RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.50
CF winter peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.45
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.62
Net to Case and	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 700 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 250 per measure

Fiel         Berric           Sector         Residential           Project Type         New Construction           Category         Lighting           Type         Interior           Sub-type         CFL Screw Base           Porgram Name         Residential New Construction           Measure Description         The installation of compact fluorescent bulbs.           Baseline Description         The installation of compact fluorescent bulbs.           Baseline Description         The baseline efficiency case is blend of incandescent, halogens, CFLs and other bulbs types, as provided the mask of the file increated or for the scenary bulbs.           Savings calculation method         Calculated sing deemed inputs           Savings calculation method         Calculated sing deemed inputs.           Savings calculation         Where:           Gross KW = Cty × deltakW         Hours           Advings because annual operating hours.         DeclakW = Decemed average flw reduction per unit.           Hours         News Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Savings source           Hours         News Market Research, RLW Analytics Spreadsheet, Three-Year Planning Version. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RL, and VT.           Hours source         #N/A         Gas Heat MMMRUyr savings source		
Sector         Residential           Depict Type         New Construction           Category         Lighting           Type         Interior           Stab-type         CTL Screw lass           Porgram Name         Residential New Construction           Measure Name         Residential New Construction           Measure Name         Residential New Construction           Measure Description         The installation of compact fluorescent bulbs.           Savings Principle         The baseline efficiency case is blend of incardescents, helogens, CFLs and other bulbs types, as provided           Savings Principle         The high efficiency case is an EKREY STAR* rated CFL spiral bulb.           Carery Savings calculation method         Calculated using decreed inputs.           Gross WM = QY & detataW + Hours         Gross WM = QY & detataW           Savings Equation         Where:         Dy = Total number of units.           DetataW = Decemed average amual operating phours.         Hours is a detata decement on units.           Hours         Decemed average amual operating phours.           Hours Source         Neury Market Research, RUM Analytics and GIS Associates (2009). Residential light and variad ware and amual operating phours.           Why rayings note         MNR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the MasAceust P	TRL Reference Number	RI_0196
Project Type         New Construction           Category         Lighting           Type         Interior           Sub type         CFL Scree Base           Program Name         Residential New Construction           Messare Description         The installation of compact fluorescent bulbs           Messare Description         The installation of compact fluorescent bulbs           Messare Description         The baseline efficiency case is an EVREY STAFF rated CFL spiral bulb.           Baseline Description         The bage efficiency case is an EVREY STAFF rated CFL spiral bulb.           Savings Strings calculation method         Calculated using deemed inputs           Savings sumt         Gross WM = Qty x dettaWW > Hours           Savings Equation         Where:           City = Total number of units.         DetataWW > Deemed average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.           Hours Source         Nexus Mirket Research, RLW Analytics and GDS Associates (2009), Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RJ, and VT.           Mours Source         MVA           MV/ry Savings         43.5           Wirly ravings note         MVA           WM/ry favings         0.35           MV/ry Savings         0.404     <		
Category         Lighting           Type         Interior           Sub-type         OFL Screw Base           Program Name         Residential New Construction           Measure Description         The installation of compact fluorescent bulbs.           Baseline Description         The installation of compact fluorescent bulbs and bulbs installed through a home energy audit, the base inners 5 avings participle           Savings Principle         The high efficiency case is bare to RERGY STAR® rated CFL spiral bulb.           Grangs Swings calculation method         Calculated stang deemed inputs           Savings unit         Residential stang deemed inputs           Savings Figuration         Where:           Qity = Total number of units.         DettakW           DettakW         DettakW           Savings Equation         Where:           Hours         DettakW         DettakW           Hours         DettakW and particip allows are 1,022 hoursylear for rebated lights and calculated by vendor for home audit applications.           Hours Source         News Market Research, RLW Analytics and GS Associates (2000), Residential Lightice Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours Source         MNA         MV/A           Wirhyr savings note         #N/A           Wirhyr avings note		
Type         Interior           Sol-type         CFL Screw Base           Program Name         Residential New Construction           Measure Name         CFL           Measure Name         CFL           Measure Name         CFL           Measure Description         The installation of compact fluorescent bulbs           Baseline Description         The installation of for EISA exempt bulbs and bulbs installed through a home energy audit, the base line is a 65 Watt incindescent.           Savings Anings Caculation method         Calculated using deemed inputs           Savings Laculation method         Calculated using deemed inputs           Savings Equation         Where:           City = Total number of units.         DetlockW = Deemed average annual operating hours.           Hours         DetlockW = Deemed average annual operating hours.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours Source note         #V/A           WM reduction source         MMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three Year Planning Version. Prepared for Warkdow and Buydown Program Sponsors in CT, MA, RI, and VT.           WW reduction source         MMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for	Project Type	
Sub-type         CFL Sorew Base           Program Name         Residential New Construction           Measure Description         The installation of compact fluorescent bulbs.           The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research of rc ESA exempt bulbs and bulbs installed through a home energy audit, the base line is a 65 with incandescent bulbs.           Savings Principle         The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.           Careys Swings calculation method         Calculated using deemed inputs           Savings unit         Rebeted lamp or fixture.           Gross KW = Qx y deltakW         Gross KW = Qx y deltakW           Savings Equation         Where:           Oty = Total number of units.         DeltakW = Deemed average XW reduction per unit.           Hours         The average annual operating hours.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours source         MNA Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           HW/ry sovings note         MNA Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.		
Program Name         Residential New Construction           Measure Name         CFL           Measure Description         The installation of compact fluorescent bulbs.           Baseline Description         The baseline efficiency case is blend of intrandescents, halogens, CFLs and other bulbs types, as provided by market research or for ISA exempt bulbs and bulbs installed through a home energy audit, the base line is a GS Watt incandescent.           Savings Principle         The high efficiency case is an EKERGY STAR* rated CFL spiral bulb.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fluture.           Gross KWH = Qty × deltakW × Hours Gross KWH = Qty × deltakW × Deemed average tW reduction per unit.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sportson in CT, MA, RJ, and VT.           Hours source onte         MI/A           Wirhlyr savings note         MI/A           Wirhlyr savings note         MI/A           Wirhlyr savings note         MI/A           Wirduction source         MMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Th	••	
Messure Name         CFL           Messure Description         The installation of compact fluorescent bulbs.           Baseline Description         The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EFA exempt bulbs and bulbs installed through a home energy audit, the base line is a 56 Watt incandescent.           Savings Principle         The high efficiency case is an ENERGY STAR® rated CFL spiral bulb.           Energy Savings calculation method         Calculated using desmed inputs           Savings unit         Rebated lamp or fixture.           Gross KW = Qry × deltakW         Gross KW = Qry × deltakW           Savings Equation         Where:           City = Total number of units.         DetaW = Deemed average annual operating hours.           Hours         The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor fo home audit applications.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RL, and VT.           Hours Source         MNA Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RL, and VT.           Hollyry savings source         MNA Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.	Sub-type	CFL Screw Base
Measure Description         The installation of compact fluorescent bulbs.           Baseline Description         The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for ESA exempt bulbs and bulbs installed through a home energy audit, the base line is a GS Wart Incandescent.           Savings Principle         The high efficiency case is an ENERGY STAR® rated CFL spiral bulb.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fisture.           Gross KWh = Qty × deltakW × Hours         Gross KWh = Qty × deltakW × Hours           Gross KWh = Qty × deltakW × Hours         Gross KWh = Qty × deltakW × Hours           Savings Equation         Qty = Total number of units.           DettakW = Deemed average AW reduction per unit.         Hours = Deemed average annual operating hours a: 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.           Hours         The average annual operating hours ar: 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.           Hours Source         INVA KWHAR Research, RLW Analytics and GOS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Whyry savings source         MN/A           Whyry rawings note         MN/A           Whyreduction onote         MN/A		Residential New Construction
The baseline efficiency case is blend of incandescents, halogens, CELs and other bulks types, as provided           Baseline Description         by market research of nEX Sexempt bulks and bulks installed through a home energy audit, the base line is a 65 Watt Incandescent.           Savings Principle         The high efficiency case is an EXERGY STAR* rated CFL spiral bulk.           Energy Savings calculation method         Calculated using deemed inputs           Savings principle         The high efficiency case is an EXERGY STAR* rated CFL spiral bulk.           Savings signal calculation method         Calculated using deemed inputs           Savings signal calculation method         Rebated Ism por fitture.           Gross KW = Qty × deltakW         Float and the Qty × deltakW × Hours           Savings Equation         Where:         Qty = Total number of units.           DetataW = Deemed average annual operating hours.         The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor fo home audit applications.           Hours         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours source         MVA         MVR Group (2012). Baseline Sensitivity Analysis Spreadsheet; Three-Year Planning Version. Prepared for the Massachuestts PAs.           WWr reduction note         MV/A         Gas Heat MMBtu/yr savings source           MW	Measure Name	
Baseline Description         by market research or for EISA exempt bulbs and bubs installed through a home energy audit, the base line is a 58 Watth incandescent.           Savings Principle         The high efficiency case is an ENERGY STAR* rated CFL spiral bulb.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or listure.           Gross KW = Qty × deltakW × Hours         Gross KW = Qty × deltakW × Hours           Savings Equation         Where:           Buttors = Deemed average KW reduction per unit.         Hours = Deemed average annual operating hours.           Hours = Deemed average annual operating hours.         DetakW = Deemed average annual operating hours.           Hours = Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours source note         MNA           KWh/ry ravings source         MNR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Masschusetts PAs.           KW reduction source         MN/A           KW reduction source         MN/A           Gas Heat MMBLityr savings 0         O           Gas Heat MMBLityr savings 0         O           Gas Heat MMBLityr savings 0         O           Gas Heat MMBLityr savings 0 <t< td=""><td>Measure Description</td><td></td></t<>	Measure Description	
line is a 65 Watt incandescent.           Swings Principle         The high efficiency case is an ENERGY STAR* rated CFL spiral bulb.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fixture.           Gross KW+ Clty × dettakW         Hours           Savings Equation         Where:           Object         Object           Savings Equation         Where:           Object         Object           Hours         DeteatWW           DeteatWW         Deemed average MV reduction per unit.           Hours         DeteatWW           Hours         The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor fo           Hours         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa           Hours source         MK/A           KWh/yr Savings         43.5           KWh/yr savings note         MNR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three Year Planning Version. Prepared for           KWr reduction note         MK/A           KWr reduction note         MK/A           KWr reduction note         MK/A           Gas Heat MMBIL/yr savings note         MK/A           KWr eduction note         MK/A </td <td></td> <td></td>		
Swings Principle         The high efficiency case is an ENERGY STAR* rated CFL spiral bulb.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fixture.           Gross KW = Qty × deltakW         Hours           Gross KW = Qty × deltakW         Gross KW = Qty × deltakW           Savings Equation         Where:           Qty = Total number of units.         DeflatAW = Deemed average annual operating hours.           Hours         Deemed average annual operating hours.           Hours         The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, Ri, and VT.           Hours source note         #N/A           WM/ryr savings note         MNR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.           WMryr savings note         #N/A           WW reduction source         MNR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.           WMryr savings note         #N/A           Gas Heat MMBLt/r savings source         #N/A           Gas Heat MMBLt/r savings s	Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fixture.           Gross KWh = Qty × deltakW × Hours         Gross KWh = Qty × deltakW × Hours           Savings Equation         Where:           Oty = Total number of units         DeltakW = Deemed average annual operating hours.           Hours         The average annual operating hours.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours Source note         #N/A           KWh/yr Savings Source         NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAS.           KWh/yr savings note         MN/A           KW reduction note         #N/A           KW reduction note         #N/A           KW reduction source         #N/A           KW reduction note         #N/A           Gas Heat MMBtu/yr savings note         #N/A           Gas Hourd MMBtu/yr savings note         #N/A           Gas Heat MMBtu/yr savings note <td< td=""><td></td><td>line is a 65 Watt incandescent.</td></td<>		line is a 65 Watt incandescent.
Savings unit         Rebated amp or fluture.           Gross WM = Qty × deltaWV > Hours         Gross WW = Qty × deltaWV           Savings Equation         Where:         Qty = Total number of units. DettaWV = Deemed average KW reduction per unit. Hours = Deemed average Nmual operating hours.           Hours         The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor fo home audit applications.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours Source         NNA           Hours Source         NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.           KWh/yr savings note         MNA           KWh/yr savings note         MNA           KW reduction oute         MNA           KW reduction note         MNA           KW reduction note         MNA           Gas Heat MMBtu/yr savings oute         MNA           Gas heat MMBtu/yr savings oute         MNA           Gas heat MMBtu/yr savings oute         MNA           Gil MMBtu/yr savings oute         MNA           Gas heat MMBtu/yr savings oute         MNA           Gil MMBtu/yr savings oute         MNA           Gil MMBt	Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
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Savings Equation       Gross KW = Qty × deltakW         Savings Equation       Where:         Qty = Total number of units.       DeltakW = Deemed average Mr reduction per unit.         Hours       The average annual operating hours.         Hours       The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor fon home audit applications.         Hours Source       Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impa Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         Hours source note       #N/A         KWh/Yr savings       43.5         Wh/Yr savings source       NMK Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAS.         KW reduction       0.044         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Ol IMMBtu/yr savings source       #N/A <td>Savings unit</td> <td>Rebated lamp or fixture.</td>	Savings unit	Rebated lamp or fixture.
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NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.           kW reduction note         #N/A           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         #N/A           Gai Matti MMBtu/yr savings source         #N/A           Oil MMBtu/yr savings source         #N/A           Oil MMBtu/yr savings note         #N/A           Propane Infle         5           measure life         5           measure life note         #N/A           In-service rate (ISR)         0.99           Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline           Study: Part II:         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett:           Joint Management         Committee.		
kW reduction source       the Massachusetts PAs.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett: Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor	w reddelion	
kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings ource       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett: Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Pers	kW reduction source	
Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings ource       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       0.99         In-service rate (ISR)       0.99         In-service rate source       Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor Source       #N/A	kW reduction note	
Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       M/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR* Homes: 2005 Baseline         Study: Part II:       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett:         Joint Management       Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared f		
Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett: Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline         Study: Part II:       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett:         Joint Management       Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline         Study: Part II:       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett:         Joint Management       Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR* Homes: 2005 Baseline         Study: Part II:       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett:         Joint Management       Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         In-service rate source       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett: Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         In-service rate source       Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline         Study: Part II:       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett:         Joint Management       Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         In-service rate source       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
measure life       5         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline         Study: Part II:         In-service rate source         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts         In-service rate note         In-service rate note         #N/A         Savings Persistence Factor (SPF)         Savings Persistence Factor source		
measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         In-service rate source       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
measure life note       #N/A         In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         In-service rate source       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett: Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
In-service rate (ISR)       0.99         Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II:         In-service rate source       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett: Joint Management Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline         Study: Part II:         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts         Joint Management         Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
In-service rate source       Study: Part II:         Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts         Joint Management         Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A	In-service rate (ISR)	
In-service rate source       Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusett:         Joint Management       Committee.         In-service rate note       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A		
Joint Management Committee. In-service rate note #N/A Savings Persistence Factor (SPF) 1.00 Savings Persistence Factor source #N/A		Study: Part II:
Committee.       In-service rate note     #N/A       Savings Persistence Factor (SPF)     1.00       Savings Persistence Factor source     #N/A	In-service rate source	Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts
In-service rate note#N/ASavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/A		Joint Management
Savings Persistence Factor (SPF)     1.00       Savings Persistence Factor source     #N/A		Committee.
Savings Persistence Factor source #N/A	In-service rate note	#N/A
Savings Persistence Factor source #N/A	Savings Persistence Factor (SPF)	1.00
		#N/A
	Savings Persistence Factor note	

Realization rate energy (RRe)	1.00
	#N/A
RRe source	·
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
CF summer peak source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT. The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for t
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
CF winter peak source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT. The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for t
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.23
Spill-Over (participant)	0.10
Spill-Over (non-participant)	0.00
Net-to-Gross	0.87
Net-to-Gross source	NMR Group (2012). Rhode Island 2011 Basline Study of Single-Family Residential New Construction. Prepared for national Grid.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 5 Per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 5 Per bulb

TRL Reference Number	RI_0191
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Lighting
Туре	Interior
Sub-type	CFL Fixture
Program Name	Residential New Construction
Measure Name	ESH Fixtures
Measure Description	The installation of ENERGY STAR <sup>®</sup> compact fluorescent (CFL) indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.
Baseline Description	The baseline efficiency case is a blend of incandescent, compact fluorescent, and halgoen lamps. For home audit applications, the baseline is the existing fixture.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
Savings Equation	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW Where: Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 912.5 hours/year or calculated for home audit applications.
Hours Source	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	71.1
kWh/yr savings source	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont Public Service Department for Efficiency Vermont, N
kWh/yr savings note	#N/A
kW reduction	0.072
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.95

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR® Homes: 2005 Baseline Study: Part II: Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts Joint Management Committee.
Savings Persistence Factor note	#N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
CF winter peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.08
Spill-Over (participant)	0.04
Spill-Over (non-participant)	0.00
Net-to-Gross	0.96
Net-to-Gross source	NMR Group (2012). Rhode Island 2011 Basline Study of Single-Family Residential New Construction. Prepared for national Grid.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 8 Per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

TRL Reference Number	RI 0223
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category Type	Lighting Interior
Sub-type	LED Screw Base
Program Name	Residential New Construction
Measure Name	LEDs
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	33
kWh/yr savings source	NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for the Massachusetts PAs.
kWh/yr savings note	#N/A
kW reduction	0.052
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
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Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
confedence factor (CF) winter peak	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	
CE winter nack nate	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.08
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.92
	NMR Group (2012). Rhode Island 2011 Basline Study of Single-Family Residential New Construction.
Net-to-Gross source	Prepared for national Grid.
Net-to-Gross note	#N/A
Gross Measure TRC unit	
ULUSS MEDSULE INC UTIL	\$ 14 Per bulb
Gross Measure TRC source	
	\$ 14 Per bulb #N/A #N/A

RI_0236         Electric         Residential         New Construction
Plug Load
Electronics
Computer
EnergyStar Products
Computers
Rebates for ENERGY STAR <sup>®</sup> computers.
The baseline efficiency case is a conventional computer.
The high efficiency case is a subset of computers that are ENERGY STAR® rated or are included in the Top
Ten USA ranking.
Deemed
Rebated ENERGY STAR <sup>®</sup> computer
Gross kWh = Qty × deltakWh Gross kW = Qty × deltakW
Where:
Qty = Total number of units.
Delta kWh = Deemed average annual kWh reduction per unit.
Delta kW = Deemed average kW reduction per unit.
The operational hours include: 3504 annual idle hours, 438 annual sleep hours, and 4818 annual off hours.
Energy Star Program Requirements for Computers Version 5.0
#N/A
70
Environmental Protection Agency (2012). ENERGY STAR Desktop & Integrated Computer Product List.
August 2, 2012. Average of all units in cateogry
#N/A 0.015
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators. #N/A
0
Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
#N/A
0
#N/A
0
#N/A
#N/A
0
4
Environmental Protection Agency (2010). Life Cycle Cost Estimate for ENERGY STAR Office Equipment.
#N/A
1.00
#N/A
In-service rates are set to 100% based on the assumption that all purchased units are installed.
1.00
#N/A
Savings persistence is assumed to be 100%.
1.00
I#N/A
#N/A National Grid assumption based on regional PA working groups.

RRd summer peak note         National Grid assumption based on regional PA working groups.           RR demard (RRd) winter peak         1.00           RRd winter peak note         NAtional Grid assumption based on regional PA working groups.           Coincidence factor (CF) summer peak         0.73           The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.           2F summer peak note         MN/A           Coincidence factor (CF) winter peak         1.00           CF winter peak source         The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.           CF winter peak source         HN/A           Administrators.         Administrators.           CF winter peak note         HN/A           Administrators.         Administrators.           CF winter peak note         HN/A           Admer savings: gallons/yr         0.00           Vater / Sever savings: Source         HN/A           Nater / Sever savings source         HN/A           Annual \$ savings         0.00           Annual \$ savings note         HN/A           Annual \$ savings note         HN/A           Annual \$ savings note         HN/A           Dre time \$ savings note         HN/A           Dre time \$ s		
RR demand (RRd) winter peak       1.00         RR winter peak source       #N/A         RR winter peak source       #N/A         Rd winter peak source       NA         Scincidence factor (CF) summer peak       0.73         Cr summer peak source       Administrators.         F summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         Cr summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       #N/A         Administrators.       Administrators.         F winter peak note       #N/A         Nater savings: gallons/yr       0.00         ewer savings: source       #N/A         Nater / Sewer savings note       #N/A         Annual S savings note       #N/A         Annual S savings source / description       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         MA       Administratore         Pill-Over (non-participant)       0.00         Opol       Consistent	RRd summer peak source	#N/A
RRd winter peak source       #N/A         National Grid assumption based on regional PA working groups.       O/3         Coincidence factor (CF) summer peak       0.73         CF summer peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         MA       0.00         Sewer savings: gallons/yr       0.00         Nater / Sewer savings Source       #N/A         Annual \$ savings       0.00         Det time \$ savings       0.00         Nater / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Det time \$ savings note       #N/A         Secore \$ savings note       #	RRd summer peak note	
RRd winter peak note       National Grid assumption based on regional PA working groups.         Colincidence factor (CF) summer peak       0.73         CF summer peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Colincidence factor (CF) winter peak       1.00         CF winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Vater savings: gallons/yr       0.00         Nater / Sewer savings Source       #N/A         Annual § savings note       #N/A         Annual § savings note       #N/A         Annual § savings note       #N/A         One time § savings note       #N/A         Done time § savings note       #N/A         Done time § savings note       #N/A         Done time § savings note       #N/A         Prese-Ridership       0.25         SignII-Over (non-participant)       0.00         Over (non-participant)       0.00         Vert-to-Gross note       #N/A         Stets offorss source       #N/A         Stets offorss source	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.73         CF summer peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program         Administrators.       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       #N/A         Vater savings: gallons/yr       0.00         Outor Vater / Sewer savings source       #N/A         Annual \$ savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A <td>RRd winter peak source</td> <td>#N/A</td>	RRd winter peak source	#N/A
F summer peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         2F summer peak note       #N/A         2.F summer peak note       #N/A         1.00       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         2F winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         2F winter peak note       #N/A         Water savings: gallons/yr       0.00         Vater savings: gallons/yr       0.00         Vater / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Dre time \$ savings source/description       #N/A         Pree-Ridership       0.25         Opel time \$ savings note       #N/A         Pree-Ridership       0.00         One time \$ savings note       #N/A         Pree-Ridership       0.25         Opel time \$ savings note       #N/A         Pree-Ridership       0.00         One time \$ savings source/description       #N/A         Start fore forsos </td <td>RRd winter peak note</td> <td>National Grid assumption based on regional PA working groups.</td>	RRd winter peak note	National Grid assumption based on regional PA working groups.
-F summer peak source       Administrators.         2F summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         2F winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         2F winter peak note       #N/A         Vater savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Vater / Sewer savings Source       #N/A         Vater / Sewer savings source       #N/A         Annual \$ savings note       #N/A         One time \$ savings source/description       #N/A         Due time \$ savings note       #N/A         Due time \$	Coincidence factor (CF) summer peak	0.73
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Spill-Over (non-participant)       0.00         Net-to-Gross       0.75         Net-to-Gross source       #N/A         Net-to-Gross note       Consistent with MA TRM         Gross Measure TRC unit       \$ 20 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Free-Ridership	0.25
Net-to-Gross       0.75         Net-to-Gross source       #N/A         Net-to-Gross note       Consistent with MA TRM         Gross Measure TRC unit       \$ 20 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.00
Net-to-Gross source       #N/A         Net-to-Gross note       Consistent with MA TRM         Gross Measure TRC unit       \$ 20 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Vet-to-Gross note       Consistent with MA TRM         Gross Measure TRC unit       \$ 20 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Net-to-Gross	0.75
Gross Measure TRC unit       \$ 20 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Net-to-Gross source	#N/A
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC note #N/A	Gross Measure TRC unit	\$ 20 per measure
	Gross Measure TRC source	#N/A
ncentive Unit \$ 10 per measure	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 10 per measure

TRL Reference Number	RI_0238
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Plug Load
Туре	Electronics
Sub-type	Monitor
Program Name	EnergyStar Products
Measure Name	Monitors
Measure Description	Rebates for ENERGY STAR <sup>®</sup> qualified computer monitors.
Baseline Description	The baseline efficiency case is a conventional computer monitor.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated LCD monitor.
Energy Savings calculation method	Deemed
Savings unit	Rebated ENERGY STAR <sup>®</sup> computer monitor
	Gross kWh = Qty × deltakWh
	Gross $kW = Qty \times deltakW$
Savings Equation	Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A #N/A
	#N/A 35
kWh/yr Savings	35
kWh/yr savings source	Consortium for Energy Efficiency (2008). Consumer Electronics Program Guide: Information on Voluntary Approaches for the Promotion of Energy Efficient Consumer Electronics - Products and Practices.
kWh/yr savings note	#N/A
kW reduction	0.01
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	Consortium for Energy Efficiency (2008). Consumer Electronics Program Guide: Information on Voluntary Approaches for the Promotion of Energy Efficient Consumer Electronics - Products and Practices.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
	#N/A
RRd summer peak source	#IV/A

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RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	0.35
CF summer peak source	#N/A
CF summer peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	National Grid assumption based on regional PA working groups.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.25
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.75
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 20 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 20 per measure

TRL Reference Number	RI 0242
Fuel	Electric
Sector	Residential
Project Type	New Construction
	Plug Load
Category Type	Room Air Cleaners
••	Room Air Cleaner
Sub-type	
Program Name	EnergyStar Products
Measure Name	Room air cleaners Rebates provided for the purchase of an ENERGY STAR <sup>®</sup> qualified room air cleaner. ENERGY STAR <sup>®</sup> air
Measure Description	cleaners are 40% more energy-efficient than standard models.
Baseline Description	The baseline efficiency case is a conventional unit with clean air delivery rate (CADR) of 51-100.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified air cleaner with a CADR of 51-100.
Energy Savings calculation method	Deemed
Savings unit	Rebated ENERGY STAR <sup>®</sup> room air cleaner
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakWh / Hours
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Deemed average annual kWh reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	The Savings are based on 16 operating hours per day, 365 days per year
Hours Source	Environmental Protection Agency (2012), Savings Calculator for Energy Star Qualified Appliances
Hours source note	#N/A
kWh/yr Savings	391
kWh/yr savings source	Environmental Protection Agency (2012), Savings Calculator for Energy Star Qualified Appliances.
kWh/yr savings note	#N/A
kW reduction	0.084
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	Environmental Protection Agency (2012), Savings Calculator for Energy Star Qualified Appliances.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor (SPF) Savings Persistence Factor source	
Savings Persistence Factor source	#N/A
Savings Persistence Factor source Savings Persistence Factor note	#N/A Savings persistence is assumed to be 100%.
Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe)	#N/A Savings persistence is assumed to be 100%. 1.00
Savings Persistence Factor source Savings Persistence Factor note	#N/A Savings persistence is assumed to be 100%.

RRd summer peak note         MNA           RRd summer peak note         National Grid assumption based on regional PA working groups.           RRd winter peak note         MNA           RRd winter peak note         National Grid assumption based on regional PA working groups.           Coincidence factor (CF) summer peak         0.73           Coincidence factor (CF) summer peak         0.73           Cr summer peak note         MN/A           Coincidence factor (CF) winter peak         1.00           Cr summer peak note         MN/A           Coincidence factor (CF) winter peak         1.00           Cr summer peak note         MN/A           Coincidence factor (CF) winter peak         1.00           Cr winter peak note         MN/A           Cr winter peak note         MN/A           Water savings igallons/vr         0.00           Sever savings igallons/vr         0.00           Water / Sever savings Source         MN/A           Annual \$ savings         0.00           Annual \$ savings         0.00           Annual \$ savings         0.00           Annual \$ savings         0.00           Annual \$ savings note         MN/A           Annual \$ savings note         MN/A           One time \$ savings n		
RR demand (RRd) winter peak       1.00         RRd winter peak source       #W/A         RRd winter peak note       National Grid assumption based on regional PA working groups.         Coincidence factor (CF) summer peak       0.73         CF summer peak note       #W/A         Cf summer peak note       #W/A         Coincidence factor (CF) winter peak       1.00         Coincidence factor (CF) winter peak       1.00         Cr winter peak note       #W/A         Coincidence factor (CF) winter peak       1.00         Cr winter peak note       #W/A         Cdincidence factor (CF) winter peak       1.00         Cr winter peak note       #W/A         Quinter peak note       #W/A         Water savings: gallons/yr       0.00         Sever savings: source       #W/A         Water / Sewer savings note       #W/A         Annual S savings       0.00         Annual S savings note       #W/A         One time \$ savings note       #W/A	RRd summer peak source	#N/A
RRd winter peak note       #N/A         RRd winter peak note       National Grid assumption based on regional PA working groups.         Coincidence factor (CF) summer peak       0.73         CF summer peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         Annual \$ savings note       #N/A         MAL       Annual \$ savings         O.00       Annual \$ savings         One time \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A	RRd summer peak note	National Grid assumption based on regional PA working groups.
RRd winter peak note       National Grid assumption based on regional PA working groups.         Coincidence factor (CF) summer peak       0.73         The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: source       #N/A         Water / Sewer savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time § savings note       #N/A         One time § savings note       #N/A         Pre-Ridership       0.25         Spill-Over (non-participant)       0.00         Net-to-Gross source       #N/A         Met-to-Gross source       #N/A         Model-toros source       #N/A         Pre-Ridership       0.25         Spill-Over (non-participant)       0.00         Net-to-Gross source       #N/A         Pre-Ridership       0.25         Spill-Over (non-participan	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.73       0.73         C F summer peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program         Administrators.       #W/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program         Administrators.       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program         Administrators.       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program         Administrators.       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program         Water savings: gallons/yr       0.00         Water / Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         More \$ savings note       #N/A         More \$ savings note       #N/A         More \$ savings note       #N/A         Pree-Ridership       0.25         Spill-Over (participant)       0.00         Spill-Over (participant)<	RRd winter peak source	#N/A
CF summer peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water savings: gallons/yr       0.00         Water savings: gallons/yr       0.00         Marter Savings       0.00         Sewer savings: gallons/yr       0.00         Mater / Sewer savings Source       #N/A         Mater / Sewer savings       0.00         Annual S savings source / description       #N/A         Annual S savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)       0.00         One time \$ savings note       #N/A         Free-Ridership       0.25         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00	RRd winter peak note	National Grid assumption based on regional PA working groups.
CF summer peak source     Administrators.       CF summer peak note     #N/A       Coincidence factor (CF) winter peak     1.00       CF winter peak source     The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.       CF winter peak note     #N/A       Water savings: gallons/yr     0.00       Sewer savings: gallons/yr     0.00       Water / Sewer savings source     #N/A       Mater / Sewer savings note     #N/A       Annual Ş savings note     #N/A       One time Ş savings source/description     #N/A       One time Ş savings note     #N/A       One time Ş savings source/description     #N/A       Pree-Ridership     0.25       Spill-Over (non-participant)     0.00       Net-to-Gross source     #N/A       Rorss Measure TRC unit     \$ 72 per measure       Gross Measure TRC note     #N/A	Coincidence factor (CF) summer peak	0.73
Administrators.       CF summer peak note     #N/A       Coincidence factor (CF) winter peak     1.00       CF winter peak source     The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.       CF winter peak note     #N/A       Water savings: gallons/yr     0.00       Sewer savings: source     #N/A       Water savings source     #N/A       Water savings source     #N/A       Annual S savings     0.00       Annual S savings source / description     #N/A       Annual S savings note     #N/A       Annual S savings note     #N/A       One time \$ savings note     #N/A       One time \$ savings note     #N/A       One time \$ savings note     #N/A       Spill-Over (participant)     0.00       Spill-Over (participant)     0.00       Spill-Over (non-participant)     0.00       Spill-Over (non-participant)     0.00       Spill-Over (non-participant)     0.00       Spill-Over (non-participant)     0.00       Net-to-Gross note     The Net-to-Gross ratio is Assumed to be 100%.       Gross Measure TRC oute     \$ 72 per measure       Gross Measure TRC note     #N/A		The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
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CF winter peak source       The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         WAter / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (partic	CF summer peak note	#N/A
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Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.25Spill-Over (participant)0.00Spill-Over (participant)0.00Net-to-Gross0.75Net-to-Gross note#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 72 per measureGross Measure TRC note#N/A	Sewer savings: gallons/yr	0.00
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Spill-Over (non-participant)0.00Net-to-Gross0.75Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 72 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Free-Ridership	0.25
Net-to-Gross       0.75         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 72 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.00
Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 72 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Spill-Over (non-participant)	0.00
Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 72 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Net-to-Gross	0.75
Gross Measure TRC unit       \$ 72 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Net-to-Gross source	#N/A
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC note #N/A	Gross Measure TRC unit	\$ 72 per measure
	Gross Measure TRC source	#N/A
Incentive Unit \$40 per measure	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 40 per measure

TRL Reference Number	RI_0336
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Heat Pump Water Heater
Program Name	EnergyStar HVAC
Measure Name	HPWH 50 gallon (electric)
Measure Description	Installation of a heat pump water heater (HPWH) instead of an electric resistance water heater.
Baseline Description	The baseline efficiency case is a new, standard efficiency electric resistance hot water heater.
Savings Principle	The high efficiency case is a high efficiency heat pump water heater.
Energy Savings calculation method	Deemed
Savings unit	Installed heat pump water heater.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1654
	Steven Winter Associates, Inc (2012). Heat Pump Water Heaters Evaluation of Field Installed Performance.
kWh/yr savings source	Sponsored by National Grid and NSTAR.
kWh/yr savings note	#N/A
kW reduction	0.37
kW reduction source	Steven Winter Associates, Inc (2012). Heat Pump Water Heaters Evaluation of Field Installed Performance. Sponsored by National Grid and NSTAR.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat Williblu/ yr savirigs	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Gas Heat MMBtu/yr savings source	Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	#N/A
measure life note	Based on warranty of equipment
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
. ·	

RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.47
CF summer peak source	Steven Winter Associates, Inc (2012). Heat Pump Water Heaters Evaluation of Field Installed Performance.
	Sponsored by National Grid and NSTAR.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Steven Winter Associates, Inc (2012). Heat Pump Water Heaters Evaluation of Field Installed Performance. Sponsored by National Grid and NSTAR.
CE winter neek nete	#N/A
CF winter peak note	
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 750 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

Fuel         Electric           Sector         Residential           Sector         New Construction           Category         Water Heating           Type         Water Heating           Water Heating         Sub-type           Program Name         Residential New Construction           Measure Name         Renovation Rehab Domestic Hot Water           Measure Description         Renovation Rehab projects include the installation of roof, wall, and basement insulation           Baseline Description         Renovation Rehab projects include the installation of roof, wall, and basement insulation           Savings Principle         The efficient case is the post-retrofit performance of a house participating the program           Energy Savings calculation method         Calculated using site-specific inputs           Savings Unit         Gross Whr = deltakW_yp_custom           Gross Whr = deltakW_yp_custom         Gross Whr = deltakW_WSP_custom           Hours         N/A           Hours Source         MNA           Whyfyr Savings         Calc           Whyfyr savings         Calc           Whyfyr savings note         Supplied by vendor           Wr reduction source         MNA           Whyfyr savings note         Supplied by vendor           Wr reduction note		
Sector         Residential           Project Type         New Construction           Category         Water Heating           Type         Water Heating           Sub-type         Insulation           Program Name         Residential New Construction           Measure Description         Resolution Rehab Donactic Heb Water           Measure Description         Resolution Rehab projects include the installation of roof, wall, and basement insulation           Saming Findple         The efficient case is the post retrofit performance of a house participating the program           Saming Sintigie         Constatuter dams are specific inputs.           Savings fiquation         Grass Win + effectWM, custom           Grass Win + effectWM, custom         Grass Win + effectWM, custom           Grass Win + effectWM, custom         Grass Wint + effectWM, custom           Grass Wint + effectWM, custom         Grass Wint + effectWM, custom           Grass Wint + Wint + effectWM, custom         Grass Wint + effectWM, custom           Grass Wint + Wint + effectWM, custom         Grass Wint + effectWM, custom           Grass Wint + Wint + effectWM, custom         Grass Wint + effectWM, custom           Mours Survice         #N/A           Wintyr Swings source         #N/A           Wintyre swings source         #N/A	TRL Reference Number	RI_0347
Project Type         New Construction           Creagency         Water Heating           Type         Water Heating           Type         Mater Heating           Storagen Name         Residential New Construction           Measure Description         Resolution Rehab Directs: Hot Water           Measure Description         Resolution Rehab Directs: Hot Water           Measure Description         The baseline case is the performance of the house before participation in the program           Swings Principle         Calculated using alte-specific inputs           Swings Studie         Cancel alter Using Starbace           Swings Studie         Gross Summer KW = dettakWA, putsor           Swings Equation         Gross Summer KW = dettakWA, putsor           Gross Summer KW = dettakWA, putsor         Starbace           Nours         N/A           Hours Source         MN/A           Hours Source         MN/A           Wirdsriction source         MN/A	Fuel	Electric
Category         Water Heating           Type         Water Heating Insulation           Sub-type         Insulation           Program Name         Residential New Construction           Messure Description         Renovation Rehab Demostic Hot Water           Messure Description         The definition of the house before participation in the program           Savings Encyption         The definition Case is the post-treatfoll performance of a house participating the program           Savings Equation         Carlotabet using site specific inputs           Savings Equation         Carlotabet using site specific inputs           Savings Equation         Gross Water V = deltaWL_gu_c sustom           Gross Water V = deltaWL_gu_c sustom         Gross Water V = deltaWL_gu_c sustom           Hours Source         N/A           Hours Source note         N/A           Warder Kater W = deltaMMBu_Cas_custom         Messare Description           Warduction note         Supplied by vendor           Warduction note         Supplied by vendor           Savings Source         N/A           Warduction note         Supplied by vendor           Savings Norging         O           Gas Heat MMBu/y ravings note         N/A           Mitry ravings source         N/A           Warduction not	Sector	Residential
Type         Water Heater Insulation           Sky type         Insulation           Program Name         Residential New Construction           Measure Name         Renovation Rehab Domestic for Water           Measure Name         Renovation Rehab Domestic For Water           Measure Name         Renovation Rehab Domestic For Water           Savings Principle         The efficient case is the post-retrofit performance of a house participation in the program           Savings Vinigs Calculation method         Calculated using site-specific inputs           Savings Vinigs Calculation         Candetx Renovation Rehab project           Gross Summer W = deftakWspcustom         Gross Summer W = deftakWspcustom           Gross Summer W = deftakWspcustom         Gross Summer M = deftakMspcustom           Hours Source         MVA           Hours Source         MVA           Windy Savings source         MVA           Windy Savings source         MVA           Savings source         MVA           Gas Heat MMBitu/yr savings source         MVA	Project Type	New Construction
Sub type         Insulation           Program Name         Residential New Construction           Program Name         Residential New Construction           Measure Name         Renovation Rehab Domestic Hot Water           Measure Description         The baseline case is the performance of the house before participation in the program           Savings Principle         The efficient case is the porformance of a house participating the program           Energy Savings calculation method         Calculated using site specific inputs           Savings Figuration         Consplict Renovation Rehab project           Savings Summer KW = deltaXW, pop. custom         Gross With Fork W = deltaXW, pop. custom           Gross With Fork W = deltaXW, pop. custom         Gross With Fork W = deltaXW, pop. custom           Gross With Fork W = deltaXW, pop. custom         Gross With Fork Medita           Mours Source         MN/A           Mours Source         MN/A           Withyr savings note         Supplied by vendor           Wr reduction ource         MN/A           Wreduction source         MN/A           Wreduction source         MN/A           Wreduction source         MN/A           Wreduction source         MN/A           Mith Withyr savings note         MN/A           O         Gradmards on HEHE	Category	Water Heating
Program Name Residential New Construction Measure Name Benovation Rehab Domestic Hot Water Measure Name Benovation Rehab Domestic Hot Water Measure Description The baseline case is the performance of the house before participation in the program Savings Principal The deficient case is the performance of a house participating the program Gasongs Principal Calculated using site-specific inputs of the outse before participating the program Gasongs Principal Calculated using site-specific inputs of Gasongs Principal Calculated using site-specific inputs of Gasongs Principal Gasongs Pri	Туре	Water Heater Insulation
Messure Name         Renovation Rehab Domestic Not Water           Messure Description         Renovation Rehab projects include the installation of roof, wall, and basement insulation           Baseline Description         The baseline case is the performance of the house participating the program           Baseline Description         The baseline case is the performance of a house participating the program           Baseline Description         Calculated using state-specific inputs           Swings Function         Calculated using state-specific inputs           Swings Sungs Equation         Gross WIMB true deltaWL, Suctom           Gross WIMB true deltaWL, Oll custom         Gross WIMB true deltaWL, Oll custom           Hours Source         M/A           Hours Source         M/A           Hours Source         M/A           Hours Source         M/A           With/yr Savings Source         M/A           With/yr savings source         M/A           Wreduction source         M/A           Sa Hoat MMBtu/yr savings source         MA           Bas Hoat MMBtu/yr savings source         M/A           Gas Heat MMBtu	Sub-type	Insulation
Measure Description derovation fehab projects include the installation of roof, wall, and basement insulation Baseline Description The baseline case is the port-retrofit performance of the house participating the program Swings Vinigs calculation method Calculated using site specific inputs Swings unit Complete Renovation Rehab project Gross SWIner W = deltatW, sp. custom Gross SWINE Gas = deltatMMBL, Cas, custom Gross Gas Heat MBL, Gas Space Gas AC MV/A stavings forte Gas Heat MBLVyr savings Too Grass Heat MBLVyr savings Too HIV/A MDLVyr savings Too HIV/A Grass Heat MBLVyr savings Too HIV/A Grass Heat MBLVyr savings Too HIV/A Grass Heat MBLVyr savings Too HIV/A Grass HIV/A Grass Heat MBLVyr savings Too HIV/A Grass HIV/A Grass HIV/A HIV/A HIT HIV/A	Program Name	Residential New Construction
Baseline Description         The baseline case is the performance of the house before participation in the program           Savings Principle         The efficient case is the post-retrofit performance of a house participating the program           Cancer Savings calculation method         Calculated using site specific inputs           Savings unit         Complete Renovation Rehab project           Savings Savings Equation         Gross WinH wull - deltakW, suctom           Gross WinHs W = deltakW, put, suctom         Gross WinHs W = deltakW, put, suctom           Gross MMBtu Gas = deltakM = Quity put, put, suctom         Gross SMMBtu Oil = deltaMMBtu_ Cas, custom           Hours         N/A         Gross Sinter KW = deltakW, put, suctom           Hours Source         #N/A         Montant Stave           Win/Y Savings         Calc         #N/A           Win/Y savings note         WN/A         Swings Education           Wir eduction source         #N/A         Montant Stave           Wir eduction source         #N/A         Swings Education           Gas Heat MMBtu/yr savings note         Bu/A         Swings Education           Gas Heat MMBtu/yr savings note         #N/A         Swings Education           Gas Heat MMBtu/yr savings note         #N/A         Go           Oli MMBtu/yr savings note         #N/A         Go <tr< td=""><td>Measure Name</td><td>Renovation Rehab Domestic Hot Water</td></tr<>	Measure Name	Renovation Rehab Domestic Hot Water
Savings Finiciple         The efficient case is the post-retrofit performance of a house participating the program           Energy Savings calculation method         Calculated uning site-specific inputs           Savings function         Gross Simmer WW = deltaWW, sp_custom           Gross Simmer WW = deltaWW, sp_custom         Gross Simmer WW = deltaWW, sp_custom           Gross Simmer WW = deltaWW, sp_custom         Gross Simmer WW = deltaWW.           Hours Source         MVA           Hours Source NVA         MVA           Hours Source NVA         Savings Lague Addition           KWH/ry ravings note         Supplied by vendor           WW reduction source         MVA           WW reduction source         MVA           WW reduction source         MVA           Gas Heat MMBtu/ry savings note         Supplied by vendor           Gas Heat MMBtu/ry savings note         Supplied by vendor           Gas Heat MMBtu/ry savings note         MVA           Oll MMBtu/ry savings note         MVA           Propane MMBtu/ry savings note	Measure Description	Renovation Rehab projects include the installation of roof, wall, and basement insulation
Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Complete nervovation Rehab project           Savings figuation         Gross kWh = dettakWh_custom           Gross MIRE UGas = dettaMMBtu_Gas_custom         Gross MIRE UGas = dettaMMBtu_Gas_custom           Hours         N/A           Hours Source         HV/A           Hours Source         HV/A           Hours Source         HV/A           Wreduction         Calc           WWreduction         Calc           WWreduction source         HV/A           WWreduction source         HV/A           WW reduction source         HV/A           Savings source         HV/A           Sa Heat MMBtu/yr savings source         HV/A           Gas Heat MMBtu/yr savings source         HV/A           Froppane MMBtu/yr savings source         HV/A           Propane MMBtu/yr savings so	Baseline Description	The baseline case is the performance of the house before participation in the program
Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Complete nervovation Rehab project           Savings figuation         Gross kWh = dettakWh_custom           Gross MIRE UGas = dettaMMBtu_Gas_custom         Gross MIRE UGas = dettaMMBtu_Gas_custom           Hours         N/A           Hours Source         HV/A           Hours Source         HV/A           Hours Source         HV/A           Wreduction         Calc           WWreduction         Calc           WWreduction source         HV/A           WWreduction source         HV/A           WW reduction source         HV/A           Savings source         HV/A           Sa Heat MMBtu/yr savings source         HV/A           Gas Heat MMBtu/yr savings source         HV/A           Froppane MMBtu/yr savings source         HV/A           Propane MMBtu/yr savings so	Savings Principle	The efficient case is the post-retrofit performance of a house participating the program
Savings unit         Complete Renovation Rehab project.           Gross KWh = dettaWh_sp_custom         Gross Sumer KW = dettaWk_sp_custom           Gross Winter KW = dettaWk_sp_custom         Gross Winter KW = dettaWk_sp_custom           Gross MUBtu Gas = dettaMMBtu_Gas_custom         Gross MUBtu Gas = dettaMMBtu_Gas           Hours         N/A           Hours source         HV/A           Hours source note         HV/A           KWh/yr savings source         Supplied by vendor           KW reduction source         HV/A           WW reduction source         HV/A           KW reduction source         HV/A           Gas Heat MMBtu/yr savings once         Supplied by vendor           Gas Heat MMBtu/yr savings         O           Gas Heat MMBtu/yr savings ource         HV/A           Gas Heat MMBtu/yr savings ource         HV/A           Oli MMBtu/yr savings source         HV/A           Oli MMBtu/yr savings source         HV/A           Propane MMBtu/yr savings source         HV/A           Propane MMBtu/yr savings source         HV/A           Oli MMBtu/yr savings source         HV/A           Propane MMBtu/yr savings source         HV/A           Propane MMBtu/yr savings source         HV/A           Propane MMBtu/yr savings source </td <td>Energy Savings calculation method</td> <td></td>	Energy Savings calculation method	
Gross kWh = detakWb_custom           Savings Equation         Gross Summer kW = detakW_sp_custom           Gross MIBIL Gas_detakW_wp_custom         Gross MMBIL OB           Hours         N/A           Hours source mt         #N/A           Hours source note         #N/A           Why reduction         Calc           Why reduction         Calc           Why reduction         Calc           Why reduction source         #N/A           Wreduction source         #N/A           Savings source         #N/A           Gas Heat MMBut/yr savings         O           Gas Heat MMBut/yr savings onte         #N/A           Savings onter         #N/A           O         Gas Heat MMBut/yr savings onte           O         IMMBut/yr savings note           M/A         O           OII MMBut/yr savings note         #N/A           O         O           OII MMBut/yr savings note         #N/A           O         O           OII MMBut/yr savings note         #N/A           O         O           O         O           OII MMBut/yr savings note         #N/A           Propane MMBut/yr savings note         #N/A		Complete Renovation Rehab project
Savings Equation         Gross Winter Wu = deTakWyp_custom           Gross Winter Wu = deTakWup_custom           Gross MMBtu Gas = dettakM.tu_Gas_custom           Gross MMBtu Oil = dettaMMBtu_Oil _custom           Hours Source         WNA           Hours Source onte         WNA           KWh/yr savings note         Supplied by vendor           KWh/yr savings note         Supplied by vendor           Gas heat MMBtu/yr savings note         Supplied by vendor           Gas heat MMBtu/yr savings note         Supplied by vendor           Gas heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal           Gas heat MMBtu/yr savings source         BN/A           Gas Heat MMBtu/yr savings note         #N/A           Gil MMBtu/yr savings note         #N/A           Gil MMBtu/yr savings note         #N/A           Gil MMBtu/yr savings note         #N/A           Group mMBtu/yr savings note         #N/A           Group measure life for insulation measures.         Group measure           Group measu		
Savings Equation         Gross Winter WP = dettaW_wpcustom           Gross MMBtu Gas = dettaMMBtu_Gas_custom           Hours         N/A           Hours Source note         #N/A           Hours Source note         #N/A           Hours Source note         #N/A           Whylyr Savings         Calc           KWh/yr savings note         Supplied by vendor           Wr reduction         Calc           KW reduction source         #N/A           Gas Heat MMBtu/yr savings         O           Gas Heat MMBtu/yr savings source         #N/A           Oll MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings source         #N/A           One         O           Oll MMBtu/yr savings source         #N/A           Horpane MMBtu/yr savings source         #N/A           Horpane MMBtu/yr savings source		-
Gross MMBtu Gas - deltaMMBtu_Clas_custom           Hours         N/A           Hours Source         MNA           Hours Source note         MNA           KWh/y savings         Calc           KWh/y savings note         MNA           KWh/y savings note         Supplied by vendor           KWh/y savings note         Supplied by vendor           KW reduction source         MNA           Gas Heat MMBtu/yr savings         O           Gas Heat MMBtu/yr savings         O           Gas Heat MMBtu/yr savings note         Supplied by vendor           Gas Heat MMBtu/yr savings note         Supplied by vendor           Gas Heat MMBtu/yr savings note         MNA           Oli MMBtu/yr savings note         MNA           Propane MMBtu/yr savings note         MNA           Cherry Areference(s) & table(s) note         0           Moare         0           Savings Persistence Factor (SPF)         1.00           Savings Persistence Factor note         <	Savings Equation	
Gross MMBtu OII = deltaMMBtu_OII_custom           Hours         N/A           Hours Source note         #N/A           Hours source note         #N/A           Kuthy Savings         Calc           KWthy savings source         #N/A           KWthy savings source         #N/A           KWthy savings source         #N/A           KWthy savings source         #N/A           KW reduction source         #N/A           KW reduction source         #N/A           KW reduction note         Supplied by vendor           Gas Heat MMBtu/r savings         0           Gas Heat MMBtu/r savings source         The Cadmus Group. Inc. (2012) Memo to HEHE Program Administrators Re: impacts of Upcoming Federal standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/r savings note         #N/A           Oli MMBtu/r savings note         #N/A           Oli MMBtu/r savings source         #N/A           Propane MMBtu/r savings source         #N/A           Propane MMBtu/r savings source         #N/A           Propane MMBtu/r savings note         #N/A           Savings Presistence Factor Supplied by endor         Commo measure life onte           Savings Presistence Factor Supplied By Camp Supplied By Supplied By Supplied By Supplied By Supplied By Supplied By Suppli		
Hours     N/A       Hours source     HN/A       Hours source note     HN/A       KWI/Y savings     Cate       KWI/Y savings source     HN/A       KWI/Y savings source     HN/A       KWI/Y savings source     HN/A       KWI reduction source     HN/A       KW reduction source     HN/A       KW reduction source     HN/A       KW reduction source     HN/A       KW reduction source     HN/A       Sa Heat MMBtu/yr savings     O       Gas Heat MMBtu/yr savings source     The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal       Gas Heat MMBtu/yr savings note     HN/A       Oil MMBtu/yr savings note     HN/A       Oil MMBtu/yr savings note     HN/A       Oil MMBtu/yr savings note     HN/A       Propane MMBtu/yr savings note     HN/A       In service rate (SR)     1.00       In service rate (SR)     1.00       Savings Persistence Factor note     Savings persistence Factor note       Savings Persistence Factor note     Savings persistence factor note       Saving		
Hours Source note #N/A hours source note #N/A hours source note #N/A hours source note #N/A kWh/yr savings source #N/A kWh/yr savings note #N/A kW reduction Calc kW reduction note Supplied by vendor kW reduction note Supplied by vendor Gas Heat MMBtu/yr savings ource #N/A Gas Heat MMBtu/yr savings note #N/A Gas Heat MMBtu/yr savings note #N/A Ol MMBtu/yr savings note #N/A Ol MMBtu/yr savings note #N/A Ol MMBtu/yr savings note #N/A Cas Heat MMBtu/yr savings note #N/A Ol MMBtu/yr savings note #N/A NA Propane MMBtu/yr savings note #N/A NA Propane IMBtu/yr savings note #N/A NA	Hours	
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kWh/yr savings source         AN/A           kWh/yr savings note         Supplied by vendor           kW reduction source         HN/A           kW reduction note         Supplied by vendor           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/yr savings source         HN/A           Oli IMMBtu/yr savings source         HN/A           Propane MMBtu/yr savings source         HN/A           Propane MMBtu/yr savings source         HN/A           Propane MMBtu/yr savings source         HN/A           Energy Reference(s) & table(s) notes         0           In-service rate life         25           measure life source         MN/A           In-service rate source         MN/A           In-service rate source         MN/A           Savings Persistence Factor (SPF)         1.00           Savings Persistence Factor Source         MN/A           Realization rate is 100% since gross savings va		
kWh/yr savings source         #N/A           kWh/yr savings note         Supplied by vendor           kWr reduction         Calc           kW reduction note         Supplied by vendor           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/yr savings         0           Oil MMBtu/yr savings source         #N/A           Oil MMBtu/yr savings         0           Oil MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings         0           Propane MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings         0           N/A         0           Energy Reference(s) & table(s) notes         0           In-service rate (SR)         1.00           In-service rate source         #N/A           In-service rate onte         All installations have 100% in-service rate since prog		
WMh/yr savings note         Supplied by vendor           KW reduction source         MN/A           KW reduction source         MN/A           KW reduction note         Supplied by vendor           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/yr savings source         #N/A           OII MMBtu/yr savings source         #N/A           OII MMBtu/yr savings note         #N/A           OII MMBtu/yr savings note         #N/A           Propane IMMBtu/yr savings note         #N/A           Propane Iffe note         Common measure life for insulation measures.           In-service rate source         #N/A           In-service rate source         #N/A           Savings Persistence Factor (SPF)         1.00           Savings Persistence Factor SOFO         MN/A           Realization rate		
kW reduction         Calc           kW reduction source         #N/A           kW reduction note         Supplied by vendor           Gas Heat MMBtu/yr savings         0           The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/yr savings note         #N/A           OII MMBtu/yr savings note         #N/A           OII MMBtu/yr savings note         #N/A           OPopane MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Energy Reference(s) & table(s) notes         0           Propane MMBtu/yr savings note         #N/A           Energy Reference(s) & table(s) notes         0           In-service rate (SR)         1.00           In-service rate (SR)         1.00           In-service rate (SR)         1.00           In-service rate (SR)         1.00           Savings Persistence Factor Source         #N/A           Savings Persistence Factor source         #N/A           Reaurce rate note         Savings persistence Factor source           Savings Persi		·
kW reduction note         #N/A           Supplied by vendor         Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/yr savings source         #N/A           Oil MMBtu/yr savings source         #N/A           Oil MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings note         #N/A           Energy Reference(s) & table(s) notes         0           measure life source         #N/A           In-service rate (ISR)         1.00           In-service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor source         #N/A           Realization rate energy (RR)         1.00           Realization rate is 100% since gross savings values are based on evaluation results.           Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (R		
kW reduction note         Supplied by vendor           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           OPopane MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings note         #N/A           Propane MMStu/yr savings note         #N/A           Inservice rate Ife         25           measure life         25           measure life source         #N/A           In-service rate source         #N/A           In-service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate is 100% s		
Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Gas Heat MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings source         #N/A           Oil MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Energy Reference(s) & table(s) notes         0           measure life         25           measure life source         #N/A           In-service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor Source         #N/A           Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate in 200% since gross savings values are based on evaluation results.           R demand (RRd) summer peak note         Realization		·
Gas Heat MMBtu/yr savings source       The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         OII MMBtu/yr savings source       #N/A         OII MMBtu/yr savings note       #N/A         Propane MBtu/yr savings note       #N/A         Propane MBtu/yr savings note       #N/A         Propane MBtu/yr savings note       #N/A         In-service rate iffe source       #N/A         In-service rate Iffe source       #N/A         In-service rate forte       Common measure life for insulation measures.         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor Surce       #N/A         Realization rate energy (Re)       1.00		
Gas Heat MWBU/Yr savings Source     Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.       Gas Heat MMBtu/yr savings note     #N/A       Oil MMBtu/yr savings source     #N/A       Oil MMBtu/yr savings note     #N/A       Propane MMBtu/yr savings source     #N/A       OPopane MMBtu/yr savings note     #N/A       Propane MMBtu/yr savings note     #N/A       Energy Reference(s) & table(s) notes     0       measure life source     #N/A       measure life note     Common measure life for insulation measures.       In-service rate (ISR)     1.00       In-service rate note     All installations have 100% in-service rate since programs include verification of equipment installations.       Savings Persistence Factor (SPF)     1.00       Savings Persistence Factor note     Savings persistence factor note       Realization rate energy (RRe)     1.00       Rea note     Realization rate is 100% since gross savings values are based on evaluation results.       RR demand (RRd) summer peak note     Realization rate is 100% since gross savings val	Gas Heat MMBtu/yr savings	-
Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings ource       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life note       Common measure life for insulation measures.         In-service rate (ISR)       1.00         In-service rate source       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor Source       #N/A         Savings Persistence Factor note       Savings persistence Factor source         Savings Persistence Factor source       #N/A         Re alization rate energy (RRe)       1.00         RR source       #N/A         RR demand (RRd) summer peak       1.00         RR demand (RRd) winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak note       Realization rate is 100% since gr	Gas Heat MMBtu/yr savings source	
Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life note       Common measure life for insulation measures.         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence Factor note         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak	Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life note       Common measure life for insulation measures.         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence Factor note         Realization rate energy (RRe)       1.00         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RRd demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluatio	Oil MMBtu/yr savings	0
Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life note       Common measure life for insulation measures.         In-service rate (ISR)       1.00         In-service rate source       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence Factor note         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (Re)       1.00         RR note       Realization rate is 100% since gross savings values are based on evaluation results.         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00	Oil MMBtu/yr savings source	#N/A
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measure life       25         measure life source       #N/A         measure life note       Common measure life for insulation measures.         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate source       #N/A         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RR source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RRd dummer peak source       #N/A         RRd dummer peak source       #N/A         RRd dummer peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       1.00     <	Energy Reference(s) & table(s) notes	
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Savings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) winter peak1.00RR demand (RRd) winter peak1.00RR demand (RRd) winter peak1.00RR dwinter peak source#N/ARR dwinter peak noteRealization rate is 100% since gross savings values are based on evaluation results.RR dwinter peak noteRealization rate is 100% since gross savings values are based on evaluation results.RR dwinter peak note#N/ARR dwinter peak noteRealization rate is 100% since gross savings values are based on evaluation results.Coincidence factor (CF) summer peak1.00CF summer peak source#N/A		
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RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       1.00         CF summer peak source       #N/A		
RRd winter peak noteRealization rate is 100% since gross savings values are based on evaluation results.Coincidence factor (CF) summer peak1.00CF summer peak source#N/A		
Coincidence factor (CF) summer peak       1.00         CF summer peak source       #N/A		
CF summer peak source #N/A		
CF summer peak note Coincidence factors are custom calculated based on project-specific detail.		
	CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.

Coincidence factor (CF) winter peak	1.00
	#N/A
CF winter peak source	
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

	DL 0225
TRL Reference Number	RI_0325
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	Residential New Construction
Measure Name	Showerheads
Measure Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.
Baseline Description	The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the
	baseline is the existing showerhead.
Savings Principle	The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	129
kWh/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
kwii/yi saviiigs source	Prepared for the Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	0.022
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	, #N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
	#N/A
RRd summer peak source	#N/A

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RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.58
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	3696.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 10 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 10 per measure

TRL Reference Number	RI_0363
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Whole Home
Туре	Custom
Sub-type	Cooling
Program Name	Residential New Construction
Measure Name	ESH Cooling
Measure Description	To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market
	to one in which new homes are moving towards net-zero energy.
Baseline Description	The User Defined Reference Home was revised in 2012 as a result of a baseline study.
Savings Principle	The high efficiency case is represented by the specific energy characteristics of each "as-built" home
Savings Frinciple	completed through the program.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed ESH heating, cooling, or DHW project.
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Supplied by vendor
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed 100% because energy savings are custom calculated.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
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RRd summer peak note	Realization rate is assumed 100% because energy savings are custom calculated.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed 100% because energy savings are custom calculated.
Coincidence factor (CF) summer peak	1.00
CF summer peak source CF summer peak note	#N/A
u i cummor poak poto	Coincidence factors are custom calculated based on project-specific detail.

Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI_0364
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Whole Home
Туре	Custom
Sub-type	DHW
Program Name	Residential New Construction
Measure Name	ESH DHW
	To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market
Measure Description	to one in which new homes are moving towards net-zero energy.
Baseline Description	The User Defined Reference Home was revised in 2012 as a result of a baseline study.
	The high efficiency case is represented by the specific energy characteristics of each "as-built" home
Savings Principle	completed through the program.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed ESH heating, cooling, or DHW project.
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A Calc
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Supplied by vendor
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	Calc
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Easter (SDE)	1.00
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed 100% because energy savings are custom calculated.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed 100% because energy savings are custom calculated.
RR demand (RRd) winter peak	1.00
	#N/A
RRd winter peak source	
RRd winter peak note	Realization rate is assumed 100% because energy savings are custom calculated.
RRd winter peak note Coincidence factor (CF) summer peak	Realization rate is assumed 100% because energy savings are custom calculated. 1.00
RRd winter peak note	Realization rate is assumed 100% because energy savings are custom calculated.

Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
•	
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI_0365
Fuel	Electric
Sector	Residential
Project Type	New Construction
Category	Whole Home
Туре	Custom
Sub-type	Heating
Program Name	Residential New Construction
Measure Name	ESH Heating
Manager Description	To capture lost opportunities, encourage the construction of energy-efficient homes, and drive the market
Measure Description	to one in which new homes are moving towards net-zero energy.
Baseline Description	The User Defined Reference Home was revised in 2012 as a result of a baseline study.
Caula da Deia dia la	The high efficiency case is represented by the specific energy characteristics of each "as-built" home
Savings Principle	completed through the program.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed ESH heating, cooling, or DHW project.
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Supplied by vendor
Gas Heat MMBtu/yr savings	
Gas near wivibru/yr savings	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
Gas Heat MMBtu/yr savings source	Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
	#N/A
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	Calc
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed 100% because energy savings are custom calculated.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed 100% because energy savings are custom calculated.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed 100% because energy savings are custom calculated.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
	······································

Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
•	
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI 0274
Fuel	Electric
Sector	Residential
Project Type	Retrofit
, ,,	
Category	Appliances
Type	Recycling Patricenter Decycling
Sub-type	Refrigerator Recycling
Program Name	Single Family Appliance Management Appliance Removal
Measure Name	This measure covers the replacement of an existing inefficient refrigerator with a new efficient
Measure Description	
	refrigerator. For Top Ten <sup>®</sup> and Most Efficient <sup>®</sup> refrigerators, the baseline is a 50% mix of available Energy Star <sup>®</sup> and
Pacolino Description	Federal standard compliant refrigerators. For Energy Star <sup>®</sup> refrigerators, the baseline is a refrigerator that
Baseline Description	meets Federal standards.
	The high efficiency case is an Energy Star <sup>®</sup> refrigerator or a model that is ENERGY STAR <sup>®</sup> rated and
Savings Principle	
Franzi Cavings calculation mathed	included in the Most Efficient <sup>®</sup> or Top Ten USA <sup>®</sup> ranking.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency refrigerator.
	Gross kWh = Qty × (kWh_base - kWh_ee)
	Gross kW = Qty × deltakW
	Note and
	Where:
Savings Equation	
	Qty = Total number of units.
	kWh_base = Deemed average demand per baseline unit.
	kWh_ee = Deemed average demand per high-efficiency unit.
	DeltakW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00
In-service rate source In-service rate note	<ul> <li>#N/A</li> <li>All installations have 100% in-service rate since programs include verification of equipment installations.</li> </ul>
Solvings Dersistence Fester (CDF)	
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.

1.00 ĦN/A Realization rate is 100% since gross savings values are based on evaluation results. 1.00 ĦN/A Realization rate is 100% since gross savings values are based on evaluation results.
Realization rate is 100% since gross savings values are based on evaluation results. 1.00 #N/A
1.00 #N/A
ŧN/A
•
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
ŧN/A
).93
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
ŧN/A
0.00
0.00
ŧN/A
ŧN/A
15.89
NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
ŧN/A
172.53
NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
ŧN/A
0.00
0.00
0.00
1.00
±N/A
The Net-to-Gross ratio is Assumed to be 100%.
5 55 per measure
το ματικό τ \$Ν/Α
тууч ŧN/А
\$ 55 per measure

TRL Reference Number	RI 0280
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Appliances
Туре	Refrigerators
Sub-type	Refrigerator
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Refrigerator
	This measure covers the replacement of an existing inefficient refrigerator with a new ENERGY STAR <sup>®</sup>
Measure Description	rated refrigerator. ENERGY STAR <sup>®</sup> qualified refrigerators use at least 20% less energy than non-qualified
	models.
	The baseline efficiency case is the existing refrigerator. It is assumed that low-income customers would
Baseline Description	otherwise replace their refrigerators with a used inefficient unit.
	The high efficiency case is an ENERGY STAR <sup>®</sup> rated refrigerator that meets the ENERGY STAR <sup>®</sup> criteria for
Savings Principle	full-sized refrigerators (7.75 cubic feet), using at least 20% less energy than models meeting the minimum
	Federal government standard.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency refrigerator.
	Gross kWh = Qty × (kWh_base - kWh_ee)
	Gross kW = Qty × (kWh_base - kWh_ee) / Hours
	Where:
Savings Equation	where.
Savings Equation	Qty = Total number of units.
	kW_base = Deemed average demand per baseline unit.
	kW_ee = Deemed average demand per high-efficiency unit.
11	Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 8760 hours/year.
Hours Source	#N/A
Hours source note	#N/A Calc
kWh/yr Savings	
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
	12
measure me	
	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Residential
measure life source	Refrigerator.
measure life source measure life note	Refrigerator. #N/A
measure life source measure life note In-service rate (ISR)	Refrigerator. #N/A 1.00
measure life source measure life note In-service rate (ISR)	Refrigerator. #N/A
measure life source measure life note	Refrigerator.         #N/A         1.00         #N/A         All installations have 100% in-service rate since programs include verification of equipment installations.
	Refrigerator. #N/A 1.00 #N/A

Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.86
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 380/audit with multiple installed measures

TDI Deference Number	DL 0304
TRL Reference Number	RI_0281
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Appliances
Type	Refrigerators
Sub-type	Refrigerator
Program Name	EnergyWise MultiFamily
Measure Name	EW Refrigerator
	This measure covers the replacement of an existing inefficient refrigerator with a new ENERGY STAR®
Measure Description	rated refrigerator. ENERGY STAR <sup>®</sup> qualified refrigerators use at least 20% less energy than non-qualified
	models.
Baseline Description	The baseline efficiency case is the existing refrigerator. It is assumed that low-income customers would
-	otherwise replace their refrigerators with a used inefficient unit.
	The high efficiency case is an ENERGY STAR® rated refrigerator that meets the ENERGY STAR® criteria for
Savings Principle	full-sized refrigerators (7.75 cubic feet), using at least 20% less energy than models meeting the minimum
	Federal government standard.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency refrigerator.
	Gross kWh = Qty × (kWh_base - kWh_ee)
	Gross kW = Qty × (kWh_base - kWh_ee) / Hours
	Where:
Savings Equation	
	Qty = Total number of units.
	kW_base = Deemed average demand per baseline unit.
	kW_ee = Deemed average demand per high-efficiency unit.
	Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 8760 hours/year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Residential
measure life source	Refrigerator.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A

Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.86
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings source	#N/A #N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TDI Deference Number	
TRL Reference Number	RI_0268
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Appliances
Туре	Freezers
Sub-type	Freezer
Program Name	Single Family Appliance Management
Measure Name	Replacement Freezer
Measure Description	This measure covers the replacement of an existing inefficient freezer with a new energy efficient model.
Baseline Description	The baseline efficiency case for both the replaced and baseline new freezer is represented by the existing freezer. It is assumed that low-income customers would replace their freezers with a used inefficient unit.
Savings Principle	The high efficiency case is a new high efficiency freezer.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency freezer.
	Gross kWh = Qty × (kWh_base - kWh_ee)
	Gross kW = Qty × (kWh_base - kWh_ee) / Hours
Savings Equation	Where:
	Qty = Total number of units.
	kW_base = Deemed average demand per baseline unit.
	kW_ee = Deemed average demand per high-efficiency unit.
	Hours = Deemed average annual operating hours.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	484
	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
kWh/yr savings source	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.06
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	- #N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	- #N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	5 #N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	19
measure life source	#N/A
measure life source measure life note	
	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00 #N/A
In-service rate source	#IV/P
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
,,	

	-
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.93
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	6.52
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	199.14
One time \$ savings source/description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 600 per measure
Gross Measure TRC unit Gross Measure TRC source	\$ 600 per measure #N/A

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TRL Reference Number Fuel	RI_0285 Electric
Sector	Residential Retrofit
Project Type	
Category Turpo	Appliances
Type	Refrigerators
Sub-type	Refrigerator
Program Name Measure Name	Single Family Appliance Management Replacement Refrigerator
	This measure covers the replacement of an existing inefficient refrigerator with a new ENERGY STAR <sup>®</sup>
Measure Description	rated refrigerator. ENERGY STAR <sup>®</sup> qualified refrigerators use at least 20% less energy than non-qualified
	models.
	The baseline efficiency case is the existing refrigerator. It is assumed that low-income customers would
Baseline Description	otherwise replace their refrigerators with a used inefficient unit.
	The high efficiency case is an ENERGY STAR <sup>®</sup> rated refrigerator that meets the ENERGY STAR <sup>®</sup> criteria for
Savings Principle	full-sized refrigerators (7.75 cubic feet), using at least 20% less energy than models meeting the minimum
Savings i fincipie	Federal government standard.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed high-efficiency refrigerator.
	Gross kWh = Qty × (kWh_base - kWh_ee)
	Gross kW = Qty × (kWh_base - kWh_ee) / Hours
	Where:
Savings Equation	
	Qty = Total number of units.
	kW_base = Deemed average demand per baseline unit.
	kW_ee = Deemed average demand per high-efficiency unit.
	Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 8760 hours/year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	384
	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
kWh/yr savings source	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.05
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
· · · ·	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A #N/A
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A #N/A 0
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	#N/A #N/A 0 19
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	#N/A #N/A 0 19 #N/A
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note	#N/A #N/A 0 19 #N/A National Grid assumption based on regional PA working groups.
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR)	#N/A #N/A 0 19 #N/A National Grid assumption based on regional PA working groups. 1.00
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note	#N/A #N/A 0 19 #N/A National Grid assumption based on regional PA working groups.
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR)	#N/A #N/A 0 19 #N/A National Grid assumption based on regional PA working groups. 1.00
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR) In-service rate source	#N/A #N/A 0 19 #N/A National Grid assumption based on regional PA working groups. 1.00 #N/A
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR) In-service rate source In-service rate note	<ul> <li>#N/A</li> <li>#N/A</li> <li>0</li> <li>19</li> <li>#N/A</li> <li>National Grid assumption based on regional PA working groups.</li> <li>1.00</li> <li>#N/A</li> <li>All installations have 100% in-service rate since programs include verification of equipment installations.</li> </ul>
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor note	<ul> <li>#N/A</li> <li>#N/A</li> <li>0</li> <li>19</li> <li>#N/A</li> <li>National Grid assumption based on regional PA working groups.</li> <li>1.00</li> <li>#N/A</li> <li>All installations have 100% in-service rate since programs include verification of equipment installations.</li> <li>1.00</li> </ul>
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source	<pre>#N/A #N/A 0 19 19 #N/A National Grid assumption based on regional PA working groups. 1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00 #N/A</pre>

RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.93
CE winter neek source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	5.17
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	199.14
One time \$ savings source/description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 1200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1200 per measure

TRL Reference Number	RI_0002
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Air Sealing
Sub-type	Air Sealing/Infiltration
Program Name	EnergyWise MultiFamily
Measure Name	EW Air Sealing (electric)
Measure Description	Thermal shell air leaks are sealed through strategic use and location of air-tight materials.
	The baseline efficiency case is the existing building before the air sealing measure is implemented. The
Baseline Description	baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family
	homes, or the existing air changes per hour (ACHPRE)
	The high efficiency case is the existing building after the air sealing measure is implemented. The high
Cauda an Daia sin la	efficiency building is characterized by the new CFM50 measurement for single family homes
Savings Principle	(CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured
	after the air sealing measure is implemented.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed air sealing project.
	Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM
	Gross kW = Gross kWh × kW/kWh
	Where:
	Stories = Total stories in the multi-family building
Covings Fountion	SQFT = Area of building in square feet
Savings Equation	CFM/SQFT_pre = Estimate of pre-retrofit air leakage in CFM/SQFT based on number of stories in the
	building and air-tightness ratings of the existing roof and floor
	CFM/SQFT_post = Estimate of post-retrofit air leakage in CFM/SQFT based on number of stories in the
	building and air-tightness ratings of the improved roof and floor
	deltakWh/CFM = Average annual kWh reduction per CFM
	Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM
	kW/kWh = Average kW reduction per kWh reduction
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.

In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.01
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	19.28
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	135.83
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross source	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC unit Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

FuelElectSectorResidProject TypeRetriCategoryBuildTypeInsulSub-typeOtheProgram NameEneMeasure NameEWMeasure DescriptionInsulBaseline DescriptionTheinsulSavings PrincipleTheSavings PrincipleComSavings unitComSavings unitComSavings EquationWheUty and the sector of the secto	ergyWise MultiFamily V Insulation (electric) Other ulation upgrades (other than basement, roofs, and walls) applied in existing facilities. e baseline efficiency case is the existing facility or equipment prior to the implementation of additional ulation. e high efficiency case is the existing facility or equipment after the implementation of additional ulation. emed mpleted insulation project. oss kWh = Qty × deltakWh oss kW = Qty × deltakW here: y = Total number of units. Ita kWh = Deemed average annual kWh reduction per unit. Ita kW = Deemed average kW reduction per unit. ating hours are characterized by the heating degree days for the facility, 4644. is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A
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Savings unit       Com         Gross       Gross         Gross       Gross         Savings Equation       Whe         Qty :       Delta:         Delta:       Delta:         Hours       Heat         Hours Source       This         Hours source note       #N/A         kWh/yr savings       Calc         kWh/yr savings note       #N/A         kW reduction       Calc         kW reduction source       Mass         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A	oss kWh = Qty × deltakWh oss kW = Qty × deltakW here: y = Total number of units. Ita kWh = Deemed average annual kWh reduction per unit. Ita kW = Deemed average kW re
Gross Gross Gross Savings Equation Uty = Delta Delta Delta Hours Meat Hours Source Hours Source Hours Source Hours Source Hours Source Hours Source Calca kWh/yr Savings Source KWh/yr savings note kWh/yr savings note kWh/yr savings note kW reduction Source Mass KW reduction source KW reduction note KW reduction source KW reduction note KW reduction note KW reduction note KW reduction note KW reduction note KW reduction note KW reduction source KW reduction note KW re	oss kWh = Qty × deltakWh oss kW = Qty × deltakW here: y = Total number of units. Ita kWh = Deemed average annual kWh reduction per unit. Ita kW = Deemed average kW re
Gross Savings Equation Autors Equation Hours Source Hours Source Hours Source note Hours Source note Hours Source note KWh/yr Savings Calc kWh/yr savings source KWh/yr savings note KWh/yr savings note KWh/yr savings note KW reduction KW reduction source KW reduction source KW reduction note KW reduction source KW reduction note KW reduction note KW reduction source KW reduction note KW reduction note KW reduction source KW reduction note KW reduction source KW reduction source KW reduction note KW reduction source KW reduction note KW reduction source KW reduction note KW reduction source KW reduction source KW reduction note KW reduction source KW r	boss kW = Qty × deltakW here: y = Total number of units. Ita kWh = Deemed average annual kWh reduction per unit. Ita kW = Deemed average kW reduction per unit. Ita kW = Deemed average kW reduction per unit. ating hours are characterized by the heating degree days for the facility, 4644. is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A Ic Iculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Savings Equation Qty = Delta Delta Hours Heat Hours Source Hours Source note Hours source note KWh/yr Savings Calc kWh/yr savings source Mas kWh/yr savings note kW reduction Calc Calc KW reduction source Mas kW reduction note KW reduction note KW reduction note KW reduction note KW reduction note KW reduction note KW reduction source Mas KW reduction note KW reduction note KW reduction note KW reduction source Mas KW reduction note KW reduction note KW reduction source KW reduction note KW reduction note KW reduction source KW reduction note KW reduction source KW reduction note KW reduction note KW reduction source KW reduction note KW reduction source KW reduction note KW reduction source KW reduction note KW reduction source KW reduction note KW reduction note KW reduction source KW reduction note KW reduction source KW reduction note KW reduction source KW reduction source KW reduction note KW reduction source KW reduction note KW reduction source KW red	y = Total number of units. Ita kWh = Deemed average annual kWh reduction per unit. Ita kW = Deemed average kW reduction per unit. ating hours are characterized by the heating degree days for the facility, 4644. is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A Ic Iculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Qty         Delta         Delta         Delta         Delta         Hours         Hours Source         This         and         Hours Source note         #Wh/yr Savings         Calct         kWh/yr savings source         Mass         kWh/yr savings note         kW reduction         Calct         kW reduction source         Mass         kW reduction note         Mass         kW reduction note         Mass         kW reduction note         Mass         kW reduction source         Mass         kW reduction source         Mass         kW reduction note         gas Heat MMBtu/yr savings         O         Gas Heat MMBtu/yr savings source	Ita kWh = Deemed average annual kWh reduction per unit. Ita kW = Deemed average kW reduction per unit. ating hours are characterized by the heating degree days for the facility, 4644. is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A Ic Iculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Delta         Hours       Heat         Hours Source       This         Hours Source note       #N/A         KWh/yr Savings       Calc         KWh/yr savings source       Mass         KWh/yr savings note       #N/A         kW reduction       Calc         KW reduction source       Mass         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A	Ita kWh = Deemed average annual kWh reduction per unit. Ita kW = Deemed average kW reduction per unit. ating hours are characterized by the heating degree days for the facility, 4644. is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A Ic Iculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Delt. Hours Meat Hours Source And	Ita kW = Deemed average kW reduction per unit. ating hours are characterized by the heating degree days for the facility, 4644. is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A Ic Iculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Hours       Heat         Hours Source       This         Hours source note       #N/A         KWh/yr Savings       Calc         kWh/yr savings source       Mass         Mass       Mass         kWh/yr savings note       #N/A         kW reduction       Calc         kW reduction source       Mass         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       Ø         Gas Heat MMBtu/yr savings source       #N/A	ating hours are characterized by the heating degree days for the facility, 4644. is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A lc lculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Hours Source       This and         Hours source note       #N/A         kWh/yr Savings       Calc         kWh/yr savings source       Mas         Mass       Mass         kWh/yr savings note       #N/A         kW reduction       Calc         kW reduction source       Mass         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A	is value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island d southeastern Massachusetts based on NOAA 30-year data. /A lc lculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Hours source       and         Hours source note       #N/A         kWh/yr Savings       Calc         kWh/yr savings source       Mas         MAS       Mas         kWh/yr savings note       #N/A         kW reduction       Calc         kW reduction source       Mas         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A	d southeastern Massachusetts based on NOAA 30-year data. /A lc lculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr Savings       Calc         kWh/yr savings source       Mas         kWh/yr savings note       #N/#         kW reduction       Calc         kW reduction source       Mas         kW reduction note       #N/#         Gas Heat MMBtu/yr savings source       #N/#	ic Iculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr Savings       Calc         kWh/yr savings source       Mas         kWh/yr savings note       #N/#         kW reduction       Calc         kW reduction source       Mas         kW reduction note       #N/#         Gas Heat MMBtu/yr savings source       #N/#	ic Iculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
KWh/yr savings source       Mas         kWh/yr savings note       #N/#         kWreduction       Calc         kW reduction source       Calc         kW reduction note       Mas         kW reduction note       #N/#         Gas Heat MMBtu/yr savings source       Ø	
kWh/yr savings source       Mas.         kWh/yr savings note       #N/A         kW reduction       Calc         kW reduction source       Mas.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       Ø         Gas Heat MMBtu/yr savings source       #N/A	
kWh/yr savings note       #N/A         kW reduction       Calc         kW reduction source       Mas:         Mass       Mass         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A	
kW reduction       Calc         kW reduction source       Mass         Mass       Mass         kW reduction note       #N/#         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/#	assachusetts Program Administrators.
KW reduction source       Calci         kW reduction source       Mass         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A	
kW reduction source Mass Mass kW reduction note #N/A Gas Heat MMBtu/yr savings 0 Gas Heat MMBtu/yr savings source #N/A	
kW reduction note#N/#Gas Heat MMBtu/yr savings0Gas Heat MMBtu/yr savings source#N/#	lculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). assachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for assachusetts Program Administrators.
Gas Heat MMBtu/yr savings 0 Gas Heat MMBtu/yr savings source #N/A	-
Gas Heat MMBtu/yr savings source #N/A	
	/Α
Oil MMBtu/yr savings 0	
Oil MMBtu/yr savings source #N/A	/Α
Oil MMBtu/yr savings note #N/A	
Propane MMBtu/yr savings 0	,
Propane MMBtu/yr savings source #N/A	/Α
Propane MMBtu/yr savings source #N/P	•
Energy Reference(s) & table(s) notes 0	
measure life 25	
	S Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source HVA	AC Measures. Prepared for The New England State Program Working Group.
measure life note #N/A	
In-service rate (ISR) 1.00	
In-service rate source #N/A	/Α
In-service rate note All ir	installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF) 1.00	
Savings Persistence Factor source #N/A	0
Realization rate energy (RRe) 1.00	/A
RRe source #N/A	/A vings persistence is assumed to be 100%.

RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.01
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TRL Reference Number	RI 0029
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Shell
Program Name	EnergyWise MultiFamily
Measure Name	EW Insulation (electric) Shell
	Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
Measure Description	and sidewalls.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed insulation project.
	Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)
	$Gross kW = Gross kWh \times kW/kWh$
	Where
	Where:
Savings Equation	SQFT = Square feet of insulation installed
	deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation
	R_pre = R-Value of the existing insulation
	R_post = R-Value of the new installed insulation
	Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM
	kW/kWh = Average annual kW reduction per kWh reduction
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
	Synapse (2012). A Preliminary Analysis of Energy Impacts from Partial Deep Energy Retrofit Projects in
Gas Heat MMBtu/yr savings source	National Grid's Jurisdiction. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	

Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.01
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.31
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	378.05
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TRL Reference Number	RI 0003
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Air Sealing
Sub-type	Air Sealing/Infiltration
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Air Sealing (electric)
Measure Description	Thermal shell air leaks are sealed through strategic use and location of air-tight materials.
······	The baseline efficiency case is the existing building before the air sealing measure is implemented. The
Baseline Description	baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family homes, or the existing air changes per hour (ACHPRE)
	The high efficiency case is the existing building after the air sealing measure is implemented. The high
	efficiency building is characterized by the new CFM50 measurement for single family homes
Savings Principle	(CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured
Energy Solvings colculation method	after the air sealing measure is implemented. Calculated using site-specific inputs
Energy Savings calculation method	
Savings unit	Completed air sealing project.
	Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM Gross kW = Gross kWh × kW/kWh
	Where:
	Stories = Total stories in the multi-family building
Savings Equation	SQFT = Area of building in square feet
	CFM/SQFT_pre = Estimate of pre-retrofit air leakage in CFM/SQFT based on number of stories in the building and air tightness ratings of the switching read and floor.
	building and air-tightness ratings of the existing roof and floor
	CFM/SQFT_post = Estimate of post-retrofit air leakage in CFM/SQFT based on number of stories in the
	building and air-tightness ratings of the improved roof and floor
	deltakWh/CFM = Average annual kWh reduction per CFM
	Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM
	kW/kWh = Average kW reduction per kWh reduction
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Dil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
	#N/A
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A 0
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0 15 Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note	0 15

In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.01
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
confedence factor (cr) whiter peak	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC source	Caumus, inc., ELD incremental Cost Study - Modeling Light Hacker ELD and Halogen Fricing Data. June
Gross Measure TRC source Gross Measure TRC note	#N/A

TRL Reference Number Fuel Sector Project Type	RI 0016
Sector	Electric
Project Type	Residential
	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Insulation Other (electric)
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
Baseline Description	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.
Savings Principle	The high efficiency case is the existing facility or equipment after the implementation of additional insulation.
Energy Savings calculation method	Deemed
Savings unit	
savings unit	Completed insulation project.
	Gross kWh = Qty × deltakWh Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
	Calc
kWh/yr Savings	
kWh/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A #N/A
Propane MMBtu/yr savings	#N/A 0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
	#N/A
measure life note	1.00
measure life note	#N/A
measure life note In-service rate (ISR)	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
measure life note In-service rate (ISR) In-service rate source	
measure life note In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF)	All installations have 100% in-service rate since programs include verification of equipment installations. 1.00
measure life note In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source	All installations have 100% in-service rate since programs include verification of equipment installations. 1.00 #N/A
measure life note In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF)	All installations have 100% in-service rate since programs include verification of equipment installations. 1.00

Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rates are 100% since savings estimates are based on evaluation results.
0.01
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
1.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 398/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A
\$ 380/audit with multiple installed measures

Fuel         Electric           Sector         Residential           Project Type         Retrofit           Category         Building Shell           Type         Insulation           Sub-type         Shell           Program Name         Income Eligible MultiFamily           Measure Parme         EW LI insulation upgrades applied in existing facilities including improved insulation in attics, b and sidewalls.           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The bight efficiency case includes increased weatherization insulation levels.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Gross KW = SQFT × detakWh/SQFT × (1/k_pre - 1/k_post)           Gross KW = Gross kWh = kW/XWh         Where:           Savings Equation         SQFT = square feet of insulation installed detakWh/SQFT = Average annual kWh reduction per SQFT of insulation R_port = R-Value of the existing insulation (Gross KW = Stories × SQFT pre < CM/SQFT_post) × detakWh/CFM kW/kWh = Average annual kW reduction per kWh reduction           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours Source         InN/A           Why savings cource         Massachusetts based on NDAA 30-year data.           Hours Source note		T
Sector         Residential           Project Type         Retrofit           Category         Building Shell           Type         Insulation           Sub-type         Shell           Messure Name         FW Linsulation Shell (electric)           Messure Name         FW Linsulation Shell (electric)           Messure Name         FW Linsulation Shell (electric)           Messure Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         Calculated using a ste-specific inputs           Savings suff         Calculated using a ste-specific inputs           Savings unit         Gross kWh > SQF x deltakWh/SQF x (1/R_pre - 1/R_post)           Gross kW = Gross kWh > SQF x deltakWh/SQF x (1/R_pre - 1/R_post)           Gross kW = Gross kWh > SQF x deltakWh/SQF T_port - CfM/SQFT_post) × detakWh/CFM           Wylewh = Average annual kWh reduction per SQFT of insulation           R_pre = R-Value of the exiting insulation           Gross kW = Sories xSQFT re - CfM/SQFT_post) × detakWh/CFM           Wylewh = Average annual kWh reduction per kWh reduction           Hours         Heating hours are characterized by the heating degree day for the facility, 4644.           Hours         Heating hours are characterized by the heating degree day for the facility, 4644.           Hours source         MN/A	TRL Reference Number	RI_0030
Project Type         Retrofit           Category         Building Shell           Type         Insulation           Sub-type         Shell           Program Name         Income Eligible MultiFamily           Measure Name         EW LI insulation bell (electric)           Measure Description         Shell Insulation upgrades applied in existing facilities including improved insulation in attics, baseline Description           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The bigh efficiency case is any existing home shell measures.           Savings unit         Catculated using site-specific inputs           Savings unit         Category e Gross kWh > KW/kWh           Where:         Sovings and efficiency errors and the site of insulation installed deltakWh/SQFT - Average annual KWh reduction per SQFT of insulation R_pore = R-Value of the exiting insulation R_more site an average RadSE GO Annual Heating Degree Days value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Hours Source         Heating hours are characterized by the heating Degree days for the facility, 4644.           KWh/yr savings source         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrof		
Category         Building Shell           Type         Insulation           Sub-type         Shell           Program Name         Income Eligible MultiFamily           Measure Name         EW Linuation Shell (lelectric)           Measure Description         Shell insulation upgrades applied in existing facilities including improved insulation in attics, b and sidewalls.           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The high efficiency case includes increased weatherization insulation levels.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Completed insulation project.           Gross KW = Gross KW + KW/kWh         Where:           Savings Equation         SQT = Square feet of insulation installed deltakWh/SQT = KValue of the existing insulation R_post = R-Value of the existing insulation Gross KW = Stroke SQFT = CFM/SQFT_post) × deltakWh/CFM kW/kWh = Average annual kWr reduction per KWr reduction Gross KW = Stroke SQFT = CFM/SQFT_post) × deltakWh/CFM kW/kWh = Average annual kWr reduction per kWr reduction           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours         Measachusetts Program Administrators.           Hours source	Sector	Residential
Type         Insulation           Sub-type         Shell           Program Name         EW LI insulation Bell (electric)           Measure Description         Shell insulation upgrades applied in existing facilities including improved insulation in attics, baseline Description           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The baseline description insulation upgrades weatherization insulation insulation insulation insulation for any existing home shell measures.           Savings principle         The baseline description         Completed insulation project.           Savings unit         Completed insulation insulation installed dettakWh/SQFT < (1/k_pre - 1/R_post)	Project Type	
Sub-type         Shell           Program Name         Income Eligible MultiFamily           Measure Name         EW Linsulation upgrades applied in existing facilities including improved insulation in attics, b and sidewalls.           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The high efficiency case is any existing home shell measures.           Energy Savings calculation method         Calculated using site specific inputs           Savings unit         Completed insulation project.           Gross KW = Gross KWh × KW/kWh         Where:           Savings Equation         SQFT = Square feet of insulation installed deltakWh/SQFT = Average annual KWh reduction per SQFT of insulation R_pore = N-Avale of the existing insulation R_pore = N-Avale of the existing insulation R_pore = N-Avale of the existing insulation Gross KWh = Stories > SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM kW/kWh = Average annual KW reduction per KWh reduction           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours Source         This value is an average BASE 60 Annual Heating Degree Days value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Hours Source         MN/A KWh/yr savings note           KWh/yr, savings note         MN/A KWh/yr savings note           KWh/yr savings note         MN/A M/A           Galculated by RISE Engi	Category	Building Shell
Program Name         Income Eligible MultiFamily           Measure Name         EW LI insulation Shell (electric)           Measure Name         EW LI insulation upgrades applied in existing facilities including improved insulation in attics, baseline Description           Baseline Description         The baseline fifciency case is any existing home shell measures.           Savings Principle         The baseline discrete dusing site-specific inputs           Savings calculation method         Calculated using site-specific inputs           Savings unit         Completed insulation project.           Gross KWh ~ SQFT × deltakWh/SQFT × (1/k_pre - 1/k_post)         Gross KWh ~ SWh × SWH × KW/kWh           Where:         Savings Equation         SQFT = Square feet of insulation installed           deltakWh/SQFT = Average annual KWh reduction per SQFT of insulation         R_post = Avalue of the new installed insulation           deltakWh/SQFT = Average annual KW reduction per KWh reduction         Hours           Hours         Heating hours are characterized by the heating degree days for the facility. 4644.           Hours Source         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and source source           HW/A         KWh/yr savings note         MN/A           KWh/yr savings note         MN/A           KWh/yr savings note         MN/A           KWh/yr savings note	Туре	Insulation
Measure Name         EWU Linsulation shell (electric)           Measure Description         Shell insulation upgrades applied in existing facilities including improved insulation in attics, b and sidewalls.           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The high efficiency case is any existing home shell measures.           Savings calculation method         Calculated using site-specific inputs           Savings sing scalculation method         Completed insulation project.           Gross kWh = SQFT × dettaxWh/SQFT × (1/R_pre - 1/R_post)         Gross kWh = SQFT × dettaxWh/SQFT pre - CHX/SQFT_post)           Savings Equation         SQFT = Square feet of insulation installed dettaXWh/SQFT = Average annual kWh reduction per SQFT of insulation R_post = R-Value of the new installed insulation Gross kWh = Stories × SQFT × (CFM/SQFT_per - CHX/SQFT_post) × deltakWh/CFM KW/kWh = Average annual kW reduction per kWh reduction Hours           Hours         Heating hours are characterized by the heating degree days for the facility. 4644.           Hours Source         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Wh/lyr savings source         Galculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           KWh/lyr savings source         Mix/A           Gas Heat MMBtu/yr savings note         Hix/A           Gas H	Sub-type	Shell
Measure Description         Shell insulation upgrades applied in existing facilities including improved insulation in attics, b and sidewalls.           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The high efficiency case is any existing home shell measures.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Completed insulation project.           Gross kWh = SOFT × dettakWh/SOFT < (lr, pre - 1/R_post)	Program Name	Income Eligible MultiFamily
Measure Description         and sidewalls.           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The high efficiency case includes increased weatherization insulation levels.           Energy Savings calculation method         Calculated using site specific inputs           Savings Principle         Gross KWH = SQFT × detlakWh/SQFT × (1/R_pre - 1/R_post)           Gross KWH = SQFT × detlakWh/SQFT = Average annual kWh reduction per SQFT of insulation         R_pre = R-Value of the existing insulation           Savings Equation         SQFT = Square feet of insulation installed         detlakWh/SQFT = Average annual kWh reduction per SQFT of insulation           R_post = R-Value of the existing insulation         Gross KWH = SQFT x detlaggere days for the facility, 4644.           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours Source         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh           Hours Source note         4#W/A           KWh/yr Savings source         Masachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Masachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Masachusetts Program Administrators.           KWh/yr savings note         #W/A           Gal Hat MMBtu/yr savings source         fin/A           Gas Heat MMBt	Measure Name	EW LI Insulation Shell (electric)
Measure Description         and sidewalls.           Baseline Description         The baseline efficiency case is any existing home shell measures.           Savings Principle         The high efficiency case includes increased weatherization insulation levels.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Completed insulation project.           Gross KWH = SQFT × dettaKWh/SQFT × (1/R_pre - 1/R_post)         Gross KWH = SQFT × dettaKWh/SQFT = A/Particle A/Partic		Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
Savings Principle         The high efficiency case includes increased weatherization insulation levels.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Completed insulation project.           Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)         Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)           Savings Equation         SQFT = Square feet of insulation installed           deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation         R_pre = R-Value of the existing insulation           R_post = R-Value of the existing insulation         R_post = R-Value of the existing insulation           Hours         Heating hours are characterized by the heating degree day for the facility, 4644.           Hours Ource         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Hours Source note         #N/A           KWh/ry savings source         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Progra	Measure Description	and sidewalls.
Savings Principle         The high efficiency case includes increased weatherization insulation levels.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Completed insulation project.           Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)         Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)           Savings Equation         SQFT = Square feet of insulation installed           deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation         R_pre = R-Value of the existing insulation           R_post = R-Value of the existing insulation         R_post = R-Value of the existing insulation           Hours         Heating hours are characterized by the heating degree day for the facility, 4644.           Hours Ource         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Hours Source note         #N/A           KWh/ry savings source         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Progra	Baseline Description	The baseline efficiency case is any existing home shell measures.
Energy Savings calculation method       Calculated using site specific inputs         Savings unit       Completed insulation project.         Gross KWh = SQFT > KeltaKWh/SQFT > (1/R_pre - 1/R_post)         Gross KWh = SQFT > KeltaKWh/SQFT > (1/R_pre - 1/R_post)         Savings Equation       SQFT = Square feet of insulation installed deltaKWh/SQFT = Average annual KWh reduction per SQFT of insulation R_pore = R-Value of the new installed insulation Gross KWh = Stories > SQFT = CFM/SQFT_post) × deltaKWh/CFM kW/kWh = Average annual kW reduction per KWh reduction         Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours       This value is an average BASE E0 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.         Hours source note       #N/A         KWh/yr savings source       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.         KWh/yr ravings note       MN/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings oute       #N/A         O       Gas Heat MMBtu/yr savings oute       #N/A	•	
Savings unit         Completed insulation project.           Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)         Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)           Gross kWh = Sors kWh × kW/kWh         Where:         Savings Equation           Savings Equation         SQFT = Square feet of insulation installed deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation R_pre = R-Value of the new installed insulation Gross kWh = Stories SQFT × (EM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM kW/kWh = Average annual kW reduction per kWh reduction           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours Source         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Hours Source         IM/A           KWh/yr savings source         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           KWh/yr savings note         MN/A           KW reduction         Calc           KW reduction note         Gas heat MMBtu/yr savings ouce           Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 00           Gas Heat MMBtu/yr saving		
Gross kWh = SQFT × deltakWh/SQFT × (1/R_pre - 1/R_post)           Gross kW = Gross kWh × kW/kWh           Where:           Savings Equation         SQFT = Square feet of insulation installed deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation R_pre = R-Value of the existing insulation Gross kWh = Stories × SQFT = (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM kW/kWh = Average annual kW reduction per KWh reduction           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours Source         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Hours source note         #N/A           KWh/yr savings source         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           KWh/yr savings note         #N/A           KW reduction         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           kW reduction note         Gacluated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           kW reduction note         #N/A           Gas Heat MMBtu/yr savings source         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.           KW reduction note         #N/A		
Gross kW = Gross kW + kW/kWh         Where:         Savings Equation       SQFT = Square feet of insulation installed deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation R_post = R-Value of the existing insulation Gross kWh = Stories × SQFT x (CM/SQFT_post) × deltakWh/CFM kW/kWh = Average annual kW reduction per kWh reduction         Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Surce       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Source       Hit value is an average BASE GO Annual Heating Degree Day value for weather stations in Rhu and southeastern Massachusetts based on NOAA 30-year data.         Hours source note       #N/A         KWh/yr savings       Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         KWh/yr savings note       #N/A         KW reduction       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         KW reduction note       Galculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         KW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings note		
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Savings Equation       SQFT = Square feet of insulation installed deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation R_pre = R-Value of the existing insulation Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM kW/KWh = Average annual kW reduction per kWh reduction         Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Source       This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.         Hours source note       #N/A         KWh/yr savings       Calc         KWh/yr savings note       #N/A         KW reduction source       Galculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts Program Administrators.       #W/A         KW reduction       Calc         KW reduction source       Galculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts Program Administrators.       #W/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         OII MMBtu/yr savings source       #N/A         OII MMBtu/yr savings note       #N/A         OII MMBtu/yr savings source       #N/A         OII MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings sou		
Savings Equation       SQFT = Square feet of insulation installed deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation R_pre = R-Value of the existing insulation Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM kW/KWh = Average annual kW reduction per kWh reduction         Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Source       This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.         Hours source note       #N/A         KWh/yr savings       Calc         KWh/yr savings note       #N/A         KW reduction source       Galculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts Program Administrators.       #W/A         KW reduction       Calc         KW reduction source       Galculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts Program Administrators.       #W/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         OII MMBtu/yr savings source       #N/A         OII MMBtu/yr savings note       #N/A         OII MMBtu/yr savings source       #N/A         OII MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings sou		Where
deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation         R_pre = R-Value of the existing insulation         R_pre = R-Value of the existing insulation         Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM         Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Source       This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh         Hours source note       #N/A         KWh/yr Savings       Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kWh/yr savings note       #N/A         kWv reduction source       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         Massachusetts Program Administrators.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gil MMBtu/yr savings note       #N/A         Olil MMBtu/yr sav		where:
deltakWh/SQFT = Average annual kWh reduction per SQFT of insulation         R_pre = R-Value of the existing insulation         R_pre = R-Value of the existing insulation         Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM         Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Source       This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh         Hours source note       #N/A         KWh/yr Savings       Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kWh/yr savings note       #N/A         kW reduction       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction source       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oli MMBtu/yr savings source       #N/A		
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R_post = R-Value of the new installed insulation         Gross KWh = Stories × SQFT × (CFM/SQFT_pre r CFM/SQFT_post) × deltakWh/CFM         KW/kWh = Average annual kW reduction per kWh reduction         Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Source       This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhe and southeastern Massachusetts based on NOAA 30-year data.         Hours source note       #N/A         KWh/yr Savings       Calc         KWh/yr savings source       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.         KWh/yr savings note       #N/A         KW reduction       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         KW reduction       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         KW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       O         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gill MMBtu/yr savings note       #N/A         Oill MMBtu/yr savings note       #N/A         Oill MMBtu/yr savings note       #N/A         Oill MMBtu/yr savings note		
Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM kW/kWh = Average annual kW reduction per kWh reduction           Hours         Heating hours are characterized by the heating degree days for the facility, 4644.           Hours Source         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rh and southeastern Massachusetts based on NOAA 30-year data.           Hours source note         #N/A           KWh/yr Savings         Calc           Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           kWh/yr savings note         #N/A           KWh/yr savings note         #N/A           kW reduction         Calc           Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           kWh/yr savings note         #N/A           kW reduction         Calc           KW reduction source         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).           kW reduction note         #N/A           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         #N/A           Gil MMBtu/yr savings source         #N/A           Oil MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A		
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Hours       Heating hours are characterized by the heating degree days for the facility, 4644.         Hours Source       This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhe and southeastern Massachusetts based on NOAA 30-year data.         Hours source note       #N/A         KWh/yr Savings       Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         KWh/yr savings source       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.         kWh/yr savings note       #N/A         KW reduction       Calc         KW reduction note       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       O         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A		Gross kWh = Stories × SQFT × (CFM/SQFT_pre - CFM/SQFT_post) × deltakWh/CFM
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Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kWh/yr savings source       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         kWh/yr savings note       #N/A         kW reduction       Calc         calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction       Calc         calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction source       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Light         HVAC Measures. Prepared for The New England State Program Working Gr	Hours source note	#N/A
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kWh/yr savings source       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.         kWh/yr savings note       #N/A         kW reduction       Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction note       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N		
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kWh/yr savings note       #N/A         kW reduction       Calc         kW reduction source       Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         kW reduction note       Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life note       GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Light HVAC Measures. Prepared for The New England State Program Working Group.         measure life note       #N/A         In-service rate (ISR)       1.00		
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Massachusetts Program Administrators.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Light HVAC Measures. Prepared for The New England State Program Working Group.         measure life note       #N/A         In-service rate (ISR)       1.00	WAY reduction course	
kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Light HVAC Measures. Prepared for The New England State Program Working Group.         measure life note       #N/A         In-service rate (ISR)       1.00	kw reduction source	
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Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Light         HVAC Measures. Prepared for The New England State Program Working Group.         measure life note       #N/A         In-service rate (ISR)       1.00		
Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Light         HVAC Measures. Prepared for The New England State Program Working Group.         measure life note       #N/A         In-service rate (ISR)       1.00		
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measure life       25         measure life source       GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Light         measure life note       HVAC Measures. Prepared for The New England State Program Working Group.         In-service rate (ISR)       1.00	Propane MMBtu/yr savings note	#N/A
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measure life source     HVAC Measures. Prepared for The New England State Program Working Group.       measure life note     #N/A       In-service rate (ISR)     1.00		GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life note #N/A In-service rate (ISR) 1.00	measure life source	
In-service rate (ISR) 1.00	measure life note	
In-service rate note All installations have 100% in-service rate since programs include verification of equipment in	In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF) 1.00	Savings Persistence Eactor (SDE)	1.00
Savings Persistence Factor source     #N/A       Savings Persistence Factor note     Savings persistence is assumed to be 100%.		

4.00
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rates are 100% since savings estimates are based on evaluation results.
0.01
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
1.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 398/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A

TRL Reference Number	RI 0043
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation & Air sealing
Sub-type	Weatherization
Program Name	Single Family Appliance Management
Measure Name	Weatherization (electric)
	Installation of weatherization measures such as air sealing and insulation in homes heated with electricity,
Measure Description	oil, or propane. Non-heating electric savings are achieved from reduced fan run time for heating and
	cooling systems.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Deemed
Savings unit	Completed weatherization project.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = Qty × deltakWh
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1616
W/h/h/m course	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
kWh/yr savings source	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.86
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low Income Weatherization Program. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
	12:00
In-service rate source	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
•	1.00
Realization rate energy (RRe)	1.00 #N/A
RRe source	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	137.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	368.56
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 4500 per job
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 4500 per job

TRL Reference Number	RI 0044
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation & Air sealing
Sub-type	Weatherization
Program Name	Single Family Appliance Management
Measure Name	Weatherization (oil)
	Installation of weatherization measures such as air sealing and insulation in homes heated with electricity,
Measure Description	oil, or propane. Non-heating electric savings are achieved from reduced fan run time for heating and
	cooling systems.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Deemed
Savings unit	Completed weatherization project.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	$Gross kWh = Qty \times deltakWh$
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	377
kW/b/ur covings course	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
kWh/yr savings source	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.2
WAY reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	28.1
	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
Oil MMBtu/yr savings source	Income Weatherization Program. Prepared for National Grid.
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
	#N/A
Propane MMBtu/yr savings source	,
Propane MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings note	#N/A 0
Propane MMBtu/yr savings note	#N/A 0 20
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	#N/A 0
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A 0 20
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	#N/A 0 20 GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	<ul> <li>#N/A</li> <li>0</li> <li>20</li> <li>GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.</li> </ul>

Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd dummer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR dwinter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         CF summer peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr </th <th>npact Model (2012).</th>	npact Model (2012).
Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         CF summer peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       Estimated using the demand allocation methodology described in: Cadmus Demand II         Prepared for the Massachusetts Program Administrators.       CF winter peak note         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00	npact Model (2012).
Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         Renote       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR dwinter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         RC f winter peak source       #Stimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: source       #N/A	npact Model (2012).
Realization rate energy (RRe)       1.00         RRe source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR dwinter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak note       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       171.89	npact Model (2012).
RRe source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak note       Estimated using the demand allocation methodology described in: Cadmus Demand In         Prepared for the Massachusetts Program Administrators.       CF winter peak source         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In         Prepared for the Massachusetts Program Administrators.       CF winter peak source         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Manual \$ savings       171.89         Annual \$ savings source / description       #N/A	npact Model (2012).
RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR dwinter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         Prepared for the Massachusetts Program Administrators.       CF winter peak note         CF winter peak note       #N/A         CF winter peak note       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Quarter savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings       171.89         Annual \$ savings note       #N/A	npact Model (2012).
RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF summer peak note       #N/A         CF winter peak note       #N/A         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A	npact Model (2012).
RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N	npact Model (2012).
RRd summer peak noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is 100% since gross savings values are based on evaluation results.Coincidence factor (CF) summer peak0.00CF summer peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak1.00CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/A	npact Model (2012).
RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A	npact Model (2012).
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       171.89         Annual \$ savings note       #N/A	npact Model (2012).
RRd winter peak noteRealization rate is 100% since gross savings values are based on evaluation results.Coincidence factor (CF) summer peak0.00CF summer peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak1.00CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/A	npact Model (2012).
Coincidence factor (CF) summer peak0.00CF summer peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak1.00CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/A	npact Model (2012).
CF summer peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak1.00CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/A	npact Model (2012).
CF summer peak sourcePrepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak1.00CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/A	npact Model (2012).
Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand In         Prepared for the Massachusetts Program Administrators.       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A	
Coincidence factor (CF) winter peak1.00CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings171.89Annual \$ savings note#N/AAnnual \$ savings note#N/A	
CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand In Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings171.89Annual \$ savings note#N/AAnnual \$ savings note#N/A	
CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       171.89         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A	
Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       171.89         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A	npact Model (2012).
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings171.89Annual \$ savings source / description#N/AAnnual \$ savings note#N/A	
Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       171.89         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A	
Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       171.89         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A	
Water / Sewer savings note       #N/A         Annual \$ savings       171.89         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A	
Annual \$ savings     171.89       Annual \$ savings source / description     #N/A       Annual \$ savings note     #N/A	
Annual \$ savings source / description #N/A Annual \$ savings note #N/A	
Annual \$ savings note #N/A	
One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.00	
Spill-Over (participant) 0.00	
Spill-Over (non-participant) 0.00	
Net-to-Gross 1.00	
Net-to-Gross source #N/A	
Net-to-Gross note The Net-to-Gross ratio is Assumed to be 100%.	
Gross Measure TRC unit \$ 4500 per job	
Gross Measure TRC source #N/A	
Gross Measure TRC note #N/A	
Incentive Unit \$ 4500 per job	

TRL Reference Number	RI 0031
Fuel	Electric
	Residential
Sector	Retrofit
Project Type	
Category	Building Shell
Туре	Insulation
Sub-type	Shell
Program Name	EnergyWise
Measure Name	EW SF Wx - GAS- Non Elec
Measure Description	Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
	and sidewalls.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
	GIOSS KW – QLY × UEILAKW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	251
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.13
kw reduction	
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
•••••••••••••••••••••••••••••••••••••••	20
measure life	
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
	Realization rate is 100% since gross savings values are based on evaluation results.
RRe note	
	1.00
RRe note	
RRe note RR demand (RRd) summer peak	1.00

RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI 0032
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Shell
Program Name	EnergyWise
Measure Name	EW SF Wx - OIL- Non Elec
Measure Description	Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
Baseline Description	and sidewalls. The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
	Deemed
Energy Savings calculation method	
Savings unit	Completed insulation project.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	336
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.18
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	23.68
Oil MMBtu/yr savings source	The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for National Grid
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.

RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	109.92
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	513.88
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2631 / participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1117 / participant

TPL Deference Number	0022
TRL Reference Number Fuel	RI_0033 Electric
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Shell
Program Name	EnergyWise
Measure Name	EW SF Wx-Electric - Elec
Measure Description	Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
	and sidewalls.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
5.	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1558
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.83
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
	1.00
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	66.59
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	513.88
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2298 / participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1657 / participant

TRL Reference Number	RI 0169
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	HVAC 0&M
Sub-type	HVAC Tune Up
Program Name	EnergyStar HVAC
Measure Name	CoolSmart AC Digital Check
Measure Description	Tune-up of an existing central AC system.
	The baseline efficiency case is a standard central air-conditioning system that does not operate according
Baseline Description	to manufacturer specifications.
	The high efficiency case is the same baseline system but which operates according to manufacturer
Savings Principle	specifications.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Completed tune-up of existing AC system
	Gross kWh = Tons × (kBtu/hr per ton) × 1/SEER × Hours_C × %SAVE
	Gross kW = Tons × (kBtu/hr per ton) × 1/EER × %SAVE
	Where:
	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation.
Savings Equation	Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
	12 kBtu/hr per ton = Conversion factor
	SEER = Seasonal Energy Efficiency Ratio of existing equipment
	Hours_C = Deemed average equivalent full load cooling hours
	5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working
	groups.
	EER = Peak efficiency of existing equipment
Hours	The equivalent full load cooling hours are 360 hours/year.
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	64.8
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kWh/yr savings source	Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.212
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kW reduction source	Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	NYSERDA Deemed Savings Database (Rev 11).
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
CF summer peak source	#N/A
CF summer peak note	Massachusetts Common Assumption
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Massachusetts Common Assumption
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 175 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 175 per measure

TRL Reference Number	RI 0168
Fuel	Electric
	Residential
Sector Project Type	Retrofit
Category	HVAC
	HVAC 0&M
Type	
Sub-type	Heat Pump Tune Up
Program Name	EnergyStar HVAC CoolSmart HP Digital Check
Measure Name Measure Description	Tune-up of an existing heat pump system.
Baseline Description	The baseline efficiency case is a standard residential heat pump system that does not operating according to manufacturer specifications.
Savings Principle	The high efficiency case is the same baseline system but which operates according to manufacturer specifications.
Energy Sovings colculation method	Calculated using deemed inputs
Energy Savings calculation method	
Savings unit	Completed tune-up of existing heat pump system
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER × Hours_C + 1/HSPF × Hours_H) × %SAVE Gross kW = Tons × (kBtu/hr per ton) × max[(1/EER),(1/HSPF)] × %SAVE
	Where: 3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
Savings Equation	12 kBtu/hr per ton = Conversion factor
	SEER = Seasonal Energy Efficiency Ratio of existing equipment
	HSPF = Heating efficiency of existing equipment
	Hours_C = Deemed average equivalent full load cooling hours
	Hours_H = Deemed average equivalent full load heating hours
	5%SAVE = Average percent demand reduction; National Grid assumption based on regional PA working
	groups.
	EER = Peak efficiency of existing equipment
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours Source	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
	373.4
kWh/yr Savings	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
kWh/yr savings source	Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.257
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	KEMA (2013). Project 25 Prescriptive Gas Program Final Evaluation Report. Prepared for Massachusetts
Sas ricat will bluy yr savings source	Energy Efficiency Program Administrators; Page 1-5
Gas Heat MMBtu/yr savings source	
	Energy Efficiency Program Administrators; Page 1-5
Gas Heat MMBtu/yr savings note	Energy Efficiency Program Administrators; Page 1-5 #N/A
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	Energy Efficiency Program Administrators; Page 1-5 #N/A 0
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A #N/A
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A 0
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A 0 4 #N/A 0
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A 0 0 #N/A #N/A #N/A #N/A
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A 0 0 #N/A #N/A 4 #N/A 5
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A 0 0 #N/A 0 0 5 GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A 0 4 W/A 0 5 5 GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	Energy Efficiency Program Administrators; Page 1-5 #N/A 0 #N/A #N/A 0 0 #N/A 0 0 5 GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.21
CF summer peak source	#N/A
CF summer peak note	Massachusetts Common Assumption
Coincidence factor (CF) winter peak	0.50
CF winter peak source	#N/A
CF winter peak note	Massachusetts Common Assumption
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 742 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI 0112
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Ducting
Sub-type	Duct Insulation
Program Name	EnergyStar HVAC
Measure Name	Duct Sealing - 100 CFM redcution in leaks 15% of flow to 5%
Measure Description	A 66% reduction in duct leakage from 15% to 5% of supplied CFM.
Baseline Description	The baseline efficiency case is assumes a 15% leakage.
Savings Principle	The high efficiency case is a system with duct leakage reduced by 66% to 5% leakage.
Energy Savings calculation method	Deemed
Savings unit	Complete duct sealing job for existing HVAC system
	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
	Where:
Savings Equation	where.
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
Hours	Delta kW = Deemed average kW reduction per unit. N/A
Hours Hours Source	#N/A
Hours source note	#N/A #N/A
	#N/A 212
kWh/yr Savings	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
White for any in the any inter-	
kWh/yr savings source	HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
	Company and United Illuminating;
kWh/yr savings note	#N/A
kW reduction	
	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential
kW reduction source	HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
	Company and United Illuminating;
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor source	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
	#N/A
RRe source	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 200 per measure

TRL Reference Number	RI_0101
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Cooling
Sub-type	Central AC
Program Name	EnergyStar HVAC
Measure Name	Early Replacement AC (EE)
Measure Description	Early replacement of a Central Air Conditioning or Heat Pump Unit. This measure accounts for the additional savings achieved for the early replacement of existing inefficient AC or heat pump units over
Deseline Deseriation	the remaining life of the existing equipment. The baseline efficiency case is assumed to be a typical 10-12 year-old central air-conditioning or heat
Baseline Description	pump unit with SEER 10, EER 8.5, and HSPF 7.0 For the retirement savings over the remaining life of the existing AC unit, the efficient case is a SEER 13,
Savings Principle	EER 11, HSPF 7.6 unit. For the high efficiency savings over the lifetime of the new AC unit, the efficient case is a new high efficiency EER 14.5, EER 12, 8.2 HSPF unit.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installation of a new efficient air conditioner.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee)
Savings Equation	<ul> <li>Where:</li> <li>3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation.</li> <li>Prepared for NSTAR, National Grid, Connecticut Light &amp; Power and United Illuminating.</li> <li>12 kBtu/hr per ton = Conversion factor</li> <li>SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment.</li> <li>SEER_ee = Seasonal Energy Efficiency Ratio of new equipment.</li> </ul>
Hours	Hours_C = Deemed average equivalent full load cooling hours
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	103
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction kW reduction source	0.273 ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Dil MMBtu/yr savings	
Dil MMBtu/yr savings source	#N/A
Dil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
n-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

	T
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 942 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

TRL Reference Number	RI 0102
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Cooling
Sub-type	Central AC
Program Name	EnergyStar HVAC
Measure Name	Early Replacement AC (Retire)
Measure Description	Early replacement of a Central Air Conditioning or Heat Pump Unit. This measure accounts for the additional savings achieved for the early replacement of existing inefficient AC or heat pump units over
	the remaining life of the existing equipment.
Baseline Description	The baseline efficiency case is assumed to be a typical 10-12 year-old central air-conditioning or heat pump unit with SEER 10, EER 8.5, and HSPF 7.0
Savings Principle	For the retirement savings over the remaining life of the existing AC unit, the efficient case is a SEER 13, EER 11, HSPF 7.6 unit. For the high efficiency savings over the lifetime of the new AC unit, the efficient case is a new high efficiency EER 14.5, EER 12, 8.2 HSPF unit.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installation of a new efficient air conditioner.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee)
Savings Equation	Where: 3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment. SEER_ee = Seasonal Energy Efficiency Ratio of new equipment. Hours_C = Deemed average equivalent full load cooling hours
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
Hours source note	Grid, Connecticut Light & Power and United Illuminating. #N/A
kWh/yr Savings	299
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	0.963
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	7 #N/A
measure life note	•
	Massachusetts Common Assumption
In-service rate (ISR) In-service rate source	1.00 #N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 942 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 300 per measure
	18 soo ber mensure

TRL Reference Number	RI_0123
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Heat Pumps
Sub-type	Early replacement
Program Name	EnergyStar HVAC
Measure Name	Early Replacement HP (EE)
Measure Description	Early replacement of a Central Air Conditioning or Heat Pump Unit. This measure accounts for the additional savings achieved for the early replacement of existing inefficient AC or heat pump units over
Baseline Description	the remaining life of the existing equipment. The baseline efficiency case is assumed to be a typical 10-12 year-old central air-conditioning or heat pump unit with SEER 10, EER 8.5, and HSPF 7.0
Savings Principle	For the retirement savings over the remaining life of the existing AC unit, the efficient case is a SEER 13, EER 11, HSPF 7.6 unit. For the high efficiency savings over the lifetime of the new AC unit, the efficient case is a new high efficiency EER 14.5, EER 12, 8.2 HSPF unit.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installation of a new efficient air conditioner.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) Where:
Savings Equation	<ul> <li>3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation.</li> <li>Prepared for NSTAR, National Grid, Connecticut Light &amp; Power and United Illuminating.</li> <li>12 kBtu/hr per ton = Conversion factor</li> <li>SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment.</li> <li>SEER_ee = Seasonal Energy Efficiency Ratio of new equipment.</li> <li>Hours_C = Deemed average equivalent full load cooling hours</li> </ul>
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	32
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction kW reduction source	0.038 ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Dil MMBtu/yr savings	0
Dil MMBtu/yr savings source	#N/A
Dil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
n-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.50
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
-	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 1000 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 850 per measure

TRL Reference Number	RI 0124
Fuel	Electric
Sector	Residential
Project Type	Retrofit
	HVAC
Category	Heat Pumps
Type	
Sub-type	Early replacement
Program Name	EnergyStar HVAC
Measure Name	Early Replacement HP (Retire) Early replacement of a Central Air Conditioning or Heat Pump Unit. This measure accounts for the
Mancura Description	
Measure Description	additional savings achieved for the early replacement of existing inefficient AC or heat pump units over
	the remaining life of the existing equipment.
Baseline Description	The baseline efficiency case is assumed to be a typical 10-12 year-old central air-conditioning or heat
	pump unit with SEER 10, EER 8.5, and HSPF 7.0 For the retirement savings over the remaining life of the existing AC unit, the efficient case is a SEER 13,
Savings Principle	EER 11, HSPF 7.6 unit. For the high efficiency savings over the lifetime of the new AC unit, the efficient
	case is a new high efficiency EER 14.5, EER 12, 8.2 HSPF unit.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installation of a new efficient air conditioner.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C
	Gross kW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee)
	Where:
Savings Equation	3 Tons = Deemed average equipment cooling capacity from Residential Central AC Regional Evaluation.
	Prepared for NSTAR, National Grid, Connecticut Light & Power and United Illuminating.
	12 kBtu/hr per ton = Conversion factor
	SEER_base = Seasonal Energy Efficiency Ratio of baseline equipment.
	SEER_ee = Seasonal Energy Efficiency Ratio of new equipment.
	Hours_C = Deemed average equivalent full load cooling hours
Hours	Equivalent full load hours are 1200 hours/year for heating and 360 hours/year for cooling
Hours Source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
Hours source note	#N/A
kWh/yr Savings	1189
kWh/yr savings source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
., .	Grid, Connecticut Light & Power and United Illuminating.
kWh/yr savings note	#N/A
kW reduction	1.199
kW reduction source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
5	

Covinge Develotones Factor covinge	45170
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.25
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF summer peak source	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.50
	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
CF winter peak source	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	Massachusetts Common Assumption
Gross Measure TRC unit	\$ 1000 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
	\$ 850 per measure
	א א א א א א א א א א א א א א א א א א א

TRL Reference Number	RI_0174
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Motors
Sub-type	ECM Motor
Program Name	EnergyStar HVAC
Measure Name	ECM Pumps
	Heating hot water circulation retrofit projects replacing the existing hot water circulation systems with
Measure Description	ECM pumps and zone valves.
Baseline Description	The baseline case is standard efficiency steady-state motor without variable speed capabilities.
Savings Principle	The efficient case is the installation of a pump with an electronically commutated motor (ECM) with variable speed capabilities on a boiler.
Energy Savings calculation method	Deemed
Savings unit	Installed ECM circulator pump retrofit project.
	Gross kWh = Qtv × deltakWh
1	
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	142.3
kWh/yr savings source	The Cadmus Group (2012). Impact Evaluation of the 2011-2012 ECM Circulation Pump Pilot Program.
kWh/yr savings note	#N/A
kW reduction	0.406
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life measure life source	The Cadmus Group (2012). Impact Evaluation of the 2011-2012 ECM Circulation Pump Pilot Program.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
nin demand (nind) summer peak	1.00

and the
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
0.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
1.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 750 per measure
#N/A
#N/A
\$ 300 per measure

TRL Reference Number	RI 0113
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Ducting
Sub-type	Duct Insulation
Program Name	EnergyStar HVAC
Measure Name	Energy Star QI with Duct Modifications
Measure Description	50% reduction in duct leakage from 20% to 10%. This measure may also include duct modifications.
Baseline Description	The baseline efficiency case is a system with an installation that is inconsistent with manufacturer specifications and may include leaky ducts.
Savings Principle	The high efficiency case is a system with an installation that is consistent with manufacturer specifications and may have reduced duct leakage.
Energy Savings calculation method	Deemed
Savings unit	Completed job
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	513
kWh/yr savings source	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light
	Company and United Illuminating;
kWh/yr savings note	#N/A
kW reduction	0.85
kW reduction source	RLW Analytics (2002). Market Research for the Rhode Island, Massachusetts, and Connecticut Residential HVAC Market. Prepared for National Grid, Northeast Utilities, NSTAR, Fitchburg Gas and Electric Light Company and United Illuminating;
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor (SFF)	#N/A
Savings Persistence Factor source	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A

i	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.26
CF summer peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	ADM Associated, Inc. (2009). Residential Central AC Regional Evaluation. Prepared for NSTAR, National
	Grid, Connecticut Light & Power and United Illuminating.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.25
Spill-Over (participant)	0.16
Spill-Over (non-participant)	0.00
Net-to-Gross	0.91
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1000 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 525 per measure

TRL Reference Number	RI 0108
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
	Cooling
Type	Window AC
Sub-type	
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Window AC Replacement Replacement of existing inefficient room air conditioners with more efficient models. This is only offered
Measure Description	
Deceline Decerintian	as a measure when an AC timer would not reduce usage during the peak period.
Baseline Description	The baseline efficiency case is the existing air conditioning unit.
Savings Principle	The high efficiency case is the high efficiency room air conditioning unit.
Energy Savings calculation method	Deemed
Savings unit	Replacement of existing window AC with high-efficiency window AC.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Calculated for Multifamily applications and not applicable for single family.
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Hours Source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
., 0	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
kw reduction source	Massachusetts Program Administrators.
kW reduction note	#N/A
	0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A #N/A
Oil MMBtu/yr savings	0
., .	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A

DD	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 380/audit with multiple installed measures

TRL Reference Number	RI 0085
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise MultiFamily
Measure Name	EW Programmable thermostat (electric)
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	$Gross kWh = Qty \times deltakWh$
	$Gross kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
Covingo Equation	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	Where:
	Oty - Total number of units
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
measure life source	
	Accessed on 10/12/2011.

measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.01
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
Coincidence factor (CF) winter peak	
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC source	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TRL Reference Number	RI 0080
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	Income Eligible MultiFamily
Measure Name	EW Programmable thermostat (electric)
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A 0
Oil MMBtu/yr savings Oil MMBtu/yr savings source	
	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life measure life source	15 Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.

measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC source	#N/A
Incentive Unit	\$ 380/audit with multiple installed measures
	la sooyaddir with multiple instaned measures

TRL Reference Number	RI 0077
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise
Measure Name	EW SF Programmable Thermostat (Electric heat only)
Measure Name	
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = $Qty \times deltakWh$
	Gross kW = $Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	Gloss Wiviblu_Flopane - Qty × deitawiviblu_Flopane
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit
Llouro	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	330
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
	4517.6
kWh/yr savings note	#N/A
kWh/yr savings note kW reduction	0.176
kW reduction kW reduction source	0.176 Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction kW reduction source kW reduction note	0.176Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).Prepared for the Massachusetts Program Administrators.#N/A
kW reduction kW reduction source	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts Program Administrators.
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         #N/A         #N/A
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings note Propane MMBtu/yr savings	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         #N/A         #N/A
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings note Oil MMBtu/yr savings note Propane MMBtu/yr savings	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         0         g         0         0         #N/A         0         0         0         0         0         #N/A         0         0         0         0         #N/A         0
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         %N/A         %N/A         %N/A         %N/A
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         #N/A         #N/A
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings note Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         0
kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings note Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0.176         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         #N/A         0         The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts         Program Administrators.         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         Ø         15         Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.02
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.80
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	•
Gross weasure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	
	2 790/audit with multiple installed measures Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June #N/A

TRL Reference Number	RI 0433
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise
Measure Name	EW SF Programmable Thermostat (Oil only)
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	$Gross kWh = Qty \times deltakWh$
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	104
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
kWh/yr savings note	#N/A
kW reduction	0.176
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note Gas Heat MMBtu/yr savings	#N/A 0
Gas Heat MMBtu/yr savings	The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	#N/A 0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A #N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	#N/A 0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
measure life note	#N/A 1.00
In-service rate (ISR)	

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
	j 7 50/ audit with multiple installed measures
Gross Measure TRC source	
	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June #N/A

TRL Reference Number	RI 0081
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise
Measure Name	EW SF WiFi Thermostat
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross kWh = Qty × deltakWh Gross kW = Qty × deltakW Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Gross MMBtu_Oil = Qty × deltaMMBtu_Oil Gross MMBtu_Propane = Qty × deltaMMBtu_Propane Where:
	Qty = Total number of units. deltakWh = Average annual kWh reduction per unit. deltakW = Average kW reduction per unit. deltaMMBtu_Gas = Average annual natural gas reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	104
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
kWh/yr savings note	#N/A
kW reduction	0.231
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
measure life note	#N/A

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC source Gross Measure TRC note	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June #N/A

TRL Reference Number	RI 0078
Fuel	Electric
Sector	Residential
Project Type	Retrofit
	HVAC
Category	Controls
Type	
Sub-type	Thermostat
Program Name	EnergyWise MultiFamily
Measure Name	EW WiFi programmable thermostat (electric)
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = Qty × deltakWh
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_on Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
Kvvn/ yr Savings	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
kwiiy yi savings source	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	#N/A 0
	The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts
Gas Heat MMBtu/yr savings source	Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
	1

	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
measure life source	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
	IS 305/audit with multiple installed measures
Gross Measure TRC unit	\$ 305/audit with multiple installed measures Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
	\$ 305/audit with multiple installed measures Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June #N/A

TRL Reference Number	RI 0150
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Heating
Sub-type	Efficient Heating
	Single Family Appliance Management
Program Name	
Measure Name	Heating system replacement (oil)
Measure Description	Replacement of existing oil heating system with a new high efficiency system. Electric savings can be attributed to reduced fan run time and reduced usage of electric space heaters.
Baseline Description	The baseline efficiency case is the existing inefficient heating equipment.
Savings Principle	The high efficiency case is the new efficient heating equipment.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency heating system.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	$Gross kWh = Qty \times deltakWh$
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	132
kWh/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.07
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0 The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal
Gas Heat MMBtu/yr savings source	
	Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	18.4
Oil MMBtu/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low Income Weatherization Program. Prepared for National Grid.
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace.
measure life note	#N/A

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	159.36
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	249.20
-	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	4500 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

	RI 0153
TRL Reference Number Fuel	Electric
Sector Project Type	Residential Retrofit
, ,,	HVAC
Category	Heating
Type Sub-type	Efficient Heating
· ·	EnergyStar HVAC
Program Name Measure Name	Oil Heat Replacement
Measure Name	
Measure Description	Replacement of existing oil or propane heating system with a new high efficiency system. Electric savings can be attributed to reduced fan run time and reduced usage of electric space heaters.
Baseline Description	The baseline efficiency case is the existing inefficient heating equipment.
Savings Principle	The high efficiency case is the new efficient heating equipment.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency heating system.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	132
kWh/yr savings source	The Cadmus Group, Inc. (2012). Low Income Single Family Impact Evaluation. Prepared for the Electric and Gas Program Administrators of Massachusetts.
kWh/yr savings note	#N/A
kW reduction	0.07
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	18.4
Oil MMBtu/yr savings source	The Cadmus Group, Inc. (2012). Low Income Single Family Impact Evaluation. Prepared for the Electric and
	Gas Program Administrators of Massachusetts.
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas Residential Furnace.
measure life note	#N/A
In-service rate (ISR)	1.00

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.01
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 500 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 200 per measure

TRL Reference Number	RI_0079
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	Single Family Appliance Management
Measure Name	Programmable thermostat
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross kWh = Qty × deltakWh Gross kW = Qty × deltakW Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Gross MMBtu_Oil = Qty × deltaMMBtu_Oil Gross MMBtu_Propane = Qty × deltaMMBtu_Propane Where:
	Qty = Total number of units. deltakWh = Average annual kWh reduction per unit. deltakW = Average kW reduction per unit. deltaMMBtu_Gas = Average annual natural gas reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	3.2
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
	In A.

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.03
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	N/A

FuelElectricSectorResidentialProject TypeRetrofitCategoryHVACTypeControlsSub-typeThermostatProgram NameEnergyStar ProductsMeasure NameWifi Programmable ThermostatMeasure DescriptionInstallation of programmable thermostats with the ability to adjust heating or air-conditioning operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operativesBaseline DescriptionThe baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.		
Sector         Residential           Project Type         Retrofit           Category         HVAC           Type         Controls           Sub-type         Thermostat           Program Name         EnergyStar Products           Measure Name         Wrif Programmable Thermostat           Measure Name         Wrif Programmable Thermostat           Measure Description         The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.           Savings Principle         The high efficiency case is an HVAC system providing space heating without a programmable thermostat.           Savings calculation method         Deemed           Savings unit         Per thermostat           Gross SWM = dettakWh_custom         Gross SWM = dettakWL           Gross SWM = Qty velotaWW         Gross SMMBtu_Gas           Gross MMBtu_Gas = Qty velotaMMBtu_Gas         Gross MMBtu_Gas = Qty velotaMMBtu_Gas           Savings Equation         Where:         Qty = Total number of units.           dettaWH = Average annual kWh reduction per unit.         dettaWH = Average annual natural gas reduction per unit.           dettaWH = Average annual antural gas reduction per unit.         dettaWW = Average annual natural gas reduction per unit.           Hours Source         MYA         Meange annual natural gas reduction per unit. </td <td>TRL Reference Number</td> <td>RI_0407</td>	TRL Reference Number	RI_0407
Project Type         Retrofit           Category         HYAC           Type         Controls           Sub-type         Thermostat           Program Name         EnergyStar Products           Measure Name         Wifi Programmable Thermostat           Measure Description         Installation of programmable thermostats with the ability to adjust heating or air-conditioning operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operatives according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operatives and HVAC system providing space heating with a programmable thermostat.           Savings principle         The high efficiency case is an HVAC system providing space heating with a programmable thermostat           Savings unit         Gross KWh = deltakW_sp_custom           Gross KWh = deltakWh_group custom         Gross KMBstu_Gla = Qty × deltakWh           Gross KMBstu_Ori = Qty × deltakWh         Gross KMBstu_Propane = Qty × deltaMMBtu_Group on th.           dettakWh = Average KWH = dettakWh         Gross KMBstu_Propane = Qty × deltaMMBtu_Group on th. <td></td> <td></td>		
Category       HVAC         Type       Controls         Sub-type       Thermostat         Program Name       EnergyStar Products         Measure Name       Wifi Programmable Thermostat         Measure Name       Installation of programmable thermostats with the ability to adjust heating or air-conditioning opera times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper distance of the presentation method         Savings calculation method       Deemed         Savings Equation       For thermostat         Where:       Qty = Total number of units.         GetastWM = Qt > deltaMMBtu_Ola = Average annual antural gas reduction per unit.         deltaMMBtu_Ola = Average annual antural gas reduction per unit.         deltaMMBtu_Ola = Average annual prop		
Type         Controls           Sub-type         Thermostat           Program Name         EnergyStar Products           Measure Name         Wifl Programmable Thermostat           Measure Description         Installation of programmable thermostats with the ability to adjust heating or air-conditioning opera times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operations           Baseline Description         The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.           Savings Principle         The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.           Energy Savings calculation method         Deemed           Savings unit         Per thermostat           Gross KWh = deltakW, custom         Gross SW mer KW = deltakW, sp_custom           Gross SW inter KW = deltakW, pp_custom         Gross SW ME VQ + v deltakW           Gross MMBtu_Oil = Qty × deltaMMBtu_Gas         Gross MMBtu_Oil Gross SMMBtu_Propane = Qty × deltaMMBtu_Propane           Savings Equation         Where:         Qty = Total number of units.           detat&Wh = Average annual kWh reduction per unit.         deltat&Wh = Average annual oil reduction per unit.           detat&Wh = Average annual oil reduction per unit.         deltat&WMBtu_Oil = Average annual and gas reduction per uni	• • • •	
Sub-type       Thermostat         Program Name       EnergyStar Products         Measure Name       Wiff Programmable Thermostat         Measure Description       Installation of programmable thermostats with the ability to adjust heating or air-conditioning opera times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper thermostat.         Savings Principle       The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.         Savings unit       Per thermostat         Gross KWh = deltakWh_custom       Gross SkWh = deltakW.sp_custom         Gross SkWh = deltakW.sp_custom       Gross SkWh = deltakW.yp_custom         Gross SkWh = Qtr × deltakW.       Gross SkWh = Qtr × deltakWh         Gross SkWh = Qtr × deltakWh       Gross SkWh = Qtr × deltakWh         Gross SkWh = Qtr × deltakWh       Gross SkMBBu_GB = Qtr × deltaMMBtu_GB S         Gross KWH = Qtr × deltakWhEu_Ga Gross MMBtu_Di = Qtr × deltaMMBtu_Cil       Gross SkMBtu_Qtr = Qtr × deltaMMBtu_Propane         Savings Equation       Where:       Qtr = Total number of units.         deltat&Wh = Average annual kWh reduction per unit.       deltat&MBtu_Qi = Average annual altural gas reduction per unit.         deltat&MBtu_Qi = Average annual propane reduction per unit.       deltat&MBtu_Qi = Average annual propane reduction per unit.         Hours Source       #N/A       M/A       M/A		
Program Name         EnergyStar Products           Measure Name         Wifi Programmable Thermostat           Measure Description         Installation of programmable thermostats with the ability to adjust heating or air-conditioning opera times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper installed.           Savings Principle         The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.           Savings calculation method         Deemed           Savings unit         Gross SWH = 0detakWwp_custom Gross Swmere KW = deltakWwp_custom Gross SWH = 0dy × deltakWh Gross SMMBtu_OI = 0dy × deltaMMBtu_Gas Gross MMBtu_OI = 0dy × deltaMMBtu_Gis Gross MMBtu_OI = 0dy × deltaMMBtu_OI Gross SMBtu_OI = 0dy × deltaMMBtu_OI Gross SMMBtu_OI = 0dy × deltaMMBtu_OI Gross MMBtu_OI = 0dy × deltaMMBtu_OI Gross MMBtu_OI = 0dy × deltaMMBtu_OI Gross SMMBtu_OI = 0dy × deltaMMBtu_OI Gross MMBtu_OI = 0dy × del		
Measure Name         Wfi Programmable Thermostat           Measure Description         Installation of programmable thermostats with the ability to adjust heating or air-conditioning oper times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper times according to a pre-set schedule to meet occupancy needs and minimize redundant the programmable thermostat.           Savings Principle         The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat installed.           Energy Savings calculation method         Deemed           Savings unit         Per thermostat           Gross SWh - deltakW_sp_custom         Gross SWh - deltakW_sp_custom           Gross SWh - deltakW_sp_custom         Gross SWh - deltakW_sp_custom           Gross SWh = Qty × deltakW         Gross SWh Gross MMEtu_Gas           Gross SWh = Qty × deltakW         Gross SWh Gross MMEtu_Gas           Gross MMEtu_Gas = Qty × deltaMMBtu_Oil         Gross MMEtu_Gas = Qty × deltaMMBtu_Oil           Gross MMEtu_Gas = Average annual kWh reduction per unit.         deltakWh = Average Wreduction per unit.           deltaMMBtu_Gas = Average annual intral gas reduction per unit.         deltaMMBtu_Gas           Hours         N/A           Hours Source         #N/A           HV/A         MA           KWh/ry savings note         #N/A           KWh/ry savings note         #N/A <t< td=""><td></td><td></td></t<>		
Measure Description         Installation of programmable thermostats with the ability to adjust heating or air-conditioning operatives schedule to meet occupancy needs and minimize redundant HVAC operatives.           Baseline Description         The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.           Savings Principle         The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.           Energy Savings calculation method         Deemed           Savings unit         Per thermostat           Gross Summer KW = deltakW_pcustom         Gross SWINE W = deltakW_pcustom           Gross SWIN = 0ty veletakWh         Gross SWIN = 0ty veletakWh           Gross SWIN = 0ty veletakWh         Gross SWIN = 0ty veletakWh           Gross SWIN = 0ty veletakWh         Gross SWIN = 0ty veletakWh           Gross SWIN = 0ty veletakWh         Gross SWINE QI = 0ty veletakMBtu_Oil           Gross SWIN = 0ty veletakWh Gross MMBtu_QI = 0ty veletakMMBtu_Oil         Gross SWINE QI = 0ty veletakMMBtu_Oil           Gross SWINE QI = 0ty veletakMMBtu_QI = 0tit, deltakWh = Average annual kWh reduction per unit.         deltakWm = Average annual antural gas reduction per unit.           deltakWh = Average annual kWh reduction per unit.         deltakMBtu_OID         deltakWh = 0tit           Hours Source         MNA         MINA         MINA           KWh/ry savings note         MNA		
Measure Description         times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC oper.           Baseline Description         The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.           Savings Principle         The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.           Energy Savings calculation method         Deemed           Savings unit         Per thermostat           Gross Summer KW = deltakW_p_custom         Gross Summer KW = deltakW_p_custom           Gross Summer KW = deltakW_D_custom         Gross SW = Qt y deltaWM           Gross SW = Qt y deltaWL         Gross MMBtu_Gas           Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Gross MMBtu_OI = Qty × deltaMMBtu_OI           Gross MMBtu_OI = Qt y × deltaMMBtu_OI         Gross MMBtu_Cas = Average annual kWh reduction per unit.           deltakW = Average AW reduction per unit.         deltakW = Average annual kWh reduction per unit.           deltakW = Average annual kWh reduction per unit.         deltaMMBtu_Gas = Average annual parae reduction per unit.           Hours         N/A         Moreage annual propane reduction per unit.           Hours Source         #N/A         Moreage annual propane reduction per unit.           Hours Source         #N/A         Moreage annual propane reduction per unit.           Hours Source	Measure Name	Wifi Programmable Thermostat
Baseline Description         thermostat.           Savings Principle         The high efficiency case is an HVAC system providing space heating with a programmable thermostal installed.           Energy Savings calculation method         Deemed           Savings unit         Per thermostat           Gross SWh = deltakWh_custom         Gross SWh = deltakW_sp_custom           Gross SWh = Qty × deltakW         Gross SWh = Qty × deltakWh           Gross SWh = Qty × deltakWh         Gross SWh = Qty × deltakWh           Gross SWh = Qty × deltakWh         Gross SWh = Qty × deltakWh           Gross SWM = Qty × deltakWh         Gross SWM = Qty × deltakWh           Gross SWM = Qty × deltakWh         Gross SWM = Qty × deltakMBtu_Oil           Gross SMMBtu_Oil = Qty × deltaMMBtu_Oil         Gross SMMBtu_Oil = Qty × deltaMMBtu_Oil           Gross SMMBtu_Oil = Qty × deltaMMBtu_Oil         Gross SMMBtu_Oil = Qty × deltaMMBtu_Oil           Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross AWH = Qty × deltaWh           Savings Equation         Where:         Qty = Total number of units.           deltaWh = Average annual kWh reduction per unit.         deltaWM = Average annual on a ural gas reduction per unit.           deltaWMBtu_Gis = Average annual propane reduction per unit.         deltatMMBtu_Gis = Average annual propane reduction per unit.           Hours         N/A         Mi/A         Mi/A	Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Savings Principle       installed.         Energy Savings calculation method       Deemed         Savings unit       Per thermostat         Gross KWh = deltakWh_custom       Gross Summer KW = deltakW.sp_custom         Gross Swinter kW = deltakWwp_custom       Gross Swinter kW = deltakWup_custom         Gross SWH = Qty × deltakWh       Gross SWH = Qty × deltakWh         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas       Gross MMBtu_Gas = Qty × deltaMMBtu_Dil         Savings Equation       Where:       Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.       deltaMMBtu_Sas = Average annual al Vreduction per unit.         deltaMMBtu_Sas = Average annual oil reduction per unit.       deltaMMBtu_Coil = Average annual oil reduction per unit.         Hours       N/A       M/A         Hours Source note       #N/A       #N/A         Hours Source note       #N/A       M/A         KWh/yr savings source       #N/A       M/A         KWh/yr savings source       #N/A       M/A         KW reduction not       0.23       M/A         KW reduction note       #N/A       M/A         Gross Source       #N/A       Gross Average annual not per unit.         GettaMMBtu_frasvings note       #N/A       Gross a veerage annual propane reduction per unit. </td <td>Baseline Description</td> <td></td>	Baseline Description	
Installed. Installed. Inrergy Savings calculation method Savings unit Per thermostat Gross Wh = deltakWh_custom Gross Summer W# = deltakW_sp_custom Gross Wh = Qty × deltakWh Gross KW = Qty × deltakWh Gross KW = Qty × deltakWh Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Gross MMBtu_Gi = Qty × deltaMMBtu_Oil Gross MMBtu_Oil = Qty × deltaMMBtu_Oil Gross MMBtu_Oil = Qty × deltaMMBtu_Oil Gross MMBtu_Ci = Qty × deltaMMBtu_Propane Qty = Total number of units. deltakWh = Average annual kWh reduction per unit. deltaMMBtu_Gas = Average annual natural gas reduction per unit. deltaMMBtu_Gas = Average annual oil reduction per unit. deltaMMBtu_Gi = Average annual oil reduction per unit. deltaMMBtu_Gas = Average annual oil reduction per unit. deltaMMBtu_Gas = Average annual oil reduction per unit. deltaMMBtu_Gas = Average annual propane reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit. deltaMMBtu_Oil = Average annual propane reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit. Hours N/A Hours N/A Hours Source #N/A KWh/yr savings note #N/A KWh/yr savings note #N/A KW reduction note #N/A Gas Heat MMBtu/yr savings note #N/A Gas Heat MMBtu/yr savings note #N/A Ol O Ol MMBtu/yr savings source #N/A	Source Dringinle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat
Savings unit       Per thermostat         Gross KWh = deltakW_sp_custom         Gross Swinter kW = deltakW_sp_custom         Gross SWh = Qty × deltakW         Gross KW = Qty × deltakW         Gross MWBtu_Gas = Qty × deltaMMBtu_Gas         Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Casa = Qty × deltaMMBtu_Oil         Gross MMBtu_Casa = Qty × deltaMMBtu_Propane         Where:         Qty = Total number of units.         deltakWb = Average annual kWh reduction per unit.         deltakWh = Average annual kWh reduction per unit.         deltaMMBtu_Gas = Qty × deltaMMBtu_Propane         Hours       N/A         Hours N/A       N/A         Hours N/A       N/A         KWh/yr savings source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings source       #N/A         KW reduction source       #N/A         KW reduction note       #N/A         KW reduction source       #N/A         Gas Heat MMBtu/yr savings note       #N/A	Savings Principle	installed.
Gross kWh = deltakWh_custom         Gross Summer kW = deltakW_wp_custom         Gross Sitter kW = deltakW, wp_custom         Gross KW = Qty × deltakWh         Gross MMBtu_Gas = Qty × deltakWh         Gross MMBtu_Oil = Qty × deltaMMBtu_Gas         Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Propane = Qty × deltaMMBtu_Propane         Where:         Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.         deltakWh = Average annual kWh reduction per unit.         deltakWh = Average annual antural gas reduction per unit.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         deltaMMBtu_Gas = Average annual propane reduction per unit         Hours       N/A         Hours Source       #N/A         Hours Source note       #N/A         KWh/yr savings source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KW reduction source       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Hea	Energy Savings calculation method	Deemed
Gross Summer kW = deltakW_sp_custom         Gross SWinter KW = deltakW_wp_custom         Gross KW = Qty × deltakW         Gross KW = Qty × deltakW         Gross SMMBtu_Gas = Qty × deltaMMBtu_Gas         Gross MMBtu_oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Oil = Qty × deltaMMBtu_Propane         Savings Equation         Where:         Qty = Total number of units.         deltakW = Average annual kWh reduction per unit.         deltakW = Average annual kWh reduction per unit.         deltaMMBtu_Gas = Average annual nural gas reduction per unit.         deltaMMBtu_Gas = Average annual nural gas reduction per unit.         deltaMMBtu_Propane = Average annual oil reduction per unit.         deltaMMBtu_Propane = Average annual propane reduction per unit.         deltaMMBtu_Yropane = Average annual oil reduction per unit.         deltaMMBtu_Yropane = Average annual oil reduction per unit.         deltaMMBtu_Yropane = Average annual propane reduction per unit.         Hours Source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KW reduction source       #N/A         KW reduction source       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings noute<	Savings unit	Per thermostat
Gross Winter kW = deltakW_wp_custom         Gross KWh = Qty × deltakWh         Gross KWh = Qty × deltakWh         Gross KWL = Qty × deltakWb         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Gross MMBtu_Gas = Qty × deltaMMBtu_Oil         Gross MMBtu_Propane = Qty × deltaMMBtu_Propane         Where:         Qty = Total number of units.         deltakW = Average annual kWh reduction per unit.         deltakW = Average annual oil reduction per unit.         deltakWh = Average annual oil reduction per unit.         deltaMMBtu_Oil = Average annual oil reduction per unit.         deltaMMBtu_Propane = Average annual oil reduction per unit.         deltaMMBtu_Oil = Average annual oil reduction per unit.         deltaMMBtu_Propane = Average annual oil reduction per unit.         deltaMMBtu_Propane = Average annual propane reduction per unit         Hours       N/A         Hours source note       #N/A         KWh/yr savings source       #N/A         KWh/yr savings source       #N/A         KW reduction note       #N/A         KW reduction note       #N/A         KW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A		Gross kWh = deltakWh_custom
Gross kWh = Qty × deltakWh         Gross kW = Qty × deltakW         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Oil = Qty × deltaMMBtu_Propane         Savings Equation         Where:         Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.         deltakWh = Average annual kWh reduction per unit.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         deltaMMBtu_Propane = Average annual natural gas reduction per unit.         deltaMMBtu_Propane = Average annual propane reduction per unit.         deltaMMBtu_Propane = Average annual propane reduction per unit.         Hours       N/A         Hours Source       #N/A         KWh/yr savings       104         KWh/yr savings note       #N/A         kWr reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Oli IMMBtu/yr savings note       #N/A         Oli IMMBtu/yr savings note       #N/A         Oli IMMBtu/yr savings note       #N/A         Oli IMMBtu/yr savings note </td <td></td> <td></td>		
Gross kWh = Qty × deltakWh         Gross kW = Qty × deltakW         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Oil = Qty × deltaMMBtu_Propane         Savings Equation         Where:         Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.         deltakWh = Average annual kWh reduction per unit.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         deltaMMBtu_Propane = Average annual natural gas reduction per unit.         deltaMMBtu_Propane = Average annual propane reduction per unit.         deltaMMBtu_Propane = Average annual propane reduction per unit.         Hours       N/A         Hours Source       #N/A         KWh/yr savings       104         KWh/yr savings note       #N/A         KWr eduction note       #N/A         KWr reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Olil MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note		
Gross kW = Qty × deltakW         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Propane = Qty × deltaMMBtu_Propane         Savings Equation         Where:         Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.         deltakWh = Average kW reduction per unit.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         deltaMMBtu_Propane = Average annual oil reduction per unit         deltaMMBtu_Propane = Average annual oil reduction per unit         deltaMMBtu_Propane = Average annual propane reduction per unit         Hours       N/A         Hours Source       #N/A         Hours Source note       #N/A         kWh/yr Savings source       #N/A         kWh/yr savings source       #N/A         kW reduction note       #N/A         kW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gil MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source		
Savings EquationGross MMBtu_Gas = Qty × deltaMMBtu_Gas Gross MMBtu_Dil = Qty × deltaMMBtu_Propane Gross MMBtu_Propane = Qty × deltaMMBtu_Propane Qty = Total number of units. deltakWh = Average annual kWh reduction per unit. deltakWh = Average kW reduction per unit. deltaMMBtu_Gas = Average annual natural gas reduction per unit. deltaMMBtu_Gil = Average annual oil reduction per unit deltaMMBtu_Dil = Average annual natural gas reduction per unit deltaMMBtu_Gil = Average annual natural gas reduction per unit deltaMMBtu_Oil = Average annual natural gas reduction per unit deltaMMBtu_Oil = Average annual natural gas reduction per unitHoursN/AHours Source#N/AHours Source note#N/AKWh/yr Savings104KWh/yr savings note#N/AKW reduction source#N/AKW reduction note#N/AGas Heat MMBtu/yr savings0Gas Heat MMBtu/yr savings0Gas Heat MMBtu/yr savings0Olil MMBtu/yr savings0Olil MMBtu/yr savings0Olil MMBtu/yr savings source#N/AOlil MMBtu/yr savings source#N/AOlil MMBtu/yr savings source#N/AOlil MMBtu/yr savings source#N/AOlil MMBtu/yr savings source0Olil MMBtu/yr savings source#N/AOlil MMBtu/yr savings source#N/A </td <td></td> <td>Gross kW = Qty × deltakW</td>		Gross kW = Qty × deltakW
Gross MMBtu_Oil = Qty × deltaMMBtu_Oil         Gross MMBtu_Propane = Qty × deltaMMBtu_Propane         Savings Equation         Where:         Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.         deltakWh = Average annual kWh reduction per unit.         deltakWh = Average annual kWh reduction per unit.         deltakMMBtu_Gas = Average annual oil reduction per unit.         deltaMMBtu_Gil = Average annual oil reduction per unit         deltaMMBtu_Oil = Average annual oil reduction per unit         deltaMMBtu_Oil = Average annual oil reduction per unit         deltaMMBtu_Soil = Average annual oil reduction per unit         deltaMMBtu_Propane = Average annual oil reduction per unit         deltaMMBtu_Soil = Average annual oil reduction per unit         Hours Source       #N/A         Hours source note       #N/A         kWh/yr savings       104         kWh/yr savings note       #N/A         kWh/yr savings note       #N/A         kW reduction source       #N/A         kW reduction source       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A		
Savings EquationGross MMBtu_Propane = Qty × deltaMMBtu_PropaneSavings EquationWhere:Qty = Total number of units. deltakWh = Average annual kWh reduction per unit. deltakW = Average kW reduction per unit. deltaMMBtu_Gas = Average annual natural gas reduction per unit. deltaMMBtu_Gas = Average annual oil reduction per unit deltaMMBtu_Oil = Average annual oil reduction per unit deltaMMBtu_Propane = Average annual propane reduction per unit deltaMMBtu_Yr savingsHoursN/AHours Source#N/AHours Source note#N/AkWh/yr Savings source#N/AkWh/yr savings note#N/AkW reduction0.23kW reduction source#N/AkW reduction note#N/AGas Heat MMBtu/yr savings source#N/AGas Heat MMBtu/yr savings source#N/AGas Heat MMBtu/yr savings source#N/AOII MMBtu/yr		
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deltakWh = Average annual kWh reduction per unit. deltakW = Average kW reduction per unit. deltaMMBtu_Gas = Average annual natural gas reduction per unit. deltaMMBtu_Oil = Average annual oil reduction per unit deltaMMBtu_Propane = Average annual propane reduction per unitHoursN/AHours Source#N/AHours source note#N/AkWh/yr savings104kWh/yr savings note#N/AkW reduction0.23kW reduction note#N/AGas Heat MMBtu/yr savings0Gas Heat MMBtu/yr savings note#N/AGas Heat MMBtu/yr savings0Gas Heat MMBtu/yr savings0Oil MMBtu/yr savings source#N/A		Oty = Total number of units
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Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A		
Oil MMBtu/yr savings     0       Oil MMBtu/yr savings source     #N/A		
Oil MMBtu/yr savings source #N/A	· · · ·	
Oil MMBtu/yr savings note  #N/A		
	· · · ·	
Propane MMBtu/yr savings 0		
Propane MMBtu/yr savings source #N/A		
Propane MMBtu/yr savings note #N/A		
Energy Reference(s) & table(s) notes 0		
measure life 15		
measure life source #N/A		
measure life note #N/A	measure life note	
In-service rate (ISR) 1.00	In-service rate (ISR)	
In-service rate source #N/A	In-service rate source	#N/A
In-service rate note #N/A	In-service rate note	#N/A
Savings Persistence Factor (SPF) 0.00	Savings Persistence Factor (SPE)	

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak source	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
	#N/A #N/A
	0.00
	#N/A
CF summer peak note	#N/A
	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 150 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 50 per measure

TRL Reference Number	RI 0369
Fuel	Electric
Sector	Residential
Project Type	Retrofit
	HVAC
Category	Controls
Type	Thermostat
Sub-type	
Program Name	Income Eligible MultiFamily
Measure Name	Wifi Programmable Thermostat
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Per thermostat
<u> </u>	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	$Gross kWh = Qty \times deltakWh$
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_On = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	104
kWh/yr savings source	104 #N/A
kWh/yr savings note	#N/A #N/A
kWn/yr savings note	#N/A 0.231
kW reduction source	0.231 #N/A
kW reduction source kW reduction note	#N/A #N/A
	#N/A 0
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	6.6 HN / A
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
	145175
In-service rate source	#N/A
In-service rate source In-service rate note Savings Persistence Factor (SPF)	#N/A #N/A 0.00

Savings Persistence Factor source	#N/A
	#N/A #N/A
Savings Persistence Factor note	1.00
Realization rate energy (RRe)	
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 380/audit with multiple installed measures

TRL Reference Number	RI 0095
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyStar HVAC
Measure Name	WiFi programmable thermostat with cooling (gas)
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating
	times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation. The baseline efficiency case is an HVAC system providing space heating without a programmable
Baseline Description	thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = $Qty \times deltakWh$
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	104
Kvvii) yi Saviiigs	The Cadmus Group (2011). Memo: Wi-fi Programmable Thermostat Billing Analysis. Prepared for Keith
kWh/yr savings source	Miller and Whitney Domigan, National Grid.
kWh/yr savings note	#N/A
., 0	#N/A 0.231
kW reduction	U.231 The Cadmus Group (2011). Memo: Wi-fi Programmable Thermostat Billing Analysis. Prepared for Keith
kW reduction source	Niller and Whitney Domigan, National Grid.
kW reduction pote	
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	6.6 #N/A
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	#N/A
., 0	
Oil MMBtu/yr savings source	#N/A #N/A
Oil MMBtu/yr savings note	#N/A 0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	
measure life	
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
	#N/A
measure life note In-service rate (ISR)	#IN/A

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 50 per measure

TDI Deference Number	
TRL Reference Number	RI_0096
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyStar HVAC
Measure Name	WiFi programmable thermostat with cooling (oil)
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = $Qty \times deltakWh$
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	erose himble
	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
	104
kWh/yr Savings	The Cadmus Group (2011). Memo: Wi-fi Programmable Thermostat Billing Analysis. Prepared for Keith
kWh/yr savings source	Miller and Whitney Domigan, National Grid.
kW/h/yr savings poto	
kWh/yr savings note	#N/A 0.231
kW reduction	0.231 The Cadmus Group (2011). Memo: Wi-fi Programmable Thermostat Billing Analysis. Prepared for Keith
kW reduction source	
WW reduction note	Miller and Whitney Domigan, National Grid.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	6.6 The Contract Contract (2002) Manager the 2011 Desidential Detrofit Multiferrity Decrement Applying
Oil MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
measure life note	#N/A

In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CE winter neck course	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC source Gross Measure TRC note	#N/A #N/A

TRL Reference Number	RI 0109
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Cooling
Sub-type	Window AC
Program Name	Single Family Appliance Management
Measure Name	Window AC Replacements
Measure Description	Replacement of existing inefficient room air conditioners with more efficient models. This is only offered
	as a measure when an AC timer would not reduce usage during the peak period.
Baseline Description	The baseline efficiency case is the existing air conditioning unit.
Savings Principle	The high efficiency case is the high efficiency room air conditioning unit.
Energy Savings calculation method	Deemed
Savings unit	Replacement of existing window AC with high-efficiency window AC.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
0	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Calculated for Multifamily applications and not applicable for single family.
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Hours Source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
Hours source note	#N/A
kWh/yr Savings	100
kWh/yr savings source	Quantec, LLC (2005). Evaluation of National Grid's 2003 Appliance Management Program: Room Air Conditioning Metering and Non-Energy Benefits Study. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.29
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Room Air Conditioner. Interactive Excel Spreadsheet found at
	www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerRoomAC.xls
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
	India

i	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	50.85
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 350 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 350 per measure
•	

	04.00
TRL Reference Number	RI_0420
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise
Measure Name	EW Single FamilyWiFi Thermostat - DR Enabled
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system providing space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat. Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakWi = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
Hours	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
kWh/yr savings note	#N/A
kW reduction	0.231
kW reduction source	National Grid DR Thermostat Demand Savings Calc.xlsx
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	
	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	никата и каланата и кал #N/А
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A

TRL Reference Number	RI_0197
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	Single Family Appliance Management
Measure Name	CFL
Measure Description	The installation of compact fluorescent bulbs.
	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	$Gross kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for
Hours	
	home audit applications.
	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
Hours Source	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	43.5
kWh/yr savings source	NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for
	the Massachusetts PAs.
kWh/yr savings note	#N/A
kW reduction	0.044
kW reduction source	NMR Group (2012). Baseline Sensitivity Analysis Spreadsheet, Three-Year Planning Version. Prepared for
RW Teduction source	the Massachusetts PAs.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
ווישבו אונש ומנש (ושת)	
	Nexus Market Research & Dorothy Conant (2006). Massachusetts ENERGY STAR <sup>®</sup> Homes: 2005 Baseline
	Study: Part II:
In-service rate source	Homeowner Survey Analysis Incorporating Inspection Data Final Report. Prepared for the Massachusetts
	Joint Management
	Committee.
In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00

Declipation rate energy (DDc)	1.00
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
CF summer peak source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT. The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for t
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
CF winter peak source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT. The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for t
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.60
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	NMR Group (2012). Rhode Island 2011 Basline Study of Single-Family Residential New Construction. Prepared for national Grid.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 10 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 10 per measure

TRI Deference Number	RI 0198
TRL Reference Number	
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	EnergyWise MultiFamily
Measure Name	EW CFLs
Measure Description	The installation of compact fluorescent bulbs.
L	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR® rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for
	home audit applications.
	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
Hours Source	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
	#N/A
measure life note	
measure life note In-service rate (ISR)	
In-service rate (ISR)	1.00
In-service rate (ISR) In-service rate source In-service rate note	1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations.
In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF)	1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00
In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source	1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00 #N/A
In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF)	1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00

RRe noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak source#N/ARRd winter peak noteRealization rates are 100% since savings estimates are based on evaluation results.Coincidence factor (CF) summer peak0.13CF summer peak noteEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16	RRe source	45170
RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RR demand (RRd) winter peak       1.00         RR dwinter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.13         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sever savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A		#N/A
RRd summer peak note       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak source       Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Annual \$ savings note		
RRd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           RRd winter peak source         #N/A           RRd winter peak note         Realization rates are 100% since savings estimates are based on evaluation results.           Coincidence factor (CF) summer peak         0.13           CF summer peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.           CF summer peak note         #N/A           Cr summer peak note         #N/A           Cr summer peak note         #N/A           Coincidence factor (CF) winter peak         0.16           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Sewer savings source         #N/A           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           One time \$ savings note         #N/A           One time \$ savin		
RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Ore (participant)       0.00		
RRd winter peak source       #N/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (pon-participant)       0.00		
RRd winter peak note         Realization rates are 100% since savings estimates are based on evaluation results.           Coincidence factor (CF) summer peak         0.13           CF summer peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.16           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water / Sewer savings Source         #N/A           Annual \$ savings note         #N/A           Annual \$ savings source / description         #N/A           Annual \$ savings note         #N/A           One time \$ savings source/description         #N/A           One time \$ savings note         #N/A		
Coincidence factor (CF) summer peak       0.13         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012         Prepared for the Massachusetts Program Administrators.       Cf summer peak note         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012         Prepared for the Massachusetts Program Administrators.       Cf winter peak note         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	RRd winter peak source	#N/A
CF summer peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings0.00Annual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00	RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
CF summer peak source       Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012)         Prepared for the Massachusetts Program Administrators.       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00	Coincidence factor (CF) summer peak	0.13
Prepared for the Massachusetts Program Administrators.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings0.00Annual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00	CE summer neak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Coincidence factor (CF) winter peak0.16CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00		Prepared for the Massachusetts Program Administrators.
CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings onte#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings note#N/APree-Ridership0.18Spill-Over (participant)0.00Spill-Over (non-participant)0.00		#N/A
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Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings note#N/APree-Ridership0.18Spill-Over (non-participant)0.00	CE winter neak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/APree-Ridership0.18Spill-Over (non-participant)0.00	CF willer peak source	Prepared for the Massachusetts Program Administrators.
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Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.18Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/APree-Ridership0.18Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Water / Sewer savings Source	#N/A
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       3.00         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.18         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.18Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Annual \$ savings	0.00
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One time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.18Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.18Spill-Over (participant)0.00Spill-Over (non-participant)0.00		3.00
Free-Ridership     0.18       Spill-Over (participant)     0.00       Spill-Over (non-participant)     0.00	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	One time \$ savings note	#N/A
Spill-Over (non-participant) 0.00	Free-Ridership	0.18
	Spill-Over (participant)	0.00
	Spill-Over (non-participant)	0.00
	Net-to-Gross	0.82
Net-to-Gross source The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation	Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note #N/A		
Gross Measure TRC unit \$ 305/audit with multiple installed measures	Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June		
Gross Measure TRC note #N/A	Gross Measure TRC note	
Incentive Unit \$ 296/audit with multiple installed measures		

TRL Reference Number	DI 0103
TRL Reference Number	RI_0192 Electric
Sector	Residential
	Retrofit
Project Type	
Category	Lighting Interior
Type	
Sub-type	CFL Fixture
Program Name	EnergyWise MultiFamily
Measure Name	EW Fixtures
Measure Description	The installation of ENERGY STAR <sup>®</sup> compact fluorescent (CFL) indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.
Baseline Description	The baseline efficiency case is a blend of incandescent, compact fluorescent, and halgoen lamps. For home audit applications, the baseline is the existing fixture.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
Savings Equation	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW Where: Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 912.5 hours/year or calculated for home audit applications.
Hours Source	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	0 Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber,
	NSTAR.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A

In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC unit Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A \$ 206 /audit with multiple installed measures
Incentive Unit	\$ 296/audit with multiple installed measures

TBL Deference Number	DI 0315
TRL Reference Number Fuel	RI_0215 Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Screw Base
Program Name	EnergyWise MultiFamily
Measure Name	EW LED A Lamp
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
Savings Equation	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
	h

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TRL Reference Number	RI 0199
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	Income Eligible MultiFamily
Measure Name	EW LI CFLs
Measure Description	The installation of compact fluorescent bulbs.
	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
	Milhana
Savings Equation	Where:
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for
	home audit applications.
	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
Hours Source	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00

Re note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) summer peak         1.00           RR dummer peak source         MN/A           RR duminer peak note         Realization rates are 100% since savings estimates are based on evaluation results.           Coincidence factor (CF) summer peak         0.13           CF summer peak note         MN/A           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           CF winter peak source         Bitimate using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           Prepared for the Massachusetts Program Administrators.         CF winter peak source           Water / Sever savings Source         MN/A           Water / Sever savings source         MN/A	RRe source	45170
RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak note       #N/A         RD coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       Cf         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings source / description       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savin		#N/A
RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (Rd) winter peak       1.00         RRd winter peak note       #N/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) winter peak       0.13         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #N/A         WA       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       CF         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual S savings note       #N/A         Annual S savings source / description       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A		
RRd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR deminter peak source         #W/A           RRd winter peak note         Realization rates are 100% since savings estimates are based on evaluation results.           Coincidence factor (CF) summer peak         0.13           CF summer peak note         #W/A           Cf summer peak note         #W/A           Coincidence factor (CF) winter peak         0.16           Coincidence factor (CF) winter peak         0.16           CF summer peak note         #W/A           CF winter peak note         #W/A           CF winter peak note         #W/A           CF winter peak note         #W/A           Coincidence factor (CF) winter peak         0.16           CF winter peak note         #W/A           Water savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Annual \$ savings         0.00           Annual \$ savings         0.00           Annual \$ savings         0.00           Annual \$ savings note         #W/A           Annual \$ savings note         #W/A           Annual \$ savings note         #W/A <t< td=""><td></td><td></td></t<>		
RR demand (RRd) winter peak       1.00         RRd winter peak source       #W/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak note       Prepared for the Massachusetts Program Administrators.         CF summer peak note       #W/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #W/A         Water savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Sever savings source       #W/A         Mater / Sever savings note       #W/A         Annual S savings       0.00         Annual S savings note       #W/A         Mater / Sever savings note       #W/A         Annual S savings note       #W/A         Model       0.00         Spill-Over (participant)       0.00		
RRd winter peak source       #N/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       CF winter peak source         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings note       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       3.00         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-	•	
RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time § savings note       #N/A         One time § savings note       #N/A         Pre-Ridership       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Source / description       #N/A         Annual S savings note       #N/A         Pre-Residership       0.00         Spill-Over (non-participant)       0.00         S		
Coincidence factor (CF) summer peak       0.13         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF summer peak note       #W/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Cf winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00		#N/A
CF summer peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.16           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Sewer savings source         #N/A           Manual 5 savings         0.00           Annual 5 savings note         #N/A           M/A         Model           One time \$ savings note         #N/A           One time \$ savings source/description         #N/A           One time \$ savings note         #N/A           Spill-Over (non-participant)         0.00           Spill-Over (non-participant)         0.00           Spill-Over (non-participant)         0.00           Spill-Over (non-participant)         0.00		Realization rates are 100% since savings estimates are based on evaluation results.
CF summer peak source     Prepared for the Massachusetts Program Administrators.       CF summer peak note     #N/A       Coincidence factor (CF) winter peak     0.16       CF winter peak source     Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.       CF winter peak note     #N/A       Water savings: gallons/yr     0.00       Sewer savings: gallons/yr     0.00       Water / Sewer savings Source     #N/A       Mater / Sewer savings source     #N/A       Annual S savings note     #N/A       Annual S savings note     #N/A       Annual S savings note     #N/A       One time S savings source/description     #N/A       One time S savings note     #N/A       One time S savings note     #N/A       Spill-Over (non-participant)     0.00       Spill-Over (non-participant)     0.00       Spill-Over (non-participant)     0.00       Net-to-Gross note     #N/A       Net-to-Gross note     The Net-to-Gross ratio is Assumed to be 100%.       Gross Measure TRC onte     #N/A	Coincidence factor (CF) summer peak	0.13
Prepared for the Massachusetts Program Administrators.           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.16           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water savings source         #N/A           Water savings source         #N/A           Mater savings source / description         #N/A           Annual S savings note         #N/A           Annual S savings note         #N/A           One time \$ savings note         #N/A           One time \$ savings note         #N/A           One time \$ savings note         #N/A           Spill-Over (participant)         0.00           Spill-Over (participant)         0.00           Spill-Over (non-participant)         0.00           Net-to-Gross source         #N/A           Net-to-Gross note         The Net-to-Gross ratio is Assumed to be 100%.           Gross Measure TRC outi         \$ 398/audit with multiple installed measures           Gross Measure TRC note         #N/A	CE summer peak source	
Coincidence factor (CF) winter peak       0.16         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         WAter / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC note       #N/A		
CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings source#N/AWater / Sewer savings source#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A		#N/A
CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings onte       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC note       #N/A	Coincidence factor (CF) winter peak	0.16
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One time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
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Free-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	One time \$ savings source/description	#N/A
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Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Free-Ridership	0.00
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Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Spill-Over (non-participant)	0.00
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Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross source	#N/A
Gross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC note #N/A	Gross Measure TRC source	
	Gross Measure TRC note	
		\$ 380/audit with multiple installed measures

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TRL Reference Number	RI_0193
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Fixture
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Fixtures
Measure Description	The installation of ENERGY STAR® compact fluorescent (CFL) indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.
Baseline Description	The baseline efficiency case is a blend of incandescent, compact fluorescent, and halgoen lamps. For home audit applications, the baseline is the existing fixture.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
Savings Equation	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW Where: Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 912.5 hours/year or calculated for home audit applications.
Hours Source	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
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In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A

TRL Reference Number	RI 0216
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting Interior
Type	LED Screw Base
Sub-type	
Program Name	Income Eligible MultiFamily
Measure Name	EW LI LED A Lamp
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 #N/A
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	#N/A #N/A 0
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Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A         #N/A         0         #N/A         Supplied by vendor         0         9         The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for National Grid
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	#N/A         #N/A         0         #N/A         Supplied by vendor         0         9         The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 380/audit with multiple installed measures

	DL 0247
TRL Reference Number	RI_0217
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Screw Base
Program Name	Income Eligible MultiFamily
Measure Name	EW LI LED Fixture
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
Gas Heat MMBtu/yr savings note	
· · · · · · · · · · · · · · · · · · ·	#N/A
Oil MMBtu/yr savings	#N/A 0
Oil MMBtu/yr savings Oil MMBtu/yr savings source	
11 0	0
Oil MMBtu/yr savings source	0 #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	0 #N/A #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	0 #N/A #N/A 0
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0 #N/A #N/A 0 #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	0 #N/A #N/A 0 #N/A #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0 #N/A #N/A 0 #N/A #N/A 0
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0 #N/A #N/A 0 #N/A #N/A 0 11 The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	0 #N/A #N/A 0 #N/A #N/A 0 11 The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for National Grid

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 380/audit with multiple installed measures

TRL Reference Number Fuel Sector Project Type Category Type Sub-type Program Name Measure Name	RI_0187         Electric         Residential         Retrofit         Lighting
Sector Project Type Category Type Sub-type Program Name	Residential         Retrofit         Lighting
Project Type Category Type Sub-type Program Name	Retrofit Lighting
Category Type Sub-type Program Name	Lighting
Type Sub-type Program Name	
Sub-type Program Name	Exterior
Program Name	
-	CFL Fixture
Measure Name	Income Eligible MultiFamily
	EW LI Outdoor Fixtures The installation of hardwired ENERGY STAR <sup>®</sup> fluorescent outdoor fixtures with pin-based bulbs. Savings
Massura Description	for this measure are attributable to high efficiency outdoor lighting fixtures and are treated similarly to
Measure Description	indoor fixtures.
Baseline Description	The baseline efficiency case is an incandescent, screw-based fixture with an incandescent bulb.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> fixture wired for exclusive use with a pin based CFL bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,642.5 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
Hours Source	and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
Hours Source	Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	Calc
Kvvii/yi Saviiigs	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
kwii/yi saviigs source	
	Massachusetts Program Administrators.
kWh/yr savings note kW reduction	#N/A Calc
kw reduction	
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
., c	Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	11
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
	#N/A
In-service rate source	
In-service rate source	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate energy (RRe)         1.00           Res source         #N/A           Res source         #N/A           Rest demand (RRd) summer peak         1.00           RAd summer peak source         #N/A           RR demand (RRd) winter peak         1.00           RR demand (RRd) winter peak note         Realization rates are 100% since gross savings values are based on evaluation results.           Cricicidence factor (CF) summer peak         0.00           CF summer peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           Prepared for the Massachusetts Program Administrators.         Editated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           Prepared for the Massachusetts Program Administrators.         Editated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           Prepared for the Massachusetts Program Administrators.         Editated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           Prepared f	Cavingo Devoiator do Factor douros	45170
Realization rate energy (RRe)       1.00         RRe source       NN/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RN demand (RRd) summer peak       1.00         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Cf winter peak note       #N/A         CF summer peak note       #N/A         CF summer peak note       #N/A         CF summer peak note       #N/A         CF winter peak note       #N/A         CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         MWA       Mater savings: gallons/yr         0.00       Sever savings: gallons/yr       0.00         Water / Sever savings source       #N/A         Annual \$ savings note       #N/A <td>Savings Persistence Factor source</td> <td>#N/A</td>	Savings Persistence Factor source	#N/A
RRe source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak source       MN/A         RR demand (Rd) winter peak       1.00         RR demand (Rd) winter peak source       MN/A         RRd winter peak source       MN/A         Rd winter peak source       RN/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       Cf summer peak note         CF summer peak note       MN/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       CF winter peak note         CF winter peak note       MN/A         Mater savings; gallons/yr       0.00         Sever savings; gallons/yr       0.00         Sever savings source       MN/A         Annual S savings source / description       MN/A         Annual S savings note       MN/A         One time S savings note       MN/A <td< td=""><td></td><td>•</td></td<>		•
RRe note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) summer peak Note         NV/A           RRd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           RRd winter peak source         NV/A           RRd winter peak source         NV/A           RRd winter peak source         NV/A           RRd winter peak note         Realization rates are 100% since savings estimates are based on evaluation results.           Coincidence factor (CF) summer peak         0.00           CF summer peak note         Festimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           Prepared for the Massachusetts Program Administrators.         Figure of the Massachusetts Program Administrators.           CF winter peak note         NV/A           Water Savings igalions/yr         0.00           Sewer savings: gallons/yr         0.00           Sewer savings source         MV/A           Water / Sewer savings note         MV/A           Annual \$ savings source / description         MV/A           Annual \$ savings note         MV/A           One time \$ savings note         MV/A           One time \$ savings note         MV/		
RR demand (RRd) summer peak       1.00         RRd summer peak note       #N/A         RR durnner peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR durnter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) summer peak       0.00         Prepared for the Massachusetts Program Administrators.       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/vr       0.00         Sever savings: gallons/vr       0.00         Water / Sever savings source       #N/A         Manual \$ savings       0.00         Sever savings: gallons/vr       0.00         One time \$ savings source / description       #N/A         Annual \$ savings source / description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One t		,
RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Water / Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       3.50         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)		
RRd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           RRd winter peak source         #W/A           RRd winter peak note         Realization rates are 100% since savings estimates are based on evaluation results.           Coincidence factor (CF) summer peak         0.00           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         1.00           Coincidence factor (CF) winter peak         1.00           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         1.00           CF winter peak note         #N/A           CF winter peak note         #N/A           Vater savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Water / Sever savings Source         #N/A           MN/A         Manual \$ savings           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           MA         MA           One time \$ savings note         #N/A           Spill-Over (non-participant)         0.00		
RR demand (RRd) winter peak       1.00         RRd winter peak source       HN/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak note       HN/A         Coincidence factor (CF) winter peak       1.00         CF summer peak note       HN/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       HN/A         Cr winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       HN/A         CF winter peak note       HN/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water savings source       HN/A         Manual \$ savings note       HN/A         Annual \$ savings note       HN/A         Annual \$ savings note       HN/A         Annual \$ savings note       HN/A         One time \$ savings note       HN/A         Annual \$ savings note       HN/A         Annual \$ savings note       HN/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Ove		•
RRd winter peak source       #N/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.00         Sever savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Water / Sever savings once       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Splil-Over (non-participant)       0.00         Splil-Over (non-participant)       0.00         Splil-Over (non-participant)       0		Realization rate is 100% since gross savings values are based on evaluation results.
RRd winter peak note         Realization rates are 100% since savings estimates are based on evaluation results.           Coincidence factor (CF) summer peak         0.00           CF summer peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         1.00           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).           CF winter peak source         Prepared for the Massachusetts Program Administrators.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Water / Sever savings source         #N/A           Water / Sever savings note         #N/A           Annual S savings note         #N/A           Annual S savings note         #N/A           One time S savings note         #N/A           One time S savings note         #N/A           One time S savings note         #N/A           Pre-Ridership         0.00           Spill-Over (participant)         0.00           Spill-Over (non-participant)         0.00           Spill-Over (on-participant)         0.00	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.00         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF summer peak note       #W/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #W/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-	RRd winter peak source	#N/A
CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       #N/A         CG summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       CF winter peak note         WhA       0.00         Sewer savings: gallons/yr       0.00         Sewer savings source       #N/A         Water savings source       #N/A         Manual § savings note       #N/A         Annual § savings note       #N/A         Annual § savings note       #N/A         One time § savings source/description       #N/A         One time § savings note       #N/A         One time § savings note       #N/A         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross note       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC note       #N/A	RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
CF summer peak source     Prepared for the Massachusetts Program Administrators.       CF summer peak note     #N/A       Coincidence factor (CF) winter peak     1.00       CF winter peak source     Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.       CF winter peak note     #N/A       Water savings: gallons/yr     0.00       Sewer savings: gallons/yr     0.00       Water / Sewer savings Source     #N/A       Annual \$ savings note     #N/A       One time \$ savings source/description     #N/A       One time \$ savings note     #N/A       Pree-Ridership     0.00       Spill-Over (non-participant)     0.00       Net-to-Gross     1.00       Net-to-Gross note     The Net-to-Gross ratio is Assumed to be 100%. <td>Coincidence factor (CF) summer peak</td> <td>0.00</td>	Coincidence factor (CF) summer peak	0.00
Prepared for the Massachusetts Program Administrators.           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         1.00           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water / Sewer savings Source         #N/A           Mater / Sewer savings source / description         #N/A           Annual \$ savings         0.00           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           One time \$ savings note         #N/A           Spill-Over (participant)         0.00           Spill-Over (participant)         0.00           Net-to-Gross source         #N/A           Net-to-Gross note         The Net-t		Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Coincidence factor (CF) winter peak1.00CF winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC sourceGadus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross note       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC note       #N/A   <	CF summer peak note	#N/A
CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings oute / description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC note       #N/A	Coincidence factor (CF) winter peak	1.00
CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings ource/description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Met-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC note       #N/A		Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings: Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Met-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC note       #N/A	CF winter peak source	Prepared for the Massachusetts Program Administrators.
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings3.50One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross note#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A	CF winter peak note	
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings3.50One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross note#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A	Water savings: gallons/yr	0.00
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Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.00Spill-Over (participant)0.00Spill-Over (participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A		#N/A
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Annual \$ savings note#N/AOne time \$ savings3.50One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A	Annual \$ savings	0.00
One time \$ savings3.50One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
One time \$ savings3.50One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A	Annual \$ savings note	#N/A
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Free-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A		
Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Free-Ridership	0.00
Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.00
Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Net-to-Gross	1.00
Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross source	#N/A
Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A		
Gross Measure TRC note #N/A	Gross Measure TRC source	
Incentive Unit \$ 380/audit with multiple installed measures		

TRL Reference Number	RI_0212
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Fixture
Program Name	EnergyWise MultiFamily
Measure Name	EW MF LED Fixtures
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, CFLs and other bulbs types, as provided by market research or for a home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW Where:
Savings Equation	Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	11
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life source measure life note	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model #N/A
measure life note	#N/A
measure life note In-service rate (ISR) In-service rate source In-service rate note	#N/A 1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations.
measure life note In-service rate (ISR) In-service rate source	#N/A 1.00 #N/A

i	
0	Savings persistence is assumed to be 100%.
	1.00
	#N/A
RRe note R	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak 1	1.00
RRd summer peak source #	#N/A
RRd summer peak note R	Realization rate is 100% since gross savings values are based on evaluation results.
	1.00
RRd winter peak source #	#N/A
RRd winter peak note R	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak 0	0.13
I F SUMMER DEAK SOURCE	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note #	#N/A
	0.16
F	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
LE WINTER DEAK SOURCE	Prepared for the Massachusetts Program Administrators.
	#N/A
	0.00
Sewer savings: gallons/yr 0	0.00
	#N/A
	#N/A
Annual \$ savings 0	0.00
Annual \$ savings source / description #	#N/A
Annual \$ savings note #	#N/A
	3.50
	#N/A
One time \$ savings note #	#N/A
	0.18
Spill-Over (participant) 0	0.00
	0.00
	0.82
Net-to-Gross source T	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
	#N/A
	\$ 305/audit with multiple installed measures
Gross Measure TRC source C	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note #	#N/A

TRL Reference Number	RI_0188
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Exterior
Sub-type	CFL Fixture
Program Name	EnergyWise MultiFamily
Measure Name	EW Outdoor Fixtures
Measure Description	The installation of hardwired ENERGY STAR <sup>®</sup> fluorescent outdoor fixtures with pin-based bulbs. Savings for this measure are attributable to high efficiency outdoor lighting fixtures and are treated similarly to indoor fixtures.
Baseline Description	The baseline efficiency case is an incandescent, screw-based fixture with an incandescent bulb.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> fixture wired for exclusive use with a pin based CFL bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,642.5 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
Hours Source	and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
	Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	Calc
Kvvny yr Savings	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
	#N/A
Propane MMBtu/yr savings note	
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0
Energy Reference(s) & table(s) notes	0
Energy Reference(s) & table(s) notes measure life	0 11 Nexus Market Research and RLW Analytics (2008). Residential Lighting Measure Life Study. Prepared for New England
Energy Reference(s) & table(s) notes measure life measure life source	0 11 Nexus Market Research and RLW Analytics (2008). Residential Lighting Measure Life Study. Prepared for New England Residential Lighting Program Sponsors.

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	никата и каланата и кал
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures
	ly 250 audit with multiple instance measures

TRL Reference Number	RI_0200
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	EnergyWise
Measure Name	EW SF CFL
Measure Description	The installation of compact fluorescent bulbs.
p	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross $kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
Hours Source	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours course pote	#N/A
Hours source note	43.5
kWh/yr Savings kWh/yr savings source	43.5 #N/A
	#N/A #N/A
kWh/yr savings note	·
kW reduction	0.045
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
	Savings persistence is assumed to be 100%.
Savings Persistence Factor note	
Savings Persistence Factor note Realization rate energy (RRe)	1.00
	1.00 #N/A
Realization rate energy (RRe)	

·	
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
CE winter neek source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.24
Spill-Over (participant)	0.03
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI 0194
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Fixture
Program Name	EnergyWise
Measure Name	EW SF Fixtures
Measure Description	The installation of ENERGY STAR <sup>®</sup> compact fluorescent (CFL) indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer
Baseline Description	lifespan. The baseline efficiency case is a blend of incandescent, compact fluorescent, and halgoen lamps. For home audit applications, the baseline is the existing fixture.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
Savings Equation	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW Where: Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1168 hours/year or calculated for home audit applications.
Hours Source	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	71.1
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.072
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00

Savings Persistence Factor note     Savings persistence is assumed to be 100%.       Realization rate energy (RRe)     1.00       RRe source     #N/A       RRe note     Realization rate is 100% since gross savings values are based on evaluation results.       R demand (Rd) summer peak     1.00       Rd summer peak source     #N/A       Rd demand (Rd) winter peak     1.00       Rd winter peak source     #N/A       Rd winter peak note     Realization rate is 100% since gross savings values are based on evaluation results.       Rd winter peak note     Relization rate is 100% since gross savings values are based on evaluation results.       Coincidence factor (CF) summer peak     0.13       Coincidence factor (CF) summer peak     0.13       Coincidence factor (CF) winter peak     0.16       Cr summer peak note     #N/A       Ch winter peak source     Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).       Prepared for the Massachusetts Program Administrators.     Prepared for the Massachusetts Program Administrators.       CF winter peak note     #N/A       Water savings: galons/yr     0.00       Water / Sewer savings Source     #N/A       Mater / Sewer sav	r	
Realization rate energy (RRe)       1.00         RRe source       HN/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       1.00         Rd summer peak source       HN/A         Rd demand (RRd) winter peak       1.00         Rd demand (RRd) winter peak       1.00         Rd winter peak source       HN/A         Rd winter peak source       MN/A         Rd winter peak source       NN/A         Rd winter peak source       Relization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         Cf summer peak source       Frepared for the Massachusetts Program Administrators.         Cf winter peak note       HN/A         Coincidence factor (CF) winter peak       0.16         Cf winter peak note       HN/A         Water savings: gallons/yr       0.00         Water / Sever savings route       HN/A         Water / Sever savings note       HN/A         Annual S savings	Savings Persistence Factor source	#N/A
RRE source         #N/A           RRe note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) summer peak source         MN/A           RR demand (RRd) winter peak         1.00           RR demand (RRd) winter peak source         MN/A           RR demand (RRd) winter peak         1.00           RR demand (RRd) winter peak source         Realization rate is 100% since gross savings values are based on evaluation results.           RR dwinter peak source         Realization rate is 100% since gross savings values are based on evaluation results.           Concidence factor (CF) summer peak         0.13           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.16           Coincidence factor (CF) winter peak         0.16           CF winter peak note         #N/A           Coincidence factor (CF) winter peak         0.16           CF winter peak note         #N/A           CF winter peak note         #N/A           Coincidence factor (CF) winter peak         0.00           Sever savings: gallons/yr         0.00           Sever savings source         #N/A           Annual S savings source / description         #N/A           Annual S savings note         #N/A		
RR enote         Realization rate is 100% since gross savings values are based on evaluation results.           RR demmar (RRd) summer peak source         MV/A           Rd summer peak source         Realization rate is 100% since gross savings values are based on evaluation results.           RR demmar (RRd) winter peak         1.00           RRd winter peak source         MV/A           Rd winter peak source         MV/A           Rd winter peak source         MV/A           Rd winter peak source         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.13           Coincidence factor (CF) uniter peak         0.16           Crisinmater peak note         MV/A           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           CF winter peak note         MV/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Sewer savings source         MV/A           Annual \$ savings source         MV/A           Annual \$ savings note         MV/A           Annual \$ savings note         MV/A           Annual \$ savings note         MV/A	Realization rate energy (RRe)	
RR demand (RRd) summer peak source       HN/A         RRd summer peak source       HN/A         RR durner peak source       HN/A         RR durner peak source       HN/A         RR durner peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR durner peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF winter peak source       HN/A         Quer peak note       HN/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       HN/A         Annual \$ savings source / description       HN/A         Annual \$ savings source / description       HN/A         Annual \$ savings source / description       HN/A         One time \$ savings note       HN/A         Annual \$ savings note       HN/A         One time \$ savings note		
RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #N/A         Ce winter peak note       #N/A         Water savings: gallons/vr       0.00         Water savings: gallons/vr       0.00         Water / Sewer savings source       #N/A         Manual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         One time \$ savings note<	RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           Rd winter peak source         #N/A           Rd dimet peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.13           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.16           Coincidence factor (CF) winter peak         0.16           CF winter peak note         #N/A           CF winter peak note         #N/A           Coincidence factor (CF) winter peak         0.16           CF winter peak note         #N/A           Vater savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Water / Sever savings Source         #N/A           Annual S savings note         #N/A           Pre-Ridership         0.00           Spill-Over (non-participant)	RR demand (RRd) summer peak	1.00
RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         CF summer peak note       Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings Source       #N/A         Water / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ sa	RRd summer peak source	#N/A
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.13         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       #N/A         CD winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings note       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Spiil-Over (non-participant)       0.00         Spiil-Over (participant)       0.00	RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.13           CF summer peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.16           CF winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sever savings: gallons/yr         0.00           Water / Sever savings note         #N/A           Annual S savings note         #N/A           Annual S savings note         #N/A           One time S savings note         #N/A           Spill-Over (participant)         0.00           Spill-Over (non-participant)         0.00	RR demand (RRd) winter peak	1.00
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Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 790/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Net-to-Gross	1.00
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Gross Measure TRC note #N/A	Gross Measure TRC source	
	Gross Measure TRC note	
		\$ 766/audit with multiple installed measures

TRL Reference Number	RI 0218
Fuel	RI_0218 Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Screw Base
Program Name	EnergyWise
Measure Name	EW SF LED Bulbs
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,205 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	47.6
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.048
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

1.00
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
0.13
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.16
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
3.00
#N/A
#N/A
0.00
0.00
0.00
1.00
The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
#N/A
\$ 790/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A

TRL Reference Number	RI_0213
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Fixture
Program Name	EnergyWise
Measure Name	EW SF LED Fixture
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, CFLs and other bulbs types, as provided by market research or for a home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW Where:
Savings Equation	Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,205 hours/year.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	70.9
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.071
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	<ul> <li>#N/A</li> <li>All installations have 100% in-service rate since programs include verification of equipment installations.</li> </ul>
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
	The anzantom rate is 100% since Bross savings values are based on evaluation results.

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RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI 0189
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Exterior
Sub-type	CFL Fixture
Program Name	EnergyWise
Measure Name	EW SF OFIXTURE
Measure Name	The installation of hardwired ENERGY STAR <sup>®</sup> fluorescent outdoor fixtures with pin-based bulbs. Savings
Measure Description	for this measure are attributable to high efficiency outdoor lighting fixtures and are treated similarly to
	indoor fixtures.
Baseline Description	The baseline efficiency case is an incandescent, screw-based fixture with an incandescent bulb.
Savings Principle	The high efficiency case is an ENERGY STAR® fixture wired for exclusive use with a pin based CFL bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
Savings Equation	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,642.5 hours/year for rebated lights and calculated by vendor for
	home audit applications.
	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
Hours Source	and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
	Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	87
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.088
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
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RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI_0201
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	EnergyStar Lighting
Measure Name	HTR CFL Bulbs
Measure Description	The installation of compact fluorescent bulbs.
	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
Hours source	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours course poto	#N/A
Hours source note kWh/yr Savings	53
kWh/yr savings source	
	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model #N/A
kWh/yr savings note	·
kW reduction	0.044
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	4
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.95
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Fersistence ractor source	All PAs use 100% savings persistence factors.
Savings Persistence Factor note	All this use 100% savings persistence factors.
Savings Persistence Factor note	1.00
Savings Persistence Factor note Realization rate energy (RRe)	1.00

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RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
CF winter peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.07
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.93
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 4 per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1 per bulb

TRL Reference Number	RI_0195
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Fixture
Program Name	EnergyStar Lighting
Measure Name	Indoor CFL Fixture
Measure Description	The installation of ENERGY STAR <sup>®</sup> compact fluorescent (CFL) indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.
Baseline Description	The baseline efficiency case is a blend of incandescent, compact fluorescent, and halgoen lamps. For home audit applications, the baseline is the existing fixture.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified compact fluorescent light fixture wired for exclusive use with pin-based CFLs.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
Savings Equation	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW Where: Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	78.9
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.072
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	4
measure life source	A Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.96
In-service rate source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT. The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for t

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In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.04
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.96
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 30 per fixture
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 8 per fixture
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TRL Reference Number	RI_0404
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Fixture
Program Name	Single Family Appliance Management
Measure Name	Indoor Fixtures
Measure Description	The installation of ENERGY STAR <sup>®</sup> LED indoor fixtures. Compact fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly less wattage and significantly longer lifetimes. Hardwired fluorescent fixtures offer comparable luminosity to incandescent fixtures at significantly lower wattage and offer significantly longer lifespan.
Baseline Description	0
	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified compact fluorescent light fixture wired for exclusive
Savings Principle	use with and LED.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Retrofitted fixture
	Gross kWh = Qty × deltakW × Hours
Savings Equation	Gross kW = Qty × deltakW Where: Qty = Total number of units. DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	0
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	70.9
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.07
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	5 #N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
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In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
inic source	

RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RR demand (RRd) winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak note       #N/A         RR demand (RRd) winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.17         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       1.00         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings       3.50         One time \$ savings       3.50         One time \$ savings note       #N/A         Pree-Ridership       0.00         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (	RRe note	Paplication rate is 100% since gross sovings values are based on evaluation results
RRd summer peak source       #N/A         RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (Rd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.17         CF summer peak note       #N/A         CF summer peak note       #N/A         CF summer peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       1.06         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Minuel \$ savings note       #N/A         One time \$ saving		Realization rate is 100% since gross savings values are based on evaluation results.
RRd summer peak noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) winter peak1.00RRd winter peak note#N/ARRd winter peak noteRealization rate is 100% since gross savings values are based on evaluation results.Coincidence factor (CF) summer peak0.17CF summer peak source#N/ACF summer peak source#N/ACoincidence factor (CF) winter peak1.00CF winter peak note#N/ACoincidence factor (CF) winter peak1.00CF winter peak source#N/ACF winter peak note#N/ACF winter peak note#N/ACF winter peak note#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings source#N/AWater / Sewer savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (participant)0.00Spill-Over (participant)0.00Net-to-Gross note#N/A	, , ,	
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CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings1.06Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (participant)0.00Net-to-Gross1.00Net-to-Gross note#N/A	CF summer peak note	#N/A
CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings1.06Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AMultiple Savings note#N/ASpill-Over (participant)0.00Spill-Over (participant)0.00Net-to-Gross1.00Net-to-Gross note#N/A	Coincidence factor (CF) winter peak	1.00
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Water / Sewer savings note#N/AAnnual \$ savings1.06Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.50One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/A	Sewer savings: gallons/yr	0.00
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Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       #N/A	Free-Ridership	0.00
Net-to-Gross     1.00       Net-to-Gross source     #N/A       Net-to-Gross note     #N/A	Spill-Over (participant)	0.00
Net-to-Gross source     #N/A       Net-to-Gross note     #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross note #N/A	Net-to-Gross	1.00
	Net-to-Gross source	#N/A
	Net-to-Gross note	#N/A
	Gross Measure TRC unit	N/A
Gross Measure TRC source #N/A	Gross Measure TRC source	
Gross Measure TRC note #N/A	Gross Measure TRC note	
Incentive Unit N/A	Incentive Unit	

Fuel         Electric           Sector         Residential           Project Type         Retrofit           Category         Lighting           Type         Interior           Sub Type         LLD Serve Base           Program Name         EnergyStar Lighting           Measure Name         LED A Lamps           Measure Description         offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.           Baseline Description         by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the line (a 36 SWI incandescent).           Savings Principle         The baseline efficiency case is blend of incandescents, balogens, CFLs and other bulbs types, as principle           Savings Principle         The high efficiency case is and ENREGY STAR* qualified LED fisture.           Savings Sungs calculation method         Calculated ung deemed inputs           Savings Liquation         Gross KWI = Qix × (KW_ base - KW_ce) × Hours           Gross KWI = Qix × (KW_ base - KW_ce)         Hours           Savings Equation         Utry = Total number of units.           Where:         Qiv = Total number of units.           WW/rescure         Neus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr Evaluation.           WM/ry Savings Source		
Sector         Residential           Project Type         Betrofit           Category         Lip Screw Base           Sub type         Interior           Neasure Name         EnergySur Lighting           Measure Name         ELD A Lamp           Measure Name         ELD A Lamp           Measure Description         offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.           Baseline Description         by market research or for ELSA exempt bulbs and bulbs installed through an home energy audit, th line is a 63 Watt incandescent.           Swings Principle         The high efficiency case is and ENROY STAR* qualified LED future.           Swings unit         Rebated lamp or future.           Swings unit         Gross KWI = Qty × (KW_base - KW_ee) × Hours Gross KWI = Qty × (KW_base - LW_ee) × Hours Gross KWI = Qty × (KW_base - LW_ee) × Hours Gross KWI = Qty × (KW_base - LW_ee) × Hours Hours           Hours beened average demand per high efficiency unit. Hours - Deemed average demand per high efficiency unit. Hours - Deemed average demand per high efficiency unit. Hours - Deemed average demand per high efficiency case is and calculated by ven home and tapplications.           Hours Source         Neasy Barket Research, RU A Analytics and GDS Associates (2009). Residential lighting Markdowr Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           W/Mr eduction source         #N/A	TRL Reference Number	RI_0219
Project Type         Retrofit           Category         Lighting           Type         Interview           Sub-type         Itel Screw Base           Program Name         FenergyStar Lighting           Measure Name         Itel A Lamps           Measure Description         Offer comparable luminosity to incandescent bulbs and fixtures. LEDs           Baseline Description         The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as principle           Savings Principle         The high efficiency case is and NLRKGY TAR* qualified LED fixture.           Grosp StMP a Day KWL base - KW_eel > Hours         Grosp StMP a Day KWL base - KW_eel > Hours           Savings Liquation         Where:         Qty = Total number of units.           KW_yee = Deemed average demand per baseline unit.         KW base = Deemed average demand per baseline unit.           Hours         The verse annual operating bours are 1,058 hours/year for rebated light and calculated by ven           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr           VM/ry Savings note         MV/A           WMyhyr Savings source         M Residential Lightin		
Category         Upting           Type         Interior           Sub type         LED Screw Base           Program Name         LED Atoms           Messure Name         LED Atoms           Messure Name         LED Atoms           Messure Name         The installation of Light-Emitting Diode (LED) screw-in bulks and fixtures. LEDs           Messure Description         offer comparable luminosity to incandescents, halogens, CELs and other bulks types, as pr           Baseline Description         by market research or for ELSA exempt bulks and bulks installed through an home energy audit, the           Swings Principle         The baseline efficiency case is and ENROY STAR* qualified LED fixture.           Swings Principle         The high efficiency case is and ENROY STAR* qualified LED fixture.           Swings Sequation         Calculated using deemed inputs           Swings Equation         City = Total number of units.           KW, base - Deemed average demand per baseline unit.         KW base - Deemed average demand per baseline unit.           KW as = Deemed average demand per baseline unit.         KW base - Deemed average demand per baseline unit.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr           Hours Source         MAX         MAX           Whyfry swings toute         MVA         MVA<		
Type         Interior           Sol-type         LED Screw Base           Program Name         EnergyStar Lighting           Measure Name         LED A Lamps           Measure Name         LED A Lamps           Measure Description         offer comparable luminosity to incandescent bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs and significantly less wattage and significantly longer lamp lifetimes.           Baseline Description         The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as pri burnes is a 50 watti cnandescent.           Savings Principle         The high efficiency case is and ENERGY STAR* qualified LED fixture.           Energy Savings calculation method         Calculated using deemed inputs           Savings Finciple         The thigh efficiency case is and ENERGY STAR* qualified LED fixture.           Savings Sing calculation method         Calculated using deemed inputs           Savings Sing calculation         Rebated imp or fiture.           Gross KW = Ctty × (KW_ base - kW_ee) × Hours         Gross KW = Ctty × (KW_ base - kW_ee)           Savings Equation         Ctty = Total number of units.           KW base = Deemed average demand per baseline unit.         KW bese = Deemed average annual operating hours.           Hours         The average annual operating hours.           Hours         The average annual operating hours.		
Sub-type         LED Screw Base           Program Name         EnergyStart Lighting.           Measure Name         LED A Lamps           Measure Description         The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs           Measure Description         Offer comparable luminosity to incandescent, bulbs and spinficantly less wattage and significantly           Baseline Description         The baseline efficiency case is blend of incandescent, bulbs and bulbs installed through an home energy audit, th           Savings Principle         The haseline efficiency case is and KIRROY STAR* qualified LED fixture.           Energy Savings calculation method         Calculated using deemed inputs           Savings Funciple         The haseline efficiency case is and KIRROY STAR* qualified LED fixture.           Savings sequation         Gross kWh = Qty × (kW_ base - kW_ee) > Hours           Gross kW = Qty × (kW_ base - kW_ee)         Where:           Savings Equation         Where:           Number of units.         W_wase = Deemed average demand per baseline unit.           Ww_ge = Deemed average demand per ligh-efficiency unit.           Hours         The average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven home eudit applications.           Hours         Nexus Market Research, RLW Analytics and GDS Associates [2009]. Residential Lighting Markdowr Evaluation. Prepared for Markdown and Buydown Program Sponsors i		Lighting
Program Name         EnergyStar Liphing           Measure Name         LED A Lamps           Measure Description         Offer comparable luminosity to incandescent bulbs at significantly longer lamp lifetimes.           Baseline Description         The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescents, halogens, CFLs and other bulbs types, as program and the scale efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as program scale lamp of fictiency case is and ENRROY STAR® qualified LED fixture.           Savings Principle         The high efficiency case is and ENRROY STAR® qualified LED fixture.           Calculated using deemed inputs         Calculated using deemed inputs           Savings Equation         Calculated using deemed inputs           Savings Equation         Where:           Qty = Total number of units.         Wup to the average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven the average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven the average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven the average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven the average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven the average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven the average annual operating hours.           Hours         Nexus Market Research, RLW Analytics and GDS Associates (2009), Residential Lighting Markdown Evolution Mod		Interior
Measure Name         LED A Lamps           The installation of Light-Entiting Diode (LED) screw-in bulbs and fixtures. LEDs           Measure Description         Offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.           Baseline Description         The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as pre by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the line is a 65 Watt incandescent.           Swings Drinciple         The high efficiency case is and BNERCY STAR* gualified LED fixture.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fixture.           Gross KW = Qty × (KW_base - KW_ee) × Hours Gross KW = Qty = Total number of units.           KW_base = Deemed average demand per baseline unit.           KW_base = Deemed average demand per baseline unit.           KW_base = Deemed average annual opertaing hours.           Hours = Deemed average annual opertaing hours.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown revaluation.           Hours Source         #N/A           WN/hyr savings source         MA & KW/hyr savings source           WN/hyr savings source         MA & KW/hyr Savings           Wir reduction note         #N/A           MU/		
Measure Description         The installation of Light-Emitting Diode (LED) screw in bulbs and fixtures. LEDs           offer comparable luminosity to incandescent bulbs at significantly longer languing infermes.         Baseline Description           Baseline Description         The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as properties of the second of	Program Name	
Measure Description         offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.           Baseline Description         The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as principle           Savings Principle         The high efficiency case is and ENERGY STAR* qualified LED fixture.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fixture.           Gross KWh = Qty x (KW_base - KW_ee) x Hours         Gross KWh = Qty x (KW_base - KW_ee) x Hours           Gross KWh = Qty x (KW_base - KW_ee)         Xelve = CV           Savings Equation         Where:           Savings Equation         Where:           Savings Equation         The average annual operating hours.           Hours         The average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven home audit applications.           Hours         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours source note         IN/A           Wryflyr Savings note         MA           Wryflyr savings source         MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model           Wrhy/r savings source         IN/A <t< td=""><td>Measure Name</td><td>LED A Lamps</td></t<>	Measure Name	LED A Lamps
Baseline Description         by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, th line is a 65 Watt incandescent.           Savings Principle         The high efficiency case is and ENERGY STAR* qualified LED fixture.           Energy Savings calculation method         Calculated using deemed inputs           Savings unit         Rebated lamp or fixture.           Gross KWH = Qty x (KW_base - kW_ee) × Hours         Gross KWH = Qty x (KW_base - kW_ee) × Hours           Savings Equation         Qty = Total number of units.           KW_base = Deemed average demand per baseline unit.         KW_base = Deemed average annual operating hours.           Hours         The average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven home audit applications.           Hours Source         Mxu Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hy/ry savings source         MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model KWh/yr savings note           KW reduction note         #N/A           KW reduction note         #N/A           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A	Measure Description	offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Energy Savings calculation method       Calculated using deemed inputs         Savings unit       Rebated lamp or fixture.         Gross kWh = Qty × (kW_base - kW_ee)       Gross kW = Qty × (kW_base - kW_ee)         Savings Equation       Cty = Total number of units.         KW_base - Deemed average demand per baseline unit.       KW_gee = Deemed average demand per baseline unit.         Hours       The average annual operating hours.         Hours       The average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven home audit applications.         Hours       Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         Hours source note       MN/A         KWh/yr savings note       MN/A         KWh/yr savings note       MN/A         KW reduction       0.033         KW reduction note       MN/A         Gas Heat MMBtu/yr savings source       MN/A         Gas Heat MMBtu/yr savings note       MN/A         Gas Heat MMBtu/yr savings note       MN/A         Gas Heat MMBtu/yr savings note       MN/A	Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base
Savings unit       Rebated lamp or fixture.         Gross kW = Qty × (kW_base - kW_ee) × Hours         Gross kW = Qty × (kW_base - kW_ee)         Savings Equation         Qty = Total number of units.         KW_base = Deemed average demand per baseline unit.         kW_base = Deemed average demand per baseline unit.         Hours       The average annual operating hours.         Hours       Newerage annual operating hours.         Hours       Newerage annual operating hours.         Hours       Newerage annual operating hours.         Hours Source       Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr         Hours source note       M/A         KWh/yr savings note       M/A         KWh/yr savings note       M/A         KW reduction note       M/A         KW reduction note       M/A         Gas Heat MMBtu/yr savings source       M/A         MIMALUYr savings       0         Gas Heat MMBtu/yr savings source       M/A         M/A       MIMA         Gas Heat MMBtu/yr savings source       M/A         MIMALUYr savings note       M/A         Gas Heat MMBtu/yr savings note       M/A         Gas Heat MMBtu/yr savings note       M/A         O	Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Savings unit         Rebated lamp or fixture.           Gross KWh = Qty × (KW_base - kW_ee) × Hours         Gross KW = Qty × (KW_base - kW_ee)           Savings Equation         Qty = Total number of units.           KW_base = Deemed average demand per baseline unit.         KW_base = Deemed average demand per baseline unit.           Hours         The average annual operating hours.           Hours         The average annual operating hours.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr           Hours Source         MN/A           KWh/yr savings         40.2           KWh/yr savings note         MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model           KWh/yr vasings note         MN/A           KW reduction norce         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Mode Prepared for the Massachusetts Program Administrators.           KW reduction note         MN/A           Gas Heat MMBtu/yr savings note         MN/A           Oli IMMBtu/yr savings note         MN/A           Cli IMMBtu/yr savings note         MN/A           Gas Heat MMBtu/yr savings note         MN/A           Oli IMMBtu/yr savings note         MN/A           Propane MMBtu/yr savings note         MN/A           Pr	Energy Savings calculation method	Calculated using deemed inputs
Gross kWh = Qty × (kW_base - kW_ee) × Hours         Gross kW = Qty × (kW_base - kW_ee)         Where:         Qty = Total number of units.         kW_base = Deemed average demand per baseline unit.         KW_base = Deemed average demand per high-efficiency unit.         Hours       The average annual operating hours.         Hours       The average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven home audit applications.         Hours Source       Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdowr Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         Hours source note       #N/A         KWh/yr savings source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         KWh/yr savings note       #N/A         KW reduction source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Mode Prepared for the Massachusetts Program Administrators.         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Ereprave MMBtu/yr savings note       #N/A		Rebated lamp or fixture.
Qty = Total number of units.           kW_base         Deemed average demand per baseline unit.           kW_base         Deemed average demand per high-efficiency unit.           Hours         The average annual operating hours are 1,058 hours/year for rebated lights and calculated by ven home audit applications.           Hours Source         Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           Hours source note         #N/A           KWh/yr Savings         40.2           KWh/yr Savings note         #N/A           KWh/yr savings note         #N/A           KW reduction         0.033           KW reduction note         #N/A           KW reduction note         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Oil MMM		Gross kW = Qty × (kW_base - kW_ee)
Hours       home audit applications.         Hours Source       Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         Hours source note       #N/A         KWh/yr savings source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         KWh/yr savings note       #N/A         KW reduction       0.033         KW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gil MMBtu/yr savings note       #N/A         MV/A       More and Buydown Program Administrators.         KW reduction note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         Reasure life note       #N/A         In-service rate source       #N/A         In-service rate source       #N/A         In-service rate note       In-s	Savings Equation	kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit.
HOURS SOURCE       Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         Hours source note       #N/A         KWh/yr Savings       40.2         KWh/yr savings source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         KWh/yr savings note       #N/A         KW reduction       0.033         kW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life note       #N/A         In-service rate source       #N/A         In-service rate source       #N/A         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on t	Hours	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for home audit applications.
kWh/yr Savings       40.2         kWh/yr savings source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         kWh/yr savings note       #N/A         kW reduction       0.033         kW reduction source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life note       #N/A         In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service r	Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
kWh/yr savings source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         kWh/yr savings note       #N/A         kW reduction       0.033         kW reduction source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         reasure life note       #N/A         In-service rate (SR)       0.98         In-service rate source       #N/A         In-service rate note <td>Hours source note</td> <td>#N/A</td>	Hours source note	#N/A
kWh/yr savings source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         kWh/yr savings note       #N/A         kW reduction       0.033         kW reduction source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life note       #N/A         In-service rate source       #N/A         In-service rate source       #N/A         In-service rate source       #N/A         In-service rate note	kWh/yr Savings	40.2
kWh/yr savings note       #N/A         kW reduction       0.033         kW reduction source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Mode         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life note       #N/A         In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)<	kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kW reduction       0.033         kW reduction source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Mode         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00		
RW reduction sourcePrepared for the Massachusetts Program Administrators.kW reduction note#N/AGas Heat MMBtu/yr savings0Gas Heat MMBtu/yr savings source#N/AGas Heat MMBtu/yr savings note#N/AOil MMBtu/yr savings0Oil MMBtu/yr savings outce#N/AOil MMBtu/yr savings note#N/AOil MMBtu/yr savings note#N/AOil MMBtu/yr savings note#N/APropane IMBtu/yr savings note#N/APropane IMBtu/yr savings note#N/AIn-service rate (ISR)0In-service rate (ISR)0.98In-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00		
Gas Heat MMBtu/yr savings0Gas Heat MMBtu/yr savings source#N/AGas Heat MMBtu/yr savings note#N/AOil MMBtu/yr savings0Oil MMBtu/yr savings source#N/AOil MMBtu/yr savings note#N/AOil MMBtu/yr savings note#N/APropane MMBtu/yr savings ource#N/APropane MMBtu/yr savings source#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane IMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life8measure life note#N/AIn-service rate (ISR)0.98In-service rate source#N/AIn-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00	kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00 <td>kW reduction note</td> <td>· · · · · · · · · · · · · · · · · · ·</td>	kW reduction note	· · · · · · · · · · · · · · · · · · ·
Gas Heat MMBtu/yr savings source#N/AGas Heat MMBtu/yr savings note#N/AOil MMBtu/yr savings0Oil MMBtu/yr savings source#N/AOil MMBtu/yr savings note#N/AOil MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings source#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life8measure life note#N/AIn-service rate (ISR)0.98In-service rate source#N/AIn-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00	Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings note#N/AOil MMBtu/yr savings0Oil MMBtu/yr savings source#N/AOil MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings source#N/APropane MMBtu/yr savings source#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/APropane MMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life8measure life note#N/AIn-service rate (ISR)0.98In-service rate source#N/AIn-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00		#N/A
Oil MMBtu/yr savings0Oil MMBtu/yr savings source#N/AOil MMBtu/yr savings note#N/APropane MMBtu/yr savings0Propane MMBtu/yr savings source#N/APropane MMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life8measure life sourceMA Residential Lighting Worksheet 2016, including reference to Market Adoption Modelmeasure life note#N/AIn-service rate source#N/AIn-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00		
Oil MMBtu/yr savings source#N/AOil MMBtu/yr savings note#N/APropane MMBtu/yr savings0Propane MMBtu/yr savings source#N/APropane MMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life8measure life sourceMA Residential Lighting Worksheet 2016, including reference to Market Adoption Modelmeasure life note#N/AIn-service rate (ISR)0.98In-service rate source#N/AIn-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00		
Oil MMBtu/yr savings note#N/APropane MMBtu/yr savings0Propane MMBtu/yr savings source#N/APropane MMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life8measure life sourceMA Residential Lighting Worksheet 2016, including reference to Market Adoption Modelmeasure life note#N/AIn-service rate (ISR)0.98In-service rate source#N/AIn-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00		
Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00		
Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00		•
Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       8         measure life source       MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model         measure life note       #N/A         In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00	1 ;, 8	#N/A
Energy Reference(s) & table(s) notes0measure life8measure life sourceMA Residential Lighting Worksheet 2016, including reference to Market Adoption Modelmeasure life note#N/AIn-service rate (ISR)0.98In-service rate source#N/AIn-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00		
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measure life note       #N/A         In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00		
In-service rate (ISR)       0.98         In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00		
In-service rate source       #N/A         In-service rate note       In-service rates are set to 100% based on the assumption that all purchased units are installed.         Savings Persistence Factor (SPF)       1.00		
In-service rate noteIn-service rates are set to 100% based on the assumption that all purchased units are installed.Savings Persistence Factor (SPF)1.00		
	Savings Persistence Factor (SPF)	1.00
Javings reisistence ractor source #IV/A	Savings Persistence Factor source	#N/A
Savings Persistence Factor note All PAs use 100% savings persistence factors.		All PAs use 100% savings persistence factors.

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Net-to-Gross ratio is Assumed to be 100%.
per bulb
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Α
5 per bulb

TRL Reference Number	RI 0220
Fuel	Electric
Sector	Residential
Project Type	Retrofit
	Lighting
Category Type	Interior
Sub-type	LED Screw Base
Program Name	EnergyStar Lighting
Measure Name	LED Bulbs (EISA Exempt)
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	52.4
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.044
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	Expected lifetime from ENERGY STAR
In-service rate (ISR)	0.98
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.

Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.10
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.90
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 14 per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 8 per bulb
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TRL Reference Number	RI_0221 Electric
Fuel	
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Screw Base
Program Name	Single Family Appliance Management
Measure Name	LED Bulbs LI
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR® qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,022 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	47.6
kWh/yr savings source	#N/A
kWh/yr savings note	ENERGY STAR Website (2011). Light Bulbs for Consumers.
kW reduction	0.048
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
	1

RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.13
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
CF winter peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.63
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 17 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 17 per measure

TRL Reference Number	RI_0214
Fuel	Electric
Sector	Residential
	Retrofit
Project Type	
Category	Lighting
Type	LED Fixture
Sub-type	
Program Name Measure Name	EnergyStar Lighting LED Fixtures
Measure Name	
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, CFLs and other bulbs types, as provided by market research or for a home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours Gross kW = Qty × deltakW
Savings Equation	Where: Qty = Total number of units. DeltakW = Deemed average kW reduction per unit. Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	59.9
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.05
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life measure life source	8 MA Desidential Lighting Workshoot 2016, including reference to Market Adaption Model
measure life source measure life note	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
In-service rate (ISR)	#N/A 0.98
, <i>,</i>	0.98 #N/A
In-service rate source In-service rate note	#N/A In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.
Realization rate energy (RRe)	1.00
neanzation rate energy (nne)	1.00

RRe source	45170
	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
CF winter peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.02
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.98
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 35 per fixture
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 7 per fixture

TRL Reference Number	RI_0190
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Exterior
Sub-type	CFL Fixture
Program Name	EnergyStar Lighting
Measure Name	Outdoor Fixture
	The installation of hardwired ENERGY STAR® fluorescent outdoor fixtures with pin-based bulbs. Savings
Measure Description	for this measure are attributable to high efficiency outdoor lighting fixtures and are treated similarly to
	indoor fixtures.
Baseline Description	The baseline efficiency case is an incandescent, screw-based fixture with an incandescent bulb.
Savings Principle	The high efficiency case is an ENERGY STAR® fixture wired for exclusive use with a pin based CFL bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,642.5 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
Hours Source	and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
	Public Service Department for Efficiency Vermont, N
Hours source note	#N/A
kWh/yr Savings	87
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.088
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.87
	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
In-service rate source	and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
יווי-זבו אונפ ומנפ זטעו נפ	Public Service Department for Efficiency Vermont, N
In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.
Realization rate energy (RRe)	1.00
Neanzation rate energy (KKe)	1.00

RRe source	/#N/A
RRE source RRE note	
	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.04
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.96
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 30 per fixture
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 8 per fixture

TRL Reference Number	RI_0406
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Fixture
Program Name	EnergyStar Lighting
Measure Name	Outdoor LED Fixture
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	Existing lighting mix.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Retrofitted fixture
	Gross kWh = Qty × (kW_base - kW_ee) × Hours
Savings Equation	Gross kW = Qty × (kW_base - kW_ee) Where:
	Qty = Total number of units.
	kW_base = Deemed average demand per baseline unit.
	kW_ee = Deemed average demand per high-efficiency unit.
	Hours = Deemed average annual operating hours.
Hours	0
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	113.4
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.094
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	- #N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
	0
Propane MMBtu/yr savings Propane MMBtu/yr savings source	0 #N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
•	

RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.50
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 30 per fixture
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 8 per fixture

TRL Reference Number	RI_0203
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	EnergyStar Lighting
Measure Name	School Program CFL Bulbs
Measure Description	The installation of compact fluorescent bulbs.
	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	$Gross kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
Hours Source	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	53
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.044
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	4
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.50
In-service rate source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
	near 2010 have been and been and based on evaluation results.

RRd summer peak source       #N/A         RRd summer peak source       #N/A         RRd demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak source       #N/A         RRd winter peak source       #N/A         RRd winter peak source       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.14         CF summer peak source       Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.18         CF winter peak source       Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak source       Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak source       Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         An		
RRd summer peak note         Realization rate is 100% since gross savings values are based on evaluation results.           RR demand (RRd) winter peak         1.00           RRd winter peak source         #N/A           RRd winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.14           CF summer peak source         #N/A           Cf summer peak note         #N/A           Coincidence factor (CF) winter peak         0.14           CF summer peak note         #N/A           CGr coincidence factor (CF) winter peak         0.13           CF winter peak source         Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.           Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak source           CF winter peak note         #N/A           CGr winter peak note         #N/A           Water savings: gallons/yr         0.00           Sever savings Source         #N/A           Water / Sever savings note         #N/A           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           One time \$ savings source/description         #N/A           One time \$ savings note	RR demand (RRd) summer peak	1.00
RR demand (Rd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.14         CF summer peak source       Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.18         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.18         CF winter peak source       Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.         CF winter peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One		#N/A
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.14         CF summer peak source       Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.18         CF winter peak source       Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak source       Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.18         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings       0.00         Water / Sewer savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A </td <td>RRd summer peak note</td> <td>Realization rate is 100% since gross savings values are based on evaluation results.</td>	RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.14           CF summer peak source         Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           CF summer peak note         #N/A           Coincidence factor (CF) winter peak         0.18           CF winter peak source         Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.           CF winter peak note         #N/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water / Sewer savings Source         #N/A           Annual S savings note         #N/A           Annual S savings note         #N/A           One time \$ savings note <t< td=""><td>RR demand (RRd) winter peak</td><td>1.00</td></t<>	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.14         CF summer peak source       Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.         Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.18         CF winter peak source       Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.         Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00	RRd winter peak source	#N/A
CF summer peak source       Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.         Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.18         CF winter peak source       Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.         Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings Source       #N/A         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.46         Spill-O	RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
CF summer peak sourcePrepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF summer peak note#N/ACoincidence factor (CF) winter peak0.18CF winter peak sourceNexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00	Coincidence factor (CF) summer peak	0.14
Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF summer peak note#N/ACoincidence factor (CF) winter peak0.18CF winter peak sourceNexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings source#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00	CE summer neek source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
Coincidence factor (CF) winter peak0.18CF winter peak sourceNexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings onte#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.46Spill-Over (non-participant)0.00	CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak sourceNexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne (participant)0.00Spill-Over (non-participant)0.00	CF summer peak note	#N/A
CF winter peak sourcePrepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00	Coincidence factor (CF) winter peak	0.18
Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00		Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00	CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00	CF winter peak note	#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.46Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.46Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.46Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Water / Sewer savings Source	#N/A
Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings3.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.46Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Water / Sewer savings note	#N/A
Annual \$ savings note       #N/A         One time \$ savings       3.00         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.46         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	Annual \$ savings	0.00
One time \$ savings       3.00         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.46         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	Annual \$ savings source / description	#N/A
One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.46         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	Annual \$ savings note	#N/A
One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.46         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	One time \$ savings	3.00
Free-Ridership     0.46       Spill-Over (participant)     0.00       Spill-Over (non-participant)     0.00		#N/A
Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00	One time \$ savings note	#N/A
Spill-Over (non-participant) 0.00	Free-Ridership	0.46
	Spill-Over (participant)	0.00
Net-to-Gross 0.54	Spill-Over (non-participant)	0.00
	Net-to-Gross	0.54
Net-to-Gross source #N/A	Net-to-Gross source	#N/A
Net-to-Gross note The Net-to-Gross ratio is Assumed to be 100%.	Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit \$ 3 per bulb	Gross Measure TRC unit	\$ 3 per bulb
	Gross Measure TRC source	
	Gross Measure TRC note	
Incentive Unit \$ 3 per bulb	Incentive Unit	\$ 3 per bulb

TRL Reference Number	RI_0405
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	LED Screw Base
Program Name	EnergyStar Lighting
Measure Name	School Program LED Bulbs
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	Existing lighting mix.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed lamp
	Gross kWh = Qty × (kW_base - kW_ee) × Hours
Savings Equation	Gross kWI = Qty × (kW_base - kW_ee) Where:
	Qty = Total number of units.
	kW_base = Deemed average demand per baseline unit.
	kW_ee = Deemed average demand per high-efficiency unit.
	Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	40.2
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.033
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	8
measure life source	A Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.50
In-service rate (ISK)	#N/A
	#N/A #N/A
In-service rate note Savings Persistence Eactor (SPE)	#N/A 1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.
Realization rate energy (RRe)	1.00
RRe source RRe note	#N/A Realization rate is 100% since gross savings values are based on evaluation results.
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RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
CE winter neck source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.10
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.90
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$8 per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 8 per bulb

TDI Deference Number	DI 0410
TRL Reference Number	RI_0419 Electric
Fuel	
Sector	Residential
Project Type	Retrofit
Category	Lighting Interior
Type	
Sub-type	LED Screw Base
Program Name	EnergyStar Lighting
Measure Name	HTR LED A Lamps
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	39.5
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.033
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	8
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.98
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Caulta an Develation of Frister and second	#N/A
Savings Persistence Factor source	#N/A

Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 15 per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 10 per bulb
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TDI Deference Number	DL 0420
TRL Reference Number Fuel	RI_0430 Electric
Sector	Residential
Project Type	Retrofit
	Lighting
Category Type	Interior
Sub-type	LED Screw Base
Program Name	EnergyStar Lighting
Measure Name	LED Reflector
Measure Description	The installation of Light-Emitting Diode (LED) screw-in bulbs and fixtures. LEDs offer comparable luminosity to incandescent bulbs at significantly less wattage and significantly longer lamp lifetimes.
Baseline Description	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided by market research or for EISA exempt bulbs and bulbs installed through an home energy audit, the base line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is and ENERGY STAR <sup>®</sup> qualified LED fixture.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × (kW_base - kW_ee) × Hours Gross kW = Qty × (kW_base - kW_ee) Where:
Savings Equation	Qty = Total number of units. kW_base = Deemed average demand per baseline unit. kW_ee = Deemed average demand per high-efficiency unit. Hours = Deemed average annual operating hours.
Hours	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	57.2
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.048
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.98
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.

Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings source	#N/A #N/A
Annual \$ savings	0.00
Annual ș savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.10
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.90
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 15 per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 10 per bulb

TRL Reference Number Fuel Sector Project Type Category Type	RI_0204         Electric         Residential         Retrofit
Sector Project Type Category Type	Residential
Project Type Category Type	
Category Type	Retrofit
Туре	
	Lighting
	Interior
Sub-type	CFL Screw Base
Program Name	EnergyStar Lighting
Measure Name	Screw-in CFL Bulbs
Measure Description	The installation of compact fluorescent bulbs.
	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	53
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.044
Wieddclion	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
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kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	4
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.95
In-service rate source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	
Savings Persistence Factor source Savings Persistence Factor note	All PAs use 100% savings persistence factors.
Savings Persistence Factor note	All PAs use 100% savings persistence factors. 1.00
-	

RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.46
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.54
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 4 per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1 per bulb

TRL Reference Number	RI 0205
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	EnergyStar Lighting
Measure Name	Screw-in CFL Bulbs (EISA Exempt)
Measure Description	The installation of compact fluorescent bulbs.
-	The baseline efficiency case is blend of incandescents, halogens, CFLs and other bulbs types, as provided
Baseline Description	by market research or for EISA exempt bulbs and bulbs installed through a home energy audit, the base
	line is a 65 Watt incandescent.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> rated CFL spiral bulb.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Rebated lamp or fixture.
	Gross kWh = Qty × deltakW × Hours
	$Gross kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
	The average annual operating hours are 1,058 hours/year for rebated lights and calculated by vendor for
Hours	home audit applications.
Hours Source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact
	Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
Hours source note	#N/A
kWh/yr Savings	52.4
kWh/yr savings source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
kWh/yr savings note	#N/A
kW reduction	0.044
RW reduction	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
., .	
Oil MMBtu/yr savings note	#N/A 0
Propane MMBtu/yr savings Propane MMBtu/yr savings source	W/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0 7
measure life measure life source	
	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	0.95
In-service rate source	Nexus Market Research, RLW Analytics and GDS Associates (2009). Residential Lighting Markdown Impact Evaluation. Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
In-service rate note	#N/A
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings reisistence ractor source	
	All PAs use 100% savings persistence factors.
Savings Persistence Factor note	All PAs use 100% savings persistence factors. 1.00

RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.14
CF summer peak source	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF summer peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
	Nexus Market Research and RLW Analytics (2009). Residential Lighting Markdown Impact Evaluation.
CF winter peak source	Prepared for Markdown and Buydown Program Sponsors in CT, MA, RI, and VT.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	3.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.46
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.54
Net-to-Gross source	#N/A
Net-to-Gross note	Consistent with MA TRM
Gross Measure TRC unit	\$ 5 per bulb
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 2 per bulb

TRL Reference Number	RI 0228
	Electric
Fuel	
Sector	Residential
Project Type	Retrofit
Category	Motors/Drives
Type	Variable Speed Drive
Sub-type	Pump
Program Name	EnergyStar Products
Measure Name	Pool pump (2
Measure Description	The installation of a 2-speed or variable speed drive pool pump. Operating a pool pump for a longer period of time at a lower wattage can move the same amount of water using significantly less energy.
Baseline Description	The baseline efficiency case is a single speed pump.
Savings Principle	The high efficiency case is a 2-speed or variable speed pump.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed efficient pool pump.
	Gross kWh = Qty × kWh_base × %SAVE
	Gross $kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	kWh_base = Deemed average annual kWh consumption per baseline unit.
	%SAVE = Deemed average savings factor.
	DeltakW = Deemed average kW reduction per unit.
	Hours are considered on a case-by-case basis since they are dependent on seasonal factors, pool size, and
Hours	treatment conditions.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	824
kWh/yr savings source	Pacific Gas and Electric The Multi-Speed Pool Pump Fact Sheet.
kWh/yr savings note	#N/A
kW reduction	0.35
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	#N/A 0
	10
measure life	Davis Energy Group (2008). Proposal Information Template for Residential Pool Pump Measure Revisions.
measure life source	Prepared for Pacific Gas and Electric Company.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
Realization rate chergy (RRC)	
RRe source	#N/A
	#N/A National Grid assumption based on regional PA working groups.

RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF summer peak source	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF willer peak source	Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 300 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	

TRL Reference Number	RI 0229
	Electric
Fuel	
Sector	Residential
Project Type	Retrofit
Category	Motors/Drives
Type	Variable Speed Drive
Sub-type	Pump
Program Name	EnergyStar Products
Measure Name	Pool pump (variable)
Measure Description	The installation of a 2-speed or variable speed drive pool pump. Operating a pool pump for a longer period of time at a lower wattage can move the same amount of water using significantly less energy.
Baseline Description	The baseline efficiency case is a single speed pump.
Savings Principle	The high efficiency case is a 2-speed or variable speed pump.
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed efficient pool pump.
	Gross kWh = Qty × kWh_base × %SAVE
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	kWh_base = Deemed average annual kWh consumption per baseline unit.
	%SAVE = Deemed average savings factor.
	DeltakW = Deemed average kW reduction per unit.
	Hours are considered on a case-by-case basis since they are dependent on seasonal factors, pool size, and
Hours	treatment conditions.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1062
kWh/yr savings source	Pacific Gas and Electric The Multi-Speed Pool Pump Fact Sheet.
kWh/yr savings note	#N/A
kW reduction	0.5
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
	Davis Energy Group (2008). Proposal Information Template for Residential Pool Pump Measure Revisions.
measure life source	Prepared for Pacific Gas and Electric Company.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
DD	National Grid assumption based on regional PA working groups.
RRe note RR demand (RRd) summer peak	

<b>F</b>	
RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF winter peak source	Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 650 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 300 per measure

TRI Deference Number	0242
TRL Reference Number	RI_0243
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Plug Load
Туре	Smart Strips
Sub-type	Smart Strip
Program Name	EnergyStar Products
Measure Name	Advanced Power Strips
	The basic measures switches off plug load using current sensors and switching devices which turn off plug
Measure Description	load when electrical current drops below threshold low levels. The advanced measure shuts devices off
	after it no longer senses activity from their infrared controls.
Baseline Description	The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a
	power surge protector and leaving peripheral devices on
Savings Principle	The high efficiency case is the use of a smart strip or advanced smart strip.
Energy Savings calculation method	Deemed
Savings unit	Rebated smart strip.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
Suvings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational
110013	hours per year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	346
W/h /ur covings course	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
kWh/yr savings source	Administrators.
kWh/yr savings note	#N/A
kW reduction	0.074
LVM reduction course	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
	All installations have 100% in-service rate since programs include verification of equipment installations.
In-service rate note	
	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor (SPF) Savings Persistence Factor source	#N/A
Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note	#N/A Savings persistence is assumed to be 100%.
Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe)	#N/A Savings persistence is assumed to be 100%. 1.00
Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe) RRe source	#N/A Savings persistence is assumed to be 100%. 1.00 #N/A
Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe)	#N/A Savings persistence is assumed to be 100%. 1.00

RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	0.73
CF summer peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF summer peak source	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF willer peak source	Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 100 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 35 per measure

	DL 0344
TRL Reference Number	RI_0244 Electric
Fuel	
Sector	Residential
Project Type	Retrofit
Category	Plug Load
Туре	Smart Strips
Sub-type	Smart Strip
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Smart Strips
	The basic measures switches off plug load using current sensors and switching devices which turn off plug
Measure Description	load when electrical current drops below threshold low levels. The advanced measure shuts devices off
	after it no longer senses activity from their infrared controls.
Baseline Description	The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a
•	power surge protector and leaving peripheral devices on
Savings Principle	The high efficiency case is the use of a smart strip or advanced smart strip.
Energy Savings calculation method	Deemed
Savings unit	Rebated smart strip.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational
Hours	hours per year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	6
	Nexus Market Research and RLW Analytics (2008). Residential Lighting Measure Life Study. Prepared for
measure life source	New England
	Residential Lighting Program Sponsors.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

4.00
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rates are 100% since savings estimates are based on evaluation results.
0.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
1.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 398/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A

TRL Reference Number	RI_0245
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Plug Load
Туре	Smart Strips
Sub-type	Smart Strip
Program Name	EnergyWise
Measure Name	EW SF Smart Strip
	The basic measures switches off plug load using current sensors and switching devices which turn off plug
Measure Description	load when electrical current drops below threshold low levels. The advanced measure shuts devices off
	after it no longer senses activity from their infrared controls.
	The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a
Baseline Description	power surge protector and leaving peripheral devices on
Savings Principle	The high efficiency case is the use of a smart strip or advanced smart strip.
Energy Savings calculation method	Deemed
Savings unit	Rebated smart strip.
	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
	$Gross  kw = Qly \times deltakw$
Savings Equation	Where:
0	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational
	hours per year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	79
kWh/yr savings source	ECOS 2009 Smart Plug Strips: Draft Report
kWh/yr savings note	#N/A
kW reduction	0.017
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
	#N/A
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
	miya

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RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.73
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI_0246
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Plug Load
Туре	Smart Strips
Sub-type	Smart Strip
Program Name	EnergyWise MultiFamily
Measure Name	EW Smart Strips
	The basic measures switches off plug load using current sensors and switching devices which turn off plug
Measure Description	load when electrical current drops below threshold low levels. The advanced measure shuts devices off
·	after it no longer senses activity from their infrared controls.
	The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a
Baseline Description	power surge protector and leaving peripheral devices on
Savings Principle	The high efficiency case is the use of a smart strip or advanced smart strip.
Energy Savings calculation method	Deemed
Savings unit	Rebated smart strip.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational
Hours	hours per year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	79
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.0158
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor source	
	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RRe note RR demand (RRd) summer peak RRd summer peak source	Realization rate is 100% since gross savings values are based on evaluation results.         1.00         #N/A

RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.73
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TRL Reference Number	RI_0366
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Plug Load
Туре	Smart Strips
Sub-type	Smart Strip
Program Name	EnergyStar Products
Measure Name	Smart Strips
	The basic measures switches off plug load using current sensors and switching devices which turn off plug
Measure Description	load when electrical current drops below threshold low levels. The advanced measure shuts devices off
	after it no longer senses activity from their infrared controls.
	The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a
Baseline Description	
Covingo Drinointe	power surge protector and leaving peripheral devices on
Savings Principle	The high efficiency case is the use of a smart strip or advanced smart strip.
Energy Savings calculation method	Deemed
Savings unit	Per smart strip
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Sovings Equation	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
	Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational
Hours	hours per year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	79
kWh/yr savings source	ECOS 2009 Smart Plug Strips: Draft Report
kWh/yr savings note	#N/A
kW reduction	0.017
kW reduction source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	NATIONAL Representation based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	0.73
CF summer peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
	Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program
CF winter peak source	Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 20 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 15 per measure

TRL Reference Number	RI_0247
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Plug Load
Туре	Smart Strips
Sub-type	Smart Strip
Program Name	Single Family Appliance Management
Measure Name	Smart Strips
	The basic measures switches off plug load using current sensors and switching devices which turn off plug
Measure Description	load when electrical current drops below threshold low levels. The advanced measure shuts devices off
	after it no longer senses activity from their infrared controls.
	The baseline efficiency case is the absence power strip and leaving peripheral devices plugged in or using a
Baseline Description	power surge protector and leaving peripheral devices on
Savings Principle	The high efficiency case is the use of a smart strip or advanced smart strip.
Energy Savings calculation method	Deemed
	Rebated smart strip.
Savings unit	
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	Since the power strip is assumed to be plugged in all year, the savings are based on 8,760 operational
Hours	hours per year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	75
kWh/yr savings source	ECOS 2009 Smart Plug Strips: Draft Report
kWh/yr savings note	#N/A
kW reduction	0.02
	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	In-service rates are set to 100% based on the assumption that all purchased units are installed.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Mational Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	0.73
CF summer peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	The Cadmus Group, Inc. (2012). Demand Impact Model. Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	1.01
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 30 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 30 per measure

TDI Deference Number	01 0270
TRL Reference Number	RI_0279
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Refrigeration
Type	Refrigeration O&M
Sub-type	Refrigerator Brush
Program Name	EnergyWise
Measure Name	EW SF Refrigerator Brush
Measure Description	The cleaning of refrigerator coils.
Baseline Description	A refrigerator with uncleaned coils. A refrigerator with coils cleaned by an auditor.
Savings Principle	
Energy Savings calculation method	Deemed
Savings unit	Per brushed refrigerator coil
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	37
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
kWh/yr savings note	#N/A
kW reduction	0.005
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor source	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A Realization rate is 100% since gross cavings values are based on evaluation results
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.

Coincidence factor (CF) summer peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.93
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI_0295
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Flow Control Measures
Program Name	Single Family Appliance Management
Measure Name	DHWater Measure (electric)
Measure Description	DHW measures include high-efficiency low-flow showerheads and faucet aerators save water and water
	heating energy.
Baseline Description	The baseline efficiency case is the existing domestic hot water equipment.
Savings Principle	The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-
Savings Finciple	flow showerheads and faucet aerators.
Energy Savings calculation method	Deemed
Savings unit	Installed DHW efficiency measure.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = Qty × deltakWh
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	where.
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	134
kWh/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.02
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
	NMAD Group the Tetre Tech (2014) March during the Constant of Constant of Constant of Constant of Constant of Constant
Propane MMBtu/yr savings source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00
In-service rate source	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.94
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CE winten nach nata	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	4028.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	1.80
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	28.33
One time \$ savings source/description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 8 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 8 per measure

TRL Reference Number	RI 0296
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
• •	Flow Control
Type	Flow Control Measures
Sub-type	
Program Name	Single Family Appliance Management
Measure Name	DHWater Measure (gas & other)
Measure Description	DHW measures include high-efficiency low-flow showerheads and faucet aerators save water and water
Deseline Description	heating energy.
Baseline Description	The baseline efficiency case is the existing domestic hot water equipment.
Savings Principle	The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low- flow showerheads and faucet aerators.
Energy Savings calculation method	Deemed
Savings unit	Installed DHW efficiency measure.
-	Gross kWh = deltakWh custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross kWh = Qty × deltakWh
	Gross kW = $Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	
	Where:
	Oty - Total number of units
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.9
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	
	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	4028.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	28.33
One time \$ savings source/description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 8 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC source	#N/A
Incentive Unit	\$ 8 per measure
	y o per measure

-	
TRL Reference Number	RI_0297
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Flow Control Measures
Program Name	Single Family Appliance Management
Measure Name	DHWater Measure (oil)
Measure Description	DHW measures include high-efficiency low-flow showerheads and faucet aerators save water and water
	heating energy.
Baseline Description	The baseline efficiency case is the existing domestic hot water equipment.
Savings Principle	The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-
Savings Finciple	flow showerheads and faucet aerators.
Energy Savings calculation method	Deemed
Savings unit	Installed DHW efficiency measure.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	$Gross kWh = Qty \times deltakWh$
	$Gross kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Oil = Qty × deltaMMBtu_Oil
	Gross MMBtu_Propane = Qty × deltaMMBtu_Propane
Savings Equation	Gross Minista_i ropane = Qty × deitaminista_i ropane
	Where:
	wildle.
	Otu – Tatal number of units
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	deltaMMBtu_Oil = Average annual oil reduction per unit
	deltaMMBtu_Propane = Average annual propane reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0.7
	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
Oil MMBtu/yr savings source	Income Weatherization Program. Prepared for National Grid.
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	National Grid assumption based on regional PA working groups.
	1.00
In-service rate (ISR) In-service rate source	1.00 #N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	4028.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	1.28
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	28.33
One time \$ savings source/description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 8 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 8 per measure
	là o her menorie

	DL 0300
TRL Reference Number	RI_0289
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Aerator (electric)
Measure Description	Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a
	commercial setting with service water heated by natural gas.
Baseline Description	The baseline efficiency case is a 2.2 GPM faucet.
Savings Principle	The high efficiency case is a faucet with 1.5 GPM or less aerator installed.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	Supplied by vendor
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	
	1.00 #N/A
In-service rate source	#N/A
In-service rate source	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
In-service rate source In-service rate note Savings Persistence Factor (SPF)	<ul><li>#N/A</li><li>All installations have 100% in-service rate since programs include verification of equipment installations.</li><li>1.00</li></ul>
In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source	<ul> <li>#N/A</li> <li>All installations have 100% in-service rate since programs include verification of equipment installations.</li> <li>1.00</li> <li>#N/A</li> </ul>
In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note	<ul> <li>#N/A</li> <li>All installations have 100% in-service rate since programs include verification of equipment installations.</li> <li>1.00</li> <li>#N/A</li> <li>Savings persistence is assumed to be 100%.</li> </ul>
In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source	<pre>#N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00 #N/A Savings persistence is assumed to be 100%. 1.00</pre>
In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note	<pre>#N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00 #N/A Savings persistence is assumed to be 100%. 1.00 #N/A</pre>
In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe) RRe source RRe note	<pre>#N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00 #N/A Savings persistence is assumed to be 100%. 1.00</pre>
In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe) RRe source	<pre>#N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00 #N/A Savings persistence is assumed to be 100%. 1.00 #N/A</pre>

RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.58
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	332.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 398/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 380/audit with multiple installed measures

TRL Reference Number	RI_0301
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	Income Eligible MultiFamily
Measure Name	EW LI Showerheads (Elec Ht)
Measure Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.
Baseline Description	The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the
	baseline is the existing showerhead.
Savings Principle	The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
KWIII yr savings source	
kWh/yr savings note	Massachusetts Program Administrators.
kW reduction	#N/A Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	MA Residential Lighting Worksheet 2016, including reference to Market Adoption Model
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
	#N/A
RRd summer peak source	#N/A

RR demand (RRd) winter peak       1.00         RR dwinter peak source       MN/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.11         CF summer peak source       Prepared for the Massachusetts Program Administrators.         FF summer peak note       MN/A         Coincidence factor (CF) winter peak       0.22         CF summer peak note       MN/A         Coincidence factor (CF) winter peak       0.22         CF winter peak note       MN/A         Vater savings: gallons/yr       0.00         Vater savings: gallons/yr       0.00         Vater savings source / description       MN/A         Nater / Sewer savings source / description       MN/A         Nater / Savings       0.00         Nanual S savings source / description       MN/A         Nunual S savings source / description       MN/A         Done time \$ savings note       MN/A         Due time \$ savings note       MN/A         Nunual S savings note       MN/A         Nunual S savings note       MN/A         Due time \$ savings note       MN/A         Due time \$ savings note       MN/A         Due time \$ savings		
RRd winter peak source       #N/A         RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.11         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.         Ef winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         Prepared for the Massachusetts Program Administrators.       Prepared for the Massachusetts Program Administrators.         Ef winter peak note       #N/A         Nater savings: gallons/vr       3696.00         Nater / Sever savings source       #N/A         Annual \$ savings source       #N/A         Annual \$ savings source       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A </td <td>RRd summer peak note</td> <td>Realization rate is 100% since gross savings values are based on evaluation results.</td>	RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd winter peak note       Realization rates are 100% since savings estimates are based on evaluation results.         Coincidence factor (CF) summer peak       0.11         F summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).         F summer peak note       #N/A         Coincidence factor (CF) winter peak       0.22         EF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.22         EF winter peak note       #N/A         Vater savings: gallons/yr       3696.00         weer savings: gallons/yr       0.00         Nater / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note <td>RR demand (RRd) winter peak</td> <td>1.00</td>	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.11         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.22         CF winter peak source       Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         ZF winter peak note       #N/A         Water savings: gallons/yr       3696.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Vater / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source/description       #N/A         Due time \$ savings note       #N/A         Splil-Over (participant)       0.00         Uetto-Gross source       #N/A	RRd winter peak source	#N/A
F summer peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.2F summer peak note#N/ACoincidence factor (CF) winter peak0.222F winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.2F winter peak note#N/AWater savings: gallons/yr3696.00Vater savings: gallons/yr0.00Vater / Sewer savings Source#N/ANater / Sewer savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOnoImpact Impact ModelOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AImpact Impact Model0.00One time \$ savings note#N/AImpact Impact Model0.00One time \$ savings note#N/AImpact Impact Model0.00Impact Impact Model0.00Impact Savings note#N/AImpact Impact Model0.00Impact Impact Impact Model0.00Impact Impact Impact I	RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
	Coincidence factor (CF) summer peak	0.11
Prepared for the Massachusetts Program Administrators.           E summer peak note         #N/A           Coincidence factor (CF) winter peak         0.22           E winter peak source         Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.           EF winter peak note         #N/A           Water savings: gallons/yr         3696.00           water savings: gallons/yr         0.00           Water / Sewer savings Source         #N/A           Mater / Sewer savings source / description         #N/A           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           Ono         0.00           Dene time \$ savings note         #N/A           One time \$ savings source/description         #N/A           One time \$ savings note         #N/A           One time \$ savings note         #N/A           One time \$ savings note         #N/A           One time \$ savings note <t< td=""><td>CE summer peak source</td><td>Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).</td></t<>	CE summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Coincidence factor (CF) winter peak       0.22         EF winter peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.         2F winter peak note       #N/A         Water savings: gallons/yr       3696.00         iewer savings: gallons/yr       0.00         Nater / Sewer savings Source       #N/A         Vater / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A         Due time \$ savings note       #N/A         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Vet-to-Gross       1.00         Vet-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC onit       \$ 398/audit with multiple installed measures         Gross Measure TRC note       #N/A		Prepared for the Massachusetts Program Administrators.
F winter peak sourceEstimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.CF winter peak note#N/AWater savings: gallons/yr3696.00Sever savings: gallons/yr0.00Nater / Sever savings source#N/AWAter / Sever savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AWhy A0.00One time \$ savings note#N/AOne (non-participant)0.00Outer (non-participant)0.00Vet-to-Gross1.00Vet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A	CF summer peak note	#N/A
Prepared for the Massachusetts Program Administrators.         EF winter peak note       #N/A         Water savings: gallons/yr       3696.00         iewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Stavings note       #N/A         One time \$ savings note       #N/A         Stavings note       #N/A </td <td>Coincidence factor (CF) winter peak</td> <td>0.22</td>	Coincidence factor (CF) winter peak	0.22
Prepared for the Massachusetts Program Administrators.         CF winter peak note       #N/A         Xater savings: gallons/yr       3696.00         Sewer savings: gallons/yr       0.00         Nater / Sewer savings Source       #N/A         Nater / Sewer savings source       #N/A         Nater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Vet-to-Gross source       #N/A         Vet-to-Gross source       #N/A         Vet-to-Gross source       #N/A	CE winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Nater savings: gallons/yr3696.00sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ADue time \$ savings note#N/AOne time \$ savings note#N/AVer to-Gross note#N/ASpill-Over (non-participant)0.00Vet-to-Gross1.00Vet-to-Gross note#N/AStass note#N/AStass noteThe Net-to-Gross ratio is Assumed to be 100%. Gross Measure TRC unitS 398/audit with multiple installed measuresGross Measure TRC noteGross Measure TRC note#N/A	CF winter peak source	Prepared for the Massachusetts Program Administrators.
Sewer savings: gallons/yr       0.00         Nater / Sewer savings Source       #N/A         Nater / Sewer savings note       #N/A         Nater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         Out time \$ savings note       #N/A         Verter-Ridership       0.00         0.00       0.00         spill-Over (non-participant)       0.00         set-to-Gross       1.00         vet-to-Gross source       #N/A         vet-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measu	CF winter peak note	#N/A
Nater / Sewer savings Source       #N/A         Nater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         Stavings note       #N/A         One time \$ savings note       #N/A         Veret.or Gross note       #N/A         Vet.to-Gross       1.00         Vet.to-Gross note       #N/A         Vet.to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light	Water savings: gallons/yr	3696.00
Nater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         Due time \$ savings source/description       #N/A         One time \$ savings source/description       #N/A         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         Due time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ cource/description       #N/A         One time \$ savings note       #N/A         One time \$ cource/description       #N/A         One time \$ cource/description       #N/A         One time \$ cource/description       #N/A         One time \$ cource       #N/A         Vet ro-Gross       0.00         Vet-to-Gross       1.00         Vet-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note<	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ concertaints0.00One time \$ savings note#N/AOne time \$ concertaints0.00Outer (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross note#N/ASeross Neasure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Water / Sewer savings Source	#N/A
Annual \$ savings source / description #N/A Annual \$ savings note #N/A One time \$ savings 0.00 One time \$ savings source/description #N/A One time \$ savings note #N/A Signil-Over (participant) 0.00 Signil-Over (non-participant) 0.00 Net-to-Gross 1.00 Net-to-Gross source #N/A Net-to-Gross note The Net-to-Gross ratio is Assumed to be 100%. Signil-Over The Net-to-Gross ratio is Assum	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AGree-Ridership0.000.000.00(pill-Over (participant))0.000.010.00Net-to-Gross1.00Net-to-Gross note#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC note#N/A	Annual \$ savings	0.00
Dne time \$ savings0.00Dne time \$ savings source/description#N/ADne time \$ savings note#N/ADre time \$ savings note#N/AGree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
Dne time \$ savings0.00Dne time \$ savings source/description#N/ADne time \$ savings note#N/AGree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceKada and an an an an an and an	Annual \$ savings note	#N/A
Dene time \$ savings note#N/AGree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Scross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	One time \$ savings	0.00
Free-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	One time \$ savings source/description	#N/A
Free-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	One time \$ savings note	#N/A
Dysill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Stross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Free-Ridership	0.00
Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.00
Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 398/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Net-to-Gross	1.00
Gross Measure TRC unit\$ 398/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross source	#N/A
Gross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC note #N/A	Gross Measure TRC unit	\$ 398/audit with multiple installed measures
	Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
ncentive Unit \$ 380/audit with multiple installed measures	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 380/audit with multiple installed measures

TRL Reference Number	RI_0298
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Flow Control Measures
Program Name	EnergyWise
Measure Name	EW SF DHW
Massura Description	DHW measures including high-efficiency low-flow showerheads and faucet aerators save water and water
Measure Description	heating energy.
Baseline Description	The baseline efficiency case is the existing domestic hot water equipment.
	The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low-
Savings Principle	flow showerheads and faucet aerators.
Energy Savings calculation method	Deemed
Savings unit	Installed DHW efficiency measure.
	Gross kWh = Qty × deltakWh
	Gross $kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
kWh/yr savings note	#N/A
kW reduction	Calc
kw reduction	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
WAY reduction note	#N/A
kW reduction note	#N/A 0
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and
	Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	, #N/A
measure life note	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
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RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.94
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	4028.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI_0334
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Water Heater
Sub-type	Heat Pump Water Heater
Program Name	EnergyWise
Measure Name	EW SF HPWH 50 gallon
Measure Description	Installation of a heat pump water heater (HPWH) instead of an electric resistance water heater.
Baseline Description	The baseline efficiency case is a new, standard efficiency electric resistance hot water heater.
Savings Principle	The high efficiency case is a high efficiency heat pump water heater.
Energy Savings calculation method	Deemed
Savings unit	Installed heat pump water heater.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1654
kWh/yr savings source	Steven Winter Associates, Inc (2012). Heat Pump Water Heaters Evaluation of Field Installed Performance. Sponsored by National Grid and NSTAR.
kWh/yr savings note	#N/A
kW reduction	0.37
kW reduction source	Steven Winter Associates, Inc (2012). Heat Pump Water Heaters Evaluation of Field Installed Performance. Sponsored by National Grid and NSTAR.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
., .	Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	#N/A
measure life note	Based on warranty of equipment
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
	#N/A Savings persistence is assumed to be 100%.
Savings Persistence Factor note	
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RRd summer peak note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.47         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2000)	
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.47         CE summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (1)	
RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.47         CF summer peak source       Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (1)	
Coincidence factor (CF) summer peak 0.47 CF summer peak source Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2000)	
CE summer neak source Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (	
( E summer neak source	
	012).
Prepared for the Massachusetts Program Administrators.	
CF summer peak note #N/A	
Coincidence factor (CF) winter peak 1.00	
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (	012).
CF winter peak source Prepared for the Massachusetts Program Administrators.	
CF winter peak note #N/A	
Water savings: gallons/yr 0.00	
Sewer savings: gallons/yr 0.00	
Water / Sewer savings Source #N/A	
Water / Sewer savings note #N/A	
Annual \$ savings 0.00	
Annual \$ savings source / description #N/A	
Annual \$ savings note #N/A	
One time \$ savings 0.00	
One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.00	
Spill-Over (participant) 0.00	
Spill-Over (non-participant) 0.00	
Net-to-Gross 1.00	
Net-to-Gross source The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation	
Net-to-Gross note #N/A	
Gross Measure TRC unit \$790/audit with multiple installed measures	
Gross Measure TRC source Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Ju	e
Gross Measure TRC note #N/A	
Incentive Unit \$ 766/audit with multiple installed measures	

TRL Reference Number	RI_0302
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyWise MultiFamily
Measure Name	EW Showerhead (electric)
Measure Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.
Baseline Description	The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the
	baseline is the existing showerhead.
Savings Principle	The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
KWIII yu Saviiigs	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
KWIII yi saviiigs source	
White human in go note	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	Supplied by vendor
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for National Grid
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistonen Easter (SDE)	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00

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RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.58
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	3696.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TRL Reference Number	RI_0311
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyStar Products
Measure Name	Low Flow Showerhead thermo Control (ladybug electric DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
Receive Description	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
Baseline Description	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
Suvings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	76
kWh/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
kWh/yr savings note	#N/A
kW reduction	0.011
kW reduction source	PGE Low Flow Showerhead and Thermostatic Restriction Valve
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	, #N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A

	Net in a Critic supervise based on a size I DA weating supervise
RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.94
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	578.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 30 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 11 per measure

TRL Reference Number	RI 0434
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyStar Products
Measure Name	Low Flow Showerhead thermo Control (ladybug gas DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
Baseline Description	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
lleure	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A #N/A
Hours Source	
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.38
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	#N/A
	0.00
RR demand (RRd) winter neak	
RR demand (RRd) winter peak	μN/Δ
RR demand (RRd) winter peak RRd winter peak source RRd winter peak note	#N/A #N/A

· · ·	
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	578.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 30 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 11 per measure

TRL Reference Number	RI_0428
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyStar Products
Measure Name	Low Flow Showerhead thermo Control (ladybug oil. Propane DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
Baseline Description	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0.43
Oil MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0.38
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	
RR demand (RRd) winter peak	National Grid assumption based on regional PA working groups. 1.00
	#N/A
RRd winter peak source	mu/A

RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	578.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 30 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 11 per measure

TRL Reference Number	RI_0303
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyStar Products
Measure Name	Low Flow Showerhead w/thermo Control (roadrunner electric DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
Receive Description	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
Baseline Description	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	372
kWh/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
kWh/yr savings note	#N/A
kW reduction	0.055
kW reduction source	PGE Low Flow Showerhead and Thermostatic Restriction Valve
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	National Grid assumption based on regional PA working groups.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A

RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.94
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	2723.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 40 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 15 per measure

TRL Reference Number	RI 0435
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyStar Products Low Flow Showerhead w/thermo Control (roadrunner gas DHW)
Measure Name Measure Description	A showerhead with a control that limits flow once water is heated.
	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
Baseline Description	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Hours Source	N/A #N/A
Hours source note	#N/A 0
kWh/yr Savings	#N/A
kWh/yr savings source	
kWh/yr savings note	#N/A
kW reduction	
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	1.84
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
	0.00
RR demand (RRd) summer neak	
RR demand (RRd) summer peak RRd summer peak source	#N/A
RRd summer peak source	#N/A #N/A
RRd summer peak source RRd summer peak note	#N/A
RRd summer peak source RRd summer peak note RR demand (RRd) winter peak	#N/A 0.00
RRd summer peak source RRd summer peak note	#N/A

CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	2723.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 40 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 15 per measure

TRL Reference Number	RI_0427
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyStar Products
Measure Name	Low Flow Showerhead w/thermo Control (roadrunner oil. Propane DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
Baseline Description	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Where
Savings Equation	Where:
	Observation of write
	Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
	-
11	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	2.09
Oil MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	1.2
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	A NA
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
inna winter peak source	

RRd winter peak note	National Grid assumption based on regional PA working groups.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	2723.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 40 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 15 per measure

TRL Reference Number	RI_0300
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Flow Control Measures
Program Name	Single Family Appliance Management
Measure Name	Waterbed mattress replacement
Measure Description	Replacement of waterbed mattress with a standard mattress.
Baseline Description	The baseline efficiency case is an existing waterbed mattress.
Savings Principle	The high efficiency case is a new standard mattress.
Energy Savings calculation method	Deemed
Savings unit	Replacement of existing waterbed mattress with new standard mattress.
	Gross kWh = Qty × deltakWh
	Gross $kW = Qty \times deltakW$
	Where:
Savings Equation	Where.
1	Oty - Total number of units
1	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
11	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	872
kWh/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.19
WAY no duration accuracy	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	http://www.serta.com/best-mattress-FAQs-mattresses-Serta-Number1-Best-Selling-Mattress.html
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00

RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.73
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	11.74
Annual \$ savings source / description	NMR Group, Inc., Tetra Tech (2011). Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for Massachusetts Program Administrators.
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 600 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 600 per measure

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TRL Reference Number	RI_0292
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	EnergyWise
Measure Name	Faucet aerator
Measure Description	Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a
	residential setting with service water heated by electricity.
Baseline Description	The baseline efficiency case is 2.2 GPM or greater faucet.
Savings Principle	The high efficiency case is a faucet with 1.5 GPM or less aerator installed.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	49
kWh/yr savings source	The Cadmus Group, Inc (2012). Rhode Island EnergyWise Single Family Impact Evaluation.
kWh/yr savings note	#N/A
kW reduction	0.007
kw reduction	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
	0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	0 #N/A
	•
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	Supplied by vendor
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak source	
•	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	#N/A
RRd winter peak source	

RRd winter peak pete	Dealization rates are 100% since source estimates are based on evaluation results
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
•	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.94
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF willer peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	332.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	The Cadmus Group, Inc (2008). EnergyWise 2008 Program Evaluation
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 790/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 766/audit with multiple installed measures

TRL Reference Number	RI 0288
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	EnergyWise MultiFamily
Measure Name	Faucet aerator Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a
Measure Description	
Provincia di Constitucio di	commercial setting with service water heated by electricity.
Baseline Description	The baseline efficiency case is 2.2 GPM or greater faucet.
Savings Principle	The high efficiency case is a faucet with 1.5 GPM or less aerator installed.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kWh/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
., 6	Massachusetts Program Administrators.
kWh/yr savings note	#N/A
kW reduction	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
kW reduction source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
kw reduction source	Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	Supplied by vendor
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
	1.00
RR demand (RRd) summer peak RRd summer peak source	#N/A
innu summer peak source	#1¥/A

RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rates are 100% since savings estimates are based on evaluation results.
Coincidence factor (CF) summer peak	0.58
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	332.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.15
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.85
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 305/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 296/audit with multiple installed measures

TRL Reference Number	RI_0354
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Whole Home
Туре	Audit
Sub-type	Educational Kit
Program Name	Single Family Appliance Management
Measure Name	Basic Educational Measures
	Installation of basic educational measures during an audit to help customers become more aware of
Measure Description	energy efficiency.
Baseline Description	The baseline efficiency case assumes no measures installed.
Savings Principle	The high efficiency case includes basic educational measures such as CFLs, low flow showerheads, pool
earn.80	and air conditioner timers, torchieres, and programmable thermostats.
Energy Savings calculation method	Deemed
Savings unit	Completed audit.
	Gross kWh = Qty × deltakWh
1	$Gross kW = Qty \times deltakW$
	GIOSS KW = QLY × DEILAKW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	138
kWh/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
KWIII yr savings source	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.03
WAY reduction course	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	National Grid assumption based on regional PA working groups.
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.73
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	9.56
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 176 per kit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$176 per kit

TRL Reference Number	RI 0355
Fuel	Electric
Sector	Residential Retrofit
Project Type	
Category	Whole Home
Type	Behavior
Sub-type	Home Energy Reports
Program Name	Home Energy Reports
Measure Name	New Movers
Measure Description	A Home Energy report sent to electric customers that displays home energy consumption in comparison
	with peers and prompts energy conserving behavior.
Baseline Description	A control group of homes that does not receive Home Energy Reports
Savings Principle	A home that receives Home Energy Reports.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Customer receiving energy reports
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	1
measure life source	Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts Energy Efficiency Advisory Council & Behavioral Research Team
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	National Grid assumption based on regional PA working groups.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is 100% since measure life is 1 year.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.73
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.

CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	Free-ridership and spillover are not applicable as customers cannot participate without the utility program.
Gross Measure TRC unit	\$ 9.07 per participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 9.07 per participant

TRL Reference Number	RI 0429
Fuel	Electric
Sector	Residential
Project Type	Retrofit
, ,,	Whole Home
Category	Behavior
Type Sub-type	Home Energy Reports
Program Name Measure Name	Home Energy Reports New Movers dual fuel
Measure Name	A Home Energy report sent to electric customers that displays home energy consumption in comparison
Measure Description	with peers and prompts energy conserving behavior.
Baseline Description	A control group of homes that does not receive Home Energy Reports
Savings Principle	
Energy Savings calculation method	A home that receives Home Energy Reports.
Savings unit	Calculated using site-specific inputs
	Customer receiving energy reports
Caudia an Envirobia a	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
Hours	Gross Winter kW = deltakW_wp_custom
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	1
measure life source	Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts Energy Efficiency Advisory Council & Behavioral Research Team
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	National Grid assumption based on regional PA working groups.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is 100% since measure life is 1 year.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.73 Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CE summer neek source	issumated using the demand anotation methodology described in. Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.

CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012 Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	Free-ridership and spillover are not applicable as customers cannot participate without the utility program.
Gross Measure TRC unit	\$ 9.07 per participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 9.07 per participant

TRL Reference Number	RI_0402
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Whole Home
Туре	Behavior
Sub-type	Home Energy Reports
Program Name	Home Energy Reports
Measure Name	Opt-out dual fuel
	A Home Energy report sent to electric customers that displays home energy consumption in comparison
Measure Description	with peers and prompts energy conserving behavior.
Baseline Description	No Home Energy Report.
Savings Principle	A home that receives Home Energy Reports.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Per participant
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
5 1	Gross Winter kW = deltakW wp custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A #N/A
	0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.08
In-service rate source	#N/A
In-service rate note	#N/A
Savings Persistence Factor (SPF)	0.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A

Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 9.07 per participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 9.07 per participant

TRL Reference Number	RI_0403
Fuel	Electric
Sector	Residential
Project Type	Retrofit
Category	Whole Home
Туре	Behavior
Sub-type	Home Energy Reports
Program Name	Home Energy Reports
Measure Name	Opt-Out electric
Measure Description	A Home Energy report sent to electric customers that displays home energy consumption in comparison
Measure Description	with peers and prompts energy conserving behavior.
Baseline Description	No Home Energy Report.
Savings Principle	A home that receives Home Energy Reports.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Per participant
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	1
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	0.93
In-service rate source	#N/A
In-service rate note	#N/A
Savings Persistence Factor (SPF)	0.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
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Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 9.07 per participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 9.07 per participant

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moval of existing refrigerator or freezer.
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oss kW = Qty × deltakW
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installations have 100% in-service rate since programs include verification of equipment installations.
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RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Not to Cross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

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TRL Reference Number	RI_0383
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	Direct Install
Measure Name	Programmable Thermostats
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system providing space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed thermostat
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts Energy Efficiency Advisory Council & Behavioral Research Team.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	8
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
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RRd summer peak source       #N/A         RRd summer peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         RR demand (Rd) winter peak       1.00         RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Water savings: source       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Spill-Over (non-participant)       0.00         One t		
RRd summer peak note         Realization rate is assumed to be 100% since evaluation adjusts deemed savings value           RR demand (RRd) winter peak         1.00           RRd winter peak source         #N/A           RRd winter peak note         Realization rate is assumed to be 100% since evaluation adjusts deemed savings value           Coincidence factor (CF) summer peak         0.00           CF summer peak note         Coincidence Factors are set to zero since demand savings typically occur during off-peak hours           Coincidence factor (CF) winter peak         0.00           CF winter peak note         Coincidence Factors are set to zero since demand savings typically occur during off-peak hours           CF winter peak note         Coincidence Factors are set to zero since demand savings typically occur during off-peak hours           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water / Sewer savings Source         #N/A           Manual S savings         0.00           Annual S savings         0.00           Annual S savings note         #N/A           Annual S savings note         #N/A           One time S savings note         #N/A           Spill-Over (non-participant)         0.00           One time S savings note         #N/A           Spill-Over (non-participant) </td <td>RR demand (RRd) summer peak</td> <td>1.00</td>	RR demand (RRd) summer peak	1.00
RR demand (RRd) winter peak       1.00         RRd winter peak source       MN/A         RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.00         CF summer peak source       MN/A         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Water / Sewer savings ing inte       MN/A         Annual S savings source       MN/A         Annual S savings note       MN/A         Annual S savings note       MN/A         One time S savings note       MN/A         Spill-Over (northight)       0.01         Spill-Over (northight)       0.01         Net-to-Gross       0.97         Spill	RRd summer peak source	#N/A
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.00         CF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings; gallons/yr       0.00         Sewer savings; gallons/yr       0.00         Sewer savings; gallons/yr       0.00         Water / Sewer savings Source       #N/A         Manual \$ savings       0.00         Manual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.01         Net-to-Gross note       #N/A         Setember, 2014       Setember, 2014         Net-t	RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CC summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CC winter peak source       #N/A         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Sever savings source       #N/A         Manual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note <td>RR demand (RRd) winter peak</td> <td>1.00</td>	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         CF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings note       #N/A         Pree-Ridership       0.03         One time \$ savings note       #N/A         Free-Ridership       0.03         Spill-Over (non-participant)       0.01         Net-to-Gross       0.97         TetraTech (2014). 2013 Commercial and Industrial	RRd winter peak source	#N/A
CF summer peak source       #N/A         CCF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant) <td>RRd winter peak note</td> <td>Realization rate is assumed to be 100% since evaluation adjusts deemed savings value</td>	RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
CF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CG winter peak source       #W/A         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pre-Ridership       0.03         Spill-Over (non-participant)       0.01         Net-to-Gross       0.97         Net-to-Gross note       #N/A         September, 2014       TetraTech (2014), 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       %/A         Gross Measure TRC ource       #N/A         Gross Measure TRC note       #N/A	Coincidence factor (CF) summer peak	0.00
Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.01         Net-to-Gross       0.97         Net-to-Gross note       #N/A         Sors Measure TRC ount       \$ 0.76 /kWh         Gross Measure TRC note       #N/A	CF summer peak source	#N/A
CF winter peak source       #N/A         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.01         Net-to-Gross note       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       Sol-6 /kWh         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
CF winter peak noteCoincidence Factors are set to zero since demand savings typically occur during off-peak hoursWater savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings Source#N/AManual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (participant)0.01Net-to-Gross0.97Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC note#N/A	Coincidence factor (CF) winter peak	0.00
Water savings: gallons/yr0.00Water savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings ource/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC cote#N/A	CF winter peak source	#N/A
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.03Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross Measure TRC unit\$ 0.76 /kWhGross Measure TRC note#N/A	CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross note#N/ASeptember, 2014X/ANet-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC note#N/A	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.03Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross note#N/ASeptember, 2014#N/ASeptember, 2014#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC note#N/A	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.03Spill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross note#N/ASeptember, 2014September, 2014Net-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC source#N/A	Water / Sewer savings Source	#N/A
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.03Spill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross note#N/ASeptember, 2014September, 2014Net-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC source#N/A	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.03Spill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC note#N/A	Annual \$ savings	0.00
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.03Spill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC source#N/A	Annual \$ savings source / description	#N/A
One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.03Spill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unit\$ 0.76 /kWhGross Measure TRC source#N/AWn/A#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.03Spill-Over (participant)0.00Spill-Over (non-participant)0.01Net-to-Gross0.97Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross Measure TRC unit\$ 0.76 /kWhGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings	0.00
Free-Ridership       0.03         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.01         Net-to-Gross       0.97         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 0.76 /kWh         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.01         Net-to-Gross       0.97         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 0.76 /kWh         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.01         Net-to-Gross       0.97         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 0.76 /kWh         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Free-Ridership	0.03
Net-to-Gross       0.97         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 0.76 /kWh         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.00
Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 0.76 /kWh         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.01
Net-to-Gross source     September, 2014       Net-to-Gross note     #N/A       Gross Measure TRC unit     \$ 0.76 /kWh       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross	0.97
September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 0.76 /kWh         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A		TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Gross Measure TRC unit     \$ 0.76 /kWh       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross source	September, 2014
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	#N/A
Gross Measure TRC note #N/A	Gross Measure TRC unit	\$ 0.76 /kWh
	Gross Measure TRC source	#N/A
Incentive Unit \$ 0.53 /kWh	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 0.53 /kWh

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TRL Reference Number	RI 0186
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Lighting
Туре	Custom
Sub-type	Lighting
Program Name	Direct Install
Measure Name	Custom lighting
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A Calc
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
	All installations have 100% in-service rate since programs include verification of equipment installations.
In-service rate note	
In-service rate note Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor (SPF)	1.00

RRe source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.02
RRd summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.13
RRd winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TDL Deference Number	DL 0204
TRL Reference Number	RI_0384
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Lighting
Туре	Exterior
Sub-type	LED Fixture
Program Name	Direct Install
Measure Name	Exterior LED Fixtures
	The installation of hardwired ENERGY STAR® fluorescent outdoor fixtures with pin-based bulbs. Savings
Measure Description	for this measure are attributable to high efficiency outdoor lighting fixtures and are treated similarly to
	indoor fixtures.
Baseline Description	Lighting baseline mix.
Savings Principle	0
Energy Savings calculation method	Calculated using deemed inputs
Savings unit	Installed LED fixtures
	Gross kWh = Qty × deltakW × Hours
	Gross $kW = Qty \times deltakW$
	Where:
Savings Equation	
	Qty = Total number of units.
	DeltakW = Deemed average kW reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source kWh/yr savings note	#N/A
	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.05
RRe source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
	#N/A
RRe note	•
RR demand (RRd) summer peak	1.00
RRd summer peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRd summer peak note	#N/A

RR demand (RRd) winter peak	1.00
RRd winter peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.11
CF summer peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.91
CF winter peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number Fuel Sector Project Type	
Sector Project Type	RI_0227
Project Type	Electric
	C&I
	Direct Install
Category	Lighting
Туре	Signage
Sub-type	Exit Sign LED
Program Name	Direct Install
Measure Name	LED Exit Signs
Measure Description	This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures.
Baseline Description	For retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost opportunity installations, the baseline case is based on comparable code-compliant installations and standard practices.
Savings Principle	For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix A.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed high-efficiency lighting project.
541	
Savings Equation	Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) Where: QTY_base_i = Quantity of baseline fixtures in location i Watts_base_i = Connected wattage of baseline fixtures in location i QTY_ee_j = Quantity of efficient fixtures in location j Watts_ee_j = Connected wattage of efficient fixtures in location j 1,000 Watts per kW = Conversion factor Hours = Lighting annual hours of operation: site-specific. deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
	Calc
kW reduction	#N/A
kW reduction kW reduction source	
	HN/A
kW reduction source	#N/A Calc
kW reduction source kW reduction note Gas Heat MMBtu/yr savings	Calc
kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	Calc #N/A
kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	Calc #N/A #N/A
kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	Calc #N/A
kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	Calc #N/A Calc Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber,
kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	Calc #N/A #N/A Calc Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	Calc #N/A #N/A Calc Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR. #N/A
kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	Calc #N/A #N/A Calc Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR. #N/A 0

measure life	13
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	Summit Blue Consulting (2008). Large Commercial and Industrial Retrofit Program Impact Evaluation
	2007. Prepared for National Grid
RRe note	#N/A
RR demand (RRd) summer peak	0.98
RRd summer peak source	Summit Blue Consulting (2008). Large Commercial and Industrial Retrofit Program Impact Evaluation 2007. Prepared for National Grid
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.98
RRd winter peak source	Summit Blue Consulting (2008). Large Commercial and Industrial Retrofit Program Impact Evaluation 2007. Prepared for National Grid
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0210
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Lighting
Туре	Interior
Sub-type	Efficient Lighting
Program Name	Direct Install
Measure Name	Lighting systems
Measure Description	This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures.
Baseline Description	For retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost opportunity installations, the baseline case is based on comparable code-compliant installations and standard practices.
Savings Principle	For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix A.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed high-efficiency lighting project.
Savings Equation	Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) Where: QTY_base_i = Quantity of baseline fixtures in location i Watts_base_i = Connected wattage of baseline fixtures in location i QTY_ee_j = Quantity of efficient fixtures in location j Watts_ee_j = Connected wattage of efficient fixtures in location j 1,000 Watts per kW = Conversion factor Hours = Lighting annual hours of operation: site-specific. deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved. deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	11
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l	News Market Descendented DUM Analytics (2004) Jamest Further of the Marses durate. Dhada Jaland
	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
measure life source	and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
	Public Service Department for Efficiency Vermont, N
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.03
RRe source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRe note	#N/A
RR demand (RRd) summer peak	0.96
RRd summer peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.96
RRd winter peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.55
CF summer peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.45
CF winter peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings source	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
	4117.0
Annual \$ savings note	#N/A
One time \$ savings One time \$ savings source/description	0.00 #N/A
One time ( equippe t-	48170
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0183
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Lighting
Туре	Controls
Sub-type	Occupancy Sensor
Program Name	Direct Install
Measure Name	Occupancy sensors
Measure Description	This measure promotes the installation of lighting controls in both lost-opportunity and retrofit applications. Promoted technologies include occupancy sensors and daylight dimming controls.
Baseline Description	The baseline efficiency case assumes no controls (retrofit) or code-compliant controls (new construction).
Savings Principle	The high efficiency case involves lighting fixtures connected to controls that reduce the pre-retrofit or baseline hours of operation.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed lighting controls project.
	Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)
	Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW) Where:
Savings Equation	QTY_i = Quantity in controlled fixtures in location i Watts_i = Connected wattage of controlled fixtures in location i Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations). Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented. 1,000 Watts per kW = Conversion factor deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.
Hours	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved. The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	9
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
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In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.87
RRe source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRe note	#N/A
RR demand (RRd) summer peak	0.94
RRd summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.94
RRd winter peak source	
	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations #N/A
RRd winter peak note	0.35
Coincidence factor (CF) summer peak	
CF summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	
CF winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TDL Deference Number	
TRL Reference Number	RI_0206
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Lighting
Туре	Interior
Sub-type	CFL Screw Base
Program Name	Direct Install
Measure Name	Screw-in CFL
Measure Description	This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures.
Baseline Description	For retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost opportunity installations, the baseline case is based on comparable code-compliant installations and standard practices.
Savings Principle	For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix A.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed high-efficiency lighting project.
Savings Equation	Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) Where: QTY_base_i = Quantity of baseline fixtures in location i Watts_base_i = Connected wattage of baseline fixtures in location i QTY_ee_j = Quantity of efficient fixtures in location j Watts_ee_j = Connected wattage of efficient fixtures in location j 1,000 Watts per kW = Conversion factor Hours = Lighting annual hours of operation: site-specific.
	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.
Hours	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A
Hours Source Hours source note	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A
Hours Source	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc
Hours Source Hours source note kWh/yr Savings kWh/yr savings source	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc
Hours Source Hours source note kWh/yr Savings kWh/yr savings source	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         #N/A         #N/A         Calc         #N/A         Calc         Zolc         Zolc         Zolc         Zolc         Zolc         Zolc         Zolc
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         #N/A         #N/A         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         #N/A         #N/A         Calc         #N/A         Calc         Zolc         Zolc         Zolc         Zolc         Zolc         Zolc         Zolc
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         Calc         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         Zalc         #N/A         Calc         #N/A         Calc         #N/A         Calc         #N/A         Calc         #N/A         Calc         #N/A         #N/A         #N/A         #N/A         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         Calc         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         Zalc         #N/A         Calc         #N/A         Calc         #N/A         Calc         #N/A         Calc         #N/A         Calc         #N/A         #N/A         #N/A         #N/A         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         Calc         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         #N/A         WN/A         Calc         #N/A         Calc         @N/A         @N/A         Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber,
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         @N/A         @N/A         @N/A         @N/A         @Ditimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         The annual hours of operation are site specific and will be determined on a case by case basis.         #N/A         #N/A         Calc         #N/A         #N/A         Calc         #N/A         Calc         Optimal Energy, Inc. (2008). Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.         #N/A         0

measure life	11
measure life source	MA LIGHTING WORKSHEET_T12_Standard-wrb v2 RI Calcs.xls.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	0.87
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	HEC, Inc. (1996). Final Report for New England Power Service Company Persistence of Savings Study. Prepared for NEPSCo.
Realization rate energy (RRe)	1.03
RRe source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRe note	#N/A
RR demand (RRd) summer peak	0.96
RRd summer peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.96
RRd winter peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.55
CF summer peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.45
CF winter peak source	DNV GL (2015) RI Small Business EE Program Prescriptive Lighting Study
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

	DL 0004
TRL Reference Number	RI_0234
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Other
Туре	Custom
Sub-type	Other
Program Name	Direct Install
Measure Name	Custom other
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.81
neanzation rate energy (nne)	0.01

	DIM Analytics (2007). Could During a Courter Margaret Fundation Development
RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
	Grid.
RRe note	#N/A
RR demand (RRd) summer peak	
RRd summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
RRd summer peak note	Grid.
	#N/A
RR demand (RRd) winter peak	0.53
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
DD d inter a columpte	Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0266
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Refrigeration
Туре	Custom
Sub-type	Refrigeration
Program Name	Direct Install
Measure Name	Custom refrigeration
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.60
inclusion rate chergy (hine)	1

RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.49
RRd summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.69
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

	DL 0354
TRL Reference Number	RI_0254
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Refrigeration
Type	Controls
Sub-type	Door Heater Control
Program Name	Direct Install
Measure Name	Door heater control The Installation of controls to reduce the run time of door and frame heaters for freezers and walk-in or
Measure Description	
	reach-in coolers. The reduced heating results in a reduced cooling load.
Baseline Description	The baseline efficiency case is a cooler or freezer door heater that operates 8,760 hours per year without any controls.
Savings Principle	The high efficiency case is a cooler or freezer door heater connected to a heater control system, which controls the door heaters by measuring the ambient humidity and temperature of the store, calculating the dew point, and using pulse width modulation (PWM) to control the anti-sweat heater based on specific algorithms for freezer and cooler doors. Door temperature is typically maintained about 5 degrees Fahrenheit above the store air dew point temperature with the heaters operating at 80% (adjustable).
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed door heater controls on existing cooler/freezer.
	Gross kWh = kW_DoorHeater × %OFF × Hours Gross kW = kW_DoorHeater × %OFF
Savings Equation	Where: kW_DoorHeater = Total demand of the door heater, calculated as Volts * Amps / 1000: site-specific %OFF = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters Hours = Door heater annual run hours before controls
Hours	Pre-retrofit hours are 8,760 hours per year. After controls are installed, the door heaters in freezers are on for an average 4,730.4 hours/year (46% off time) and the door heaters for coolers are on for an average 2,277.6 hours/year (74% off time).
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00 #N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
Coincidence factor (CF) summer peak	0.50
CF summer peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0271
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Refrigeration
Туре	Motors
Sub-type	ECM
Program Name	Direct Install
Measure Name	ECM evaporator fan motors (walk-in coolers/ freezers)
Measure Description	Installation of electronically commutated motors (ECMs) in multi-deck and freestanding coolers and freezers, typically on the retail floor of convenience stores, liquor stores, and grocery stores.
Baseline Description	The baseline efficiency case is the existing case motor.
Savings Principle	The high efficiency case is the replacement of the existing case motor with an ECM.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed electronically commutated motor for evaporator fans in existing cooler/freezer.
	Gross kWh = kW_Fan × LRF × Hours × (1 + RefrigEff × (Btu/hr per kW) / (Btu/hr per ton))
	Gross kW = Gross kWh / Hours Where:
Savings Equation	kW_Fan = Power demand of evaporator fan calculated from equipment nameplate data and estimated 0.55 power factor/adjustment
	LRF = Load reduction factor for motor replacement
	Hours = Annual fan operating hours: site-specific
	1.6 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field
	experience.
	3413 Btu/hr per kW = Conversion factor
	12,000 Btu/hr per ton = Conversion factor
	The annual operating hours are assumed to be 8,760 * (1-%OFF), where %OFF = 0 if the facility does not
Hours	have evaporator fan controls or %OFF > 0 if the facility has evaporator fan controls. See section:
	Refrigeration – Evaporator Fan Controls for %OFF valu
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
	0
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	0
	0 #N/A
Oil MMBtu/yr savings note	0 #N/A #N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings	0 #N/A #N/A 0
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0 #N/A #N/A 0 #N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	0 #N/A #N/A 0 #N/A #N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0 #N/A #N/A 0 #N/A #N/A 0
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0 #N/A #N/A 0 #N/A #N/A 0 15
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	0 #N/A #N/A 0 #N/A #N/A 0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	0.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.87
CF summer peak source	RLW Analytics (2007). Impact Evaluation Analysis of the 2005 Custom SBS Program. Prepared for National Grid. Derivation based on site specific results from the study adjusted for current on peak hours.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.51
CF winter peak source	RLW Analytics (2007). Impact Evaluation Analysis of the 2005 Custom SBS Program. Prepared for National Grid. Derivation based on site specific results from the study adjusted for current on peak hours.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI 0257
Fuel	Electric
Sector	C&I
Project Type	Direct Install
· · · ·	Refrigeration
Category Type	Controls
Type	
Sub-type	Fan Control
Program Name	Direct Install
Measure Name	Fan Control
Measure Description	Installation of controls to modulate the evaporator fans based on temperature control. Energy savings include: fan energy savings from reduced fan operating hours, refrigeration energy savings from reduced waste heat, and compressor energy savings resulting from the electronic temperature control. Electronic controls allow less fluctuation in temperature, thereby creating savings.
Baseline Description	The baseline efficiency case assumes evaporator fans that run 8760 annual hours with no temperature control.
Savings Principle	The high efficiency case is the use of an energy management system to control evaporator fan operation based on temperature.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed controls on evaporator fans in existing cooler/freezer.
	Gross kWh = kW_Fan × %OFF × (Hours per year) × (1 + RefrigEff × (Btu/hr per kW) / (Btu/hr per ton)) + [kW_cp × Hours_cp + kW_fan × (Hours per year) × (1-%OFF)] × %SAVE Gross kW = Gross kWh / Hours Where:
Savings Equation	<ul> <li>kW_Fan = Power demand of evaporator fan calculated from equipment nameplate data and estimated 0.55 power factor/adjustment</li> <li>%OFF_heater = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters 8760 Hours per year = Conversion factor</li> <li>1.6 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field experience.</li> <li>3,413 Btu/hr per kW = Conversion factor</li> <li>12 kBtu/hr per ton = Conversion factor</li> <li>kW_cp = Total power demand of compressor motor and condenser fan calculated from equipment nameplate data and estimated 0.85 power factor</li> <li>Hours_cp = Equivalent annual full load hours of compressor operation; Estimate based on NRM field experience.</li> <li>%OFF_evap = Percent of annual hours that the evaporator is turned off; Estimate based on NRM field experience.</li> <li>%SAVE = Reduced run-time of compressor and evaporator due to electronic controls; Estimate based on NRM field experience.</li> <li>The average annual operating hours are 4072 hours/year.</li> </ul>
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Calculation assumptions based off of NRM field experience and data
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Calculation assumptions based off of NRM field experience and data
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
	0
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A #N/A

Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.58
RRe source	HEC, Inc. (1996). Analysis of Savings from Walkiin Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSco.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	HEC, Inc. (1996). Analysis of Savings from Walkiin Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSco.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	HEC, Inc. (1996). Analysis of Savings from Walkiin Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSco.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.23
CF summer peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.84
CF winter peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh
	1* /

TRL Reference Number	RI_0255
Fuel	Electric
Sector	
Project Type	Direct Install
Category	Refrigeration
Type	Controls
Sub-type	Door Heater Control
Program Name	Direct Install
Measure Name	Freezer Door Heater Controls The Installation of controls to reduce the run time of door and frame heaters for freezers and walk-in or
Measure Description	
	reach-in coolers. The reduced heating results in a reduced cooling load.
Baseline Description	The baseline efficiency case is a cooler or freezer door heater that operates 8,760 hours per year without any controls.
Savings Principle	The high efficiency case is a cooler or freezer door heater connected to a heater control system, which controls the door heaters by measuring the ambient humidity and temperature of the store, calculating the dew point, and using pulse width modulation (PWM) to control the anti-sweat heater based on specific algorithms for freezer and cooler doors. Door temperature is typically maintained about 5 degrees Fahrenheit above the store air dew point temperature with the heaters operating at 80% (adjustable).
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed door heater controls on existing cooler/freezer.
	Gross kWh = kW_DoorHeater × %OFF × Hours Gross kW = kW_DoorHeater × %OFF
Savings Equation	Where: kW_DoorHeater = Total demand of the door heater, calculated as Volts * Amps / 1000: site-specific %OFF = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters Hours = Door heater annual run hours before controls
Hours	Pre-retrofit hours are 8,760 hours per year. After controls are installed, the door heaters in freezers are on for an average 4,730.4 hours/year (46% off time) and the door heaters for coolers are on for an average 2,277.6 hours/year (74% off time).
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
Coincidence factor (CF) summer peak	0.50
CF summer peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0261
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Refrigeration
Туре	Controls
Sub-type	Vending Miser
Program Name	Direct Install
Measure Name	Glass front refrigerated coolers
Measure Description	Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR <sup>®</sup> qualified vending machines, as they already have built-in controls.
Baseline Description	The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.
Savings Principle	The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.
Energy Savings calculation method	Deemed
Savings unit	Installed vending miser.
	Gross kWh = Qty × deltakWh
Savings Equation	Gross kW = Qty × deltakW Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1208
kWh/yr savings source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kWh/yr savings note	#N/A
kW reduction	0.138
kW reduction	
	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

	RI_0278
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Refrigeration
Туре	Refrigeration Lighting
Sub-type	Refrigerator Case LED
Program Name	Direct Install
Measure Name	LEDs for freezer/cooler cases
	Installation of LED lighting in freezer and/or cooler cases. The LED lighting consumes less energy, and
Measure Description	results in less waste heat which reduces the cooling/freezing load.
Baseline Description	The baseline efficiency case is the existing lighting fixtures in the cooler or freezer cases.
•	The high efficiency case is the installation of LED lighting fixtures on the cooler or freezer cases, replacing
Savings Principle	the existing lighting fixtures.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed lighting project.
	Gross kWh = [SUM(QTY_base × Watts_base × Hours_base) - SUM(QTY_ee × kW_ee × Hours_ee)] × (1 +
	EffRefrig × (Btu/hr per kW) / (Btu/hr per ton))
	Gross kW = Gross kWh / Hours_ee
	Where:
	where.
	OTV base - Quantity of baseline lighting fivtures in scelar /freezer sace
	QTY_base = Quantity of baseline lighting fixtures in cooler/freezer case
	Watts_base = Connected wattage of baseline lighting fixtures in cooler/freezer case
Savings Equation	Hours_base = Annual operating hours of baseline lighting fixtures in cooler/freezer case
	QTY_ee = Quantity of efficient lighting fixtures in cooler/freezer case
	Watts_ee = Connected wattage of efficient lighting fixtures in cooler/freezer case
	Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case
	1.9 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field
	experience.
	3413 Btu/hr per kW = Conversion factor
	12,000 Btu/hr per ton = Conversion factor
	Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case
Hours	The average annual operating hours are 8760 hours/year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
., .	#N/A #N/A
kWh/yr savings note	
kWh/yr savings source kWh/yr savings note kW reduction kW reduction source	#N/A
kWh/yr savings note kW reduction	#N/A Calc
kWh/yr savings note kW reduction kW reduction source	#N/A       Calc       #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings	#N/A         Calc         #N/A         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	#N/A           Calc           #N/A           #N/A           0           #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	#N/A           Calc           #N/A           #N/A           0
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         0         0         #N/A         0
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         Ø         #N/A         #N/A         #N/A         #N/A         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         0         0         #N/A         0
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         #N/A         Ø         #N/A         Ø         Ø         #N/A         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø
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kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         Ø         0         #N/A         Ø         #N/A         #N/A         Ø         #N/A         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         Ø         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	#N/A         Calc         #N/A         #N/A         0         #N/A         Ø         #N/A         #N/A         Ø         #N/A         Ø         Ø         #N/A         Ø         #N/A         Ø         Ø         #N/A         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         13         Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         0         13         Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life note In-service rate (ISR)	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         Ø         #N/A         Ø         #N/A         Ø         Ø         #N/A         Ø         Ø         #N/A         Ø         Ø         #N/A         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         Ø         I3         Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         #N/A         1.00
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life note	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         0         13         Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         #N/A

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.04
RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.07
RRd summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.15
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0259
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Refrigeration
Туре	Controls
Sub-type	Novelty Cooler Control
Program Name	Direct Install
Measure Name	Novelty cooler shutoff
Measure Description	Installation of controls to shut off a facility's novelty coolers for non-perishable goods based on pre- programmed store hours. Energy savings occur as coolers cycle off during facility unoccupied hours.
Baseline Description	The baseline efficiency case is the novelty coolers operating 8,760 hours per year.
Savings Principle	The high efficiency case is the novelty coolers operating fewer than 8,760 hours per year since they are controlled to cycle each night based on pre-programmed facility unoccupied hours.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed controls on existing cooler/freezer.
	Gross kWh = kW_nc × DC_nc × HoursOff
	Gross kW = 0 Where:
Savings Equation	kW_nc = Power demand of novelty cooler calculated from equipment nameplate data and estimated 0.85 power factor.
	DC_nc = Weighted average annual duty cycle; Estimate based on NRM field experience. HoursOff = Potential hours off every night per year, estimated as one less than the number of hours the store is closed per day: site-specific.
Hours	Energy and demand savings are based on the reduced operation hours of the cooler equipment. Hours reduced per day are estimated on a case-by-case basis, and are typically calculated as one less than the number of hours per day that the facility is closed
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
-	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	·
Incentive Unit	\$ 0.53 /kWh

Fuel         Electric           Sector         CAI           Project Type         Direct Install           Category         Befrgeration           Type         Controls           Sub-type         Vending Miler           Progent Type         Controls           Sub-type         Vending Miler           Program Name         Direct Install           Messure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated anacky maintina "oculation to suble of powering and plans from teffigerated anacky maintina" oculation to suble of product thit meters caustomer expectations. This measure during periods of inactivity.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated socies is a standard efficiency refrigerated beverage vending machine, non-refrigerated coler with a control system capable opowering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The big efficiency case is a standard efficiency refrigerated beverage vending machine, or dass for for frigerated accel accel were a system capable of powering dow lighting and refrigeration system capable of powering dow lighting and refrigeration system capable of powering dow lighting and refrigeration system capable of powering dow lighting and refrigerated beverage vending machine, or dass for dass wending machine, or dass for dass wend		
Sector         C&I           Derject Type         Direct Install           Category         Refrigeration           Type         Controls           Sub Type         Vending Miler           Measure Name         Direct Install           Measure Name         Refrigerated bewrape vending machine           Measure Name         Refrigerated bewrape vending machine           Measure Name         Refrigerated bewrape vending machine           Measure Description         Controls can significantly reduce the energy consumption of vending machine, one-refrigerated machines, non-refrigerated sock vending machine, as they already have built-in controls.           Measure Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock vending machine, or glass front refrigerated beverage vending machine, non-refrigerated sock vending machine, or glass front refrigerated beverage vending machine, non-refrigerated sock vending machine, or glass front refrigerated beverage vending machine, non-refrigerated sock vending machine, or glass front refrigerated beverage vending machine, or glass front refrigerated beverage vending machine, or fass front vending refrigerated beverage vending machine, or fass front vending principle           Swings unit         Installed Wending miser.           Swings unit         Installed Wending miser.           Gross KWh = Qty x dettaWh         Gross KWh = Qty x dettaWh           Gross KWh = Qty x dettaWh	TRL Reference Number	RI_0265
Project Type         Direct Install           Catagory         Refriguration           Type         Controls           Sub type         Vending Miler           Program Name         Direct install           Measure Name         Refriguration is significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of in activity but, in the case of refrigerated activity was maintain a cost of product that measure suctioner expectations. This measure tool on too applied to ENERGY STAR* qualified vending machines, mast always maintain a cost of product that measure suctioner expectations. This measure tool not be applied to ENERGY STAR* qualified vending machine, or glass front refrigerated cooler without a control system capable powering down infibiting and refrigeration systems during periods of inactivity.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated cooler with a control system capable powering down infibiting and refrigeration systems during periods of inactivity.           Swings Frinciple         The high efficiency case is a standard efficiency refrigerated beverage vending machine, or glass front refrigerated cooler with a control system capable of powering down is grass.           Swings unit         Grass SWII = QY × dettaWing frons settems during periods of inactivity.           Swings unit         Grass SWII = QY × dettaWing from settems during periods of inactivity.           Detraw         Detremed average Wreduction per unit.	Fuel	
Category         Refrigeration           Type         Controls           Sub-type         Vending Miser           Program Name         Direct Install           Measure Name         Controls can significantly reduce the energy consumption of vending machine ingeridas of inactivity but, in the cas         or forfigerated beverage vending machine, must always maintain a cool product that meets customer expectations. This         measure algorithm controls must power down these systems during periods of inactivity but, in the cas         or forfigerated machines, must always maintain a cool product that meets customer expectations. This         measure algorithm controls is a standard efficiency refrigerated socker winding machines, and         glass front refrigerated coler without a contorl system capable         powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The baseline efficiency case is a standard efficiency refrigerated coler without a control system capable         powering down lighting and refrigeration systems during periods of inactivity.           Savings Dinciple         The high efficiency case is a standard efficiency refrigerated coler without a control system capable of powering dow	Sector	C&I
Type         Controls           Sub-type         Vending Miser           Program Name         Direct Install           Measure Name         Refrigerated beverage vending machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity, but, in the cas of refrigerated machines, must always maintain an cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated coolers. This measure should not be applied to ENERGY STAR* qualified vending machine, so that a control system capable powering doon lighting and refrigeration systems during periods of inactivity.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock vending machine, or glass front refrigerated cooler with a control system capable powering doon lighting and refrigeration systems during periods of inactivity.           Swings Single         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated cooler with a control system capable powering doo lighting and refrigeration systems during periods of inactivity.           Swings Single         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated beverage vending machine, one-refrigerated beverage vending machine, one-refrigerated sock vending machine, one-r	Project Type	Direct Install
Sub-type         Vending Miser           Program Name         Direct Install           Measure Name         Refrigerated beverage vending machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration           Measure Description         Systems. Qualifying controls must power down these systems during periods of inactivity but, in the cas of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure should not be applied to ENERGY STAR* qualified vending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The haseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemed         Vending miser.           Gross KW* = Cty × deltakWh         Gross KW* = Cty × deltakWh         Gross KW* = Cty × deltakWh           Savings Liquation         Where:         Where:         Why           Why May Surge source         M/A         Why/A         Why/A	Category	Refrigeration
Program Name         Direct Install           Measure Name         Refrigerated beverage vending machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity. but, in the cas of refrigerated machines, must always minitin an cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated shack wending machine, and glass front refrigerated colers. This measure should not be applied to ENERGY STAR* qualified vending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable powering down lighting and refrigeration systems during periods of inactivity.           Savings unit         Gross KWN = Qty × deltaKWh Gross KWH = Qty × deltaKWh Hours Source           Hours         HNA           Why/ry savings source         MNA           Why/ry savings source         MNA           Why/ry savings sour	Туре	Controls
Measure Name         Refrigerated beverage vending machine           Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the cas of refrigerated machines, must always maintain a coll product that meets customer expectations. This measure splice to refrigerated beverage vending machines, non-refrigerated society with out on the applied to ENERGY STAR* qualified vending machines, and glass front refrigerated beverage vending machines, non-refrigerated society without a control system capable opewering down lighting and refrigeration systems during periods of inactivity.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated society without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated society with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings calculation method         Deemed           Savings figure and refrigeration systems during periods of inactivity.           Gross kW = Qry × deltaWh         Gross kWh = Qry × deltaWh           Gross kW = Qry × deltaWh         Gross kWh = Qry × deltaWh           Gross kWh = Deemed average kir reduction per unit.         Detta kWh = Deemed average kir reduction per unit.           Hours source         RN/A <t< td=""><td>Sub-type</td><td>Vending Miser</td></t<>	Sub-type	Vending Miser
Measure Name         Refrigerated beverage vending machine           Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the cas of refrigerated machines, must always maintain a coll product that mets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machine, rol that mets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machine, or glass front refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The bigs efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerate scale werage vending machine, nor lighting and refrigeration systems during periods of inactivity.           Savings unit         Deemed           Savings unit         Installed vending miser.           Vender         Gross KW = Qi x dettakWh           Gross KW = Qi x dettakWh         Gross KW = Qi x dettakWh           Gross KW = Deemed average Wreduction per unit.         Detta kWh = Deemed average Wreduction per unit.           Hours Source	Program Name	Direct Install
Measure Description         Controls can significantly reduce the energy consumption of vending machine lighting and refrigerated systems. Qualifying controls must power down these systems during periods of mactivity but, in the cas of refrigerated machines, more than a color product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated sock wending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock wending machine, or glass front refrigerated sol in activity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock wending machine, or glass front refrigerated sol in activity.           Savings principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated solver with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemed           Savings Equation         Where:           Gross KW = Qty × deltakWh         Gross KW = Qty × deltakWh           Gross KW = Qty × deltakWh         Detta kW = Deemed average annual kWh reduction per unit.           Hours         It is assume that the connected equipment operates 24 hours per day, 7 days per week for a total anno operating hours of \$,760.           Hours source         MN/A           KWhyry savings note         MN/A <td></td> <td>Refrigerated beverage vending machine</td>		Refrigerated beverage vending machine
Baseline Description         refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated cooler with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemed           Savings unit         Installed vending miser.           Gross KWH = Qty × deltakWh         Gross KWH = Qty × deltakWh           Gross KW = Qty × deltakW         Gross KW = Qty × deltakWh           Savings Equation         Where:           Qty = Total number of units.         Delta kWH = Deemed average annual kWh reduction per unit.           Hours         Delta kW = Deemed average annual kWh reduction per unit.           Hours Source         #W/A           KWH/Y savings         1612           KWH/Y savings         1612           KWH/Yr savings source         USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.           KW reduction source         #N/A           KW reduction source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A	Measure Description	Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR <sup>®</sup> qualified
Savings Principle       snack vending machine, or glass front refrigerated cooler with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.         Energy Savings calculation method       Deemed         Savings unit       Installed vending miser.         Gross KW = Qty × deltakWh       Gross kW = Qty × deltakWh         Gross kW = Qty × deltakWh       Gross kW = Qty × deltakWh         Savings Equation       Where:         Detta kWh = Deemed average annual kWh reduction per unit.         Detta kW = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annu operating hours of 8,760.         Hours Source       #N/A         Hours Source note       #N/A         KWh/ry savings note       #N/A         KW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       M/A         O       Gas Heat MMBtu/yr savings source       M/A         O       O       Gas Heat MMBtu/yr savings note       #N/A         O       O       O       Gas Heat MMBtu/yr savi	Baseline Description	refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of
Savings unit       Installed vending miser.         Gross kW = Qty × deltakWh       Gross kW = Qty × deltakWh         Savings Equation       Where:         Qty = Total number of units.       Delta kWh = Deemed average kW reduction per unit.         Detta kW = Deemed average kW reduction per unit.       Detta kW = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annu operating hours of 8,760.         Hours source       #N/A         Hours source note       #N/A         KMh/yr savings       1612         KWh/yr savings note       #N/A         KW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KW reduction source       W/A         KW reduction notre       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A	Savings Principle	
Gross kWh = Qty × deltakWh         Gross kWh = Qty × deltakW         Savings Equation         Qty = Total number of units.         Delta kWh = Deemed average annual kWh reduction per unit.         Delta kW = Deemed average kW reduction per unit.         Hours         His assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annu operating hours of 8,760.         Hours Source       #W/A         KWh/yr Savings       1612         kWh/yr savings note       #W/A         KWh/yr savings note       #W/A         KW reduction       0.184         kW reduction note       #W/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings note       #W/A         Gas Heat MMBtu/yr savings       0         Oli MMBtu/yr savings note       #W/A         Gas Heat MMBtu/yr savings       0         Oli MMBtu/yr savings       0         Oli MMBtu/yr savings       0         Oli MMBtu/yr savings note       #W/A         Propane MMBtu/yr savings		
Savings Equation       Gross kW = Qty × deltakW         Savings Equation       Where:         Dty = Total number of units.       Detta kWh = Deemed average annual kWh reduction per unit.         Hours       Detta kWh = Deemed average kW reduction per unit.         Hours source       #N/A         Hours source note       #N/A         Hours source note       #N/A         KWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KWh/yr savings note       #N/A         KW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & t	Savings unit	Installed vending miser.
Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annu operating hours of 8,760.         Hours Source note       #N/A         Hours source note       #N/A         KWh/yr Savings       1612         KWh/yr savings note       #N/A         KW reduction       0.184         KW reduction       0.184         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         MN/A       MMBtu/yr savings         Oil MMBtu/yr savings note       #N/A         MVA       MMBtu/yr savings         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	Savings Equation	Gross kW = Qty × deltakW Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
operating hours of 8,760.           Hours Source         #N/A           Hours source note         #N/A           kWh/yr Savings         1612           kWh/yr savings source         USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.           kWh/yr savings note         #N/A           kW reduction         0.184           kW reduction note         #N/A           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings once         #N/A           Oil MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Energy Reference(s) & table(s) notes         0           measure life         5	Hours	It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual
Hours source note       #N/A         kWh/yr Savings       1612         kWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
kWh/yr Savings       1612         kWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       <	Hours Source	
kWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	Hours source note	#N/A
kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kWh/yr Savings	1612
kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kWh/yr savings source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kWh/yr savings note	#N/A
kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kW reduction source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	., .,	
Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
In-service rate (ISR)     1.00       In-service rate source     #N/A		5 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
In-service rate (ISR)     1.00       In-service rate source     #N/A	measure life note	#N/A
In-service rate source #N/A		
		All installations have 100% in-service rate since programs include verification of equipment installations.

RR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is assumRR demand (RRd) winter peak1.00RRd winter peak source#N/A	ned to be 100%. ned to be 100% since evaluation adjusts deemed savings value ned to be 100% since evaluation adjusts deemed savings value
Savings Persistence Factor noteSavings persistence is asRealization rate energy (RRe)1.00RRe source#N/ARRe noteRealization rate is assumRR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is assumRR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak source#N/ARRd winter peak noteRealization rate is assumRRd winter peak noteRealization rate is assum	ned to be 100% since evaluation adjusts deemed savings value
Realization rate energy (RRe)1.00RRe source#N/ARRe noteRealization rate is assumRR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is assumRR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak source#N/ARRd winter peak noteRealization rate is assumRRd winter peak noteRealization rate is assum	ned to be 100% since evaluation adjusts deemed savings value
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RRe noteRealization rate is assumRR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is assumRR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is assum	· · · · · ·
RR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is assumRR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is assum	· · · · · ·
RRd summer peak source#N/ARRd summer peak noteRealization rate is assumRR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is assum	ned to be 100% since evaluation adjusts deemed savings value
RRd summer peak noteRealization rate is assumRR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is assum	ned to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is assumed to the second	ned to be 100% since evaluation adjusts deemed savings value
RRd winter peak source#N/ARRd winter peak noteRealization rate is assum	
RRd winter peak note Realization rate is assum	
Coincidence factor (CF) summer peak 0.00	ned to be 100% since evaluation adjusts deemed savings value
CF summer peak source #N/A	
CF summer peak note Coincidence Factors are	set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak 0.00	
CF winter peak source #N/A	
CF winter peak note Coincidence Factors are	set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr 0.00	
Sewer savings: gallons/yr 0.00	
Water / Sewer savings Source #N/A	
Water / Sewer savings note #N/A	
Annual \$ savings 0.00	
Annual \$ savings source / description #N/A	
Annual \$ savings note #N/A	
One time \$ savings 0.00	
One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.03	
Spill-Over (participant) 0.00	
Spill-Over (non-participant) 0.01	
Net-to-Gross 0.97	
Net-to-Gross source TetraTech (2014). 2013 September, 2014	Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross note #N/A	
Gross Measure TRC unit \$ 0.76 /kWh	
Gross Measure TRC source #N/A	
Gross Measure TRC note #N/A	
Incentive Unit \$ 0.53 /kWh	

Fuel         Electric           Sector         C&I           Sector         C&I           Project Type         Direct Install           Category         Refrigeration           Type         Controls           Sub-type         Vending Miser           Program Name         Direct Install           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a coll product that meets customer expectations. This measure applies to refrigerated colors. This measure applies for refrigerated colors. This measure should not be applied to ENERGY STAR* qualified wending machines, and glass front refrigerated colors. This measure should not be applied to ENERGY STAR* qualified wending machine, or glass front refrigerated beverage vending machine, non-refrigerated snack wending machine, or glass front refrigerated colors with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         Satandard efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack wending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings calculation method         Deemed         Savings fort refrigerated coolers. This measure should be applied to prefrigerated snack wending machine, or glass front refrigerated c		
Sector         C&I           Category         Direct install           Category         Refrigeration           Type         Controls           Sub-type         Vending Miller           Program Nome         Direct install           Measure Name         Non-refrigerated snack vending machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine pipelods of inactivity but, in the case of refrigerated barce vending machines, non-refrigerated snack vending machine, non-refrigerated snack vending machine, org lass front refrigerated bareverage vending machines, non-refrigerated snack vending machine, org lass front refrigerated ocoler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, org glass front refrigerated snack vending machine.           Swings suit         Gress KW = QX × detakWh           Gress KW = QX × detakWh         Gress KW = QX × detakWh           Gress KW = QX × detakWh         Gress KW = QX × detakWh           Gress KW = QX × detakWh         Gress KW = QX × detakWh           Gress KW = QX × detakWh         <	TRL Reference Number	RI_0263
Project Type         Direct Install           Caregory         Aefrigaration           Type         Cartrols           Sub-type         Verding Miser           Type Manne         Direct Install           Measure Vame         Non-refrigerated snack verding machine           Measure Vame         Controls on significantly reduce the energy consumption of verding machine institution of the entrype verding machine institution of the entrype verding machines, and they smaltalia a coll product that meets customer expectations. This measure should not be applied to ENERGY STAR® qualified verding machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refigerated beverage verding machine, non-refigerated sock verding machine, or gliss front refigerated coler with a control system capable of powering down lighting and refigerated in systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refigerated beverage verding machine, non-refigerated sock ending machine, or gliss front refigerated control system capable of powering down lighting and refigeration systems during periods of inactivity.           Savings Varings Calculation method         Gerses Win = Cry verdina Machine group stress during periods of inactivity.           Savings suring on the system during end of system during periods of inactivity.         Gerses Win = Cry verdina Machine group stress during periods of inactivity.           Savings Squation         Where:         Gross Win = Cry		
Category         Seffiguration           Type         Controls           Sub-type         Vending Miser           Program Name         Direct Install           Measure Name         Non-refrigerated snack werding machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigerated machines, must always maintain a cool product that meets customes expectations. This measure applies to refrigerated beverage vending machines, or energinerated snack vending machines, and glass front refrigerated coolers. This measure applied to ENERGY STAR® qualified vending machine, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated severage vending machine, non-refrigerated severage vending machine, or glass front refrigerated severage vending machine, non-refrigerated severage vending machine, or glass front refrigerated severage vending machine, non-refrigerated severage vending machine, or glass front refrigerated severage vending machine, or glass front refrigerated severage vending machine, non-refrigerated severage vending machine, non-refrigerated severage vending machine, or glass front refrigerated severage vending machine, non-refrigerated severage vending machine, or glass front refrigerated severage vending v		
Type         Controls           Sub type         Vending Miser           Program Name         Direct Install           Measure Name         Non-refrigerated snack vending machine           Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must power down these systems during periods of inactivity but, in the case and gas form terrifegrated machines. This measure and only roduct that meets customer expectations. This measure and the spapiled to ENERGY STAR* qualified vending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated on account of system capable of powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated beverage vending machine, non-refrigerated beverage vending machine, non-refrigerated series down and the systems during periods of inactivity.           Swings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated beverage wending machine, non-refrigerated on the down and the systems during periods of inactivity.           Swings and         Instalied vending miser.           Gross Wh = Qry & detakWh         Gross Wh = Qry & detakWh           Gross Wh = Qry & detakWh         Gross Wh		
Sub-type         Vending Miser           Program Name         Direct Install           Messure Name         Ron-refrigerated snack vending machine           Messure Name         Controb can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Quality controls must hower down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This messure applies to refrigerated beverage vending machines, and effective controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated beverage vending machine, non- frigerated snack vending machine, or glass front refrigerated solar within a control system capable of powering down lighting and refrigeration spatems           Savings Figuation         Deemed         Deemed         Savings for the frigerated solar withing periods of inactivity.           Savings squarts         Deemed         Deemed         Savings inactivity.         Deemed verage ano	•	
Program Name         Direct Install           Measure Name         Nen-refrigerated anack vending machine           Measure Description         Controls can significantly reduce the energy consumption of vending machine lighting and refrigerated machines, must spower down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated baverage vending machines, non-refrigerated coolsers. This measure about not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated baverage vending machine, non-refrigerated coolser with a control system capable of powering down lighting and refrigerated soft nactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated baverage vending machine, and refrigerated soft nactivity.           Savings Liquation metho         Deemed         Deemed           Savings Liquation         Installed vending miser.           Gress KW = City & detakWh         Gress KW = City & detakWh           Gress KW = City & detakWh         Gress KW = City & detakWh           Gress KW = City & detakWh         Gress KW = City & detakWh           Gress KW = City & detakWh         Gress KW = City & detakWh           Gress KW = City & detakWh         Gress KW = City & detakWh           Gress KW = City & detakWh         Gress KW = City & detakW		
Measure Name         Non-refrigerated snack vending machine           Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a coal product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and upplies to refrigerated beverage vending machines, and glass front refrigerated snack vending machines, or the spalled to ENERGY STAR* qualified vending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated wending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemend           Savings Liquation         Where: Case = Total number of units. Delta kWH = Deemed average annual kWh reduction per unit. Delta kW = Deemed average annual kWh reduction per unit. Delta kWh = Deemed average annual kWh reduction per unit. Delta kWh = Deemed average annual kWh reduction per unit. Delta kWh = Deemed average annual kWh reduction per unit. Delta kWh = Deemed average annual kWh reduction per unit. Delta kWh = Deemed average annual kWh reduction per uni		
Measure Description         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must laways maintain a coal product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated shack ending machines, and glass front refrigerated colores. This measure should not be applied to ENERGY STAR* qualified vending machines, and glass front refrigerated colores. This measure should not be applied to ENERGY STAR* qualified powering down lighting and refrigeration systems during periods of inactivity.           Baseline Description         The bigs efficiency case is a standard efficiency refrigerated colore with out a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, or plass front refrigerated colore with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemed           Savings Lutt         In stalled vending miser.           Savings Equation         Where:           Carly = Total number of units.         Delta WH = Deemed average annual WM reduction per unit.           Poleta WH = Deemed average annual WM reduction per unit.         Delta WH = Deemed average Management Product Sheets (2006). Accessed on 09/01/2009.           Why Savings Source         MNA         MNA         MM/M </td <td>Program Name</td> <td></td>	Program Name	
weasure Description         systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refigirated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated ocolers. This measure should not be applied to ENERGY STAR* qualified wending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The bigh efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemed           Savings unit         Installed vending miss.           Installed vending miss.         Gross KW = Qr y - dettakWh Gross KW = Qr y - dettakWh Gross KW = Qr y - dettakWh Savings Equation           Nuers         Obel KWh = Deemed average annual KWh reduction per unit.           Deta KWh = Deemed average annual KWh reduction per unit.         Deta KWh = Resourced equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.           Hours         USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.           KWh/yr savings source	Measure Name	Non-refrigerated snack vending machine
Baseline Description         refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Energy Savings Calculation method         Deemed           Savings Laculation method         Deemed           Savings Equation         Cross kWH = Qty × deltakWh           Gross kWH = Qty × deltakWh         Cross kWH = Qty × deltakWh           Delta kW = Deemed average annual kWh reduction per unit.         Delta kW = Deemed average annual kWh reduction per unit.           Hours         Tit is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.           Hours Source         MN/A           Hours Source         MN/A           KWh/ry ravings note         MN/A           KWh/ry ravings note         MN/A           KW reduction note         MN/A           Gas Heat MMBtu/ry savings note <td>Measure Description</td> <td>systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified</td>	Measure Description	systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified
Savings Principle         snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemed           Savings unit         Installed vending miser.           Savings Liquation         Gross KWH = Qty × deltakWh Gross KW = Qty × deltakW           Savings Equation         Where: Delta kWh = Deemed average annual kWh reduction per unit. Delta kWh = Deemed average annual kWh reduction per unit. Delta kWh = Deemed average kW reduction per unit.           Hours         It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.           Hours Source         #N/A           KWh/ry savings source         USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.           KWh/ry savings source         USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.           KW reduction note         #N/A           Gas Heat MMBtu/yr savings         O           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings note         #N	Baseline Description	refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of
Savings unit       Installed vending miser.         Gross kWh = Qty × deltakWh       Gross kW = Qty × deltakWh         Savings Equation       Where:         Qty = Total number of units.       Delta kWh = Deemed average annual kWh reduction per unit.         Detta kWh = Deemed average kW reduction per unit.       Detta kWh = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.         Hours Source       #N/A         Hours source note       #N/A         KWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KWh/yr savings note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         MI/A       O         Oli MMBtu/yr savings note       #N/A         Oli MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Oli MMBtu/yr savings note       #N/A </td <td>Savings Principle</td> <td>snack vending machine, or glass front refrigerated cooler with a control system capable of powering down</td>	Savings Principle	snack vending machine, or glass front refrigerated cooler with a control system capable of powering down
Gross kWh = Qty × deltakWh         Savings Equation       Gross kW = Qty × deltakW         Savings Equation       Where:         Qty = Total number of units.       Delta kWh = Deemed average annual kWh reduction per unit.         Delta kW = Deemed average kW reduction per unit.       Delta kW = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.         Hours Source       #N/A         KWh/yr Savings       343         KWh/yr Savings note       #N/A         KWh/yr savings note       #N/A         KW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KW reduction note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A		
Savings Equation         Gross kW = Qty × deltakW           Vihere::         Qty = Total number of units.           Delta kWh = Deemed average annual kWh reduction per unit.         Delta kWh = Deemed average kW reduction per unit.           Hours         Tits assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.           Hours Source note         #N/A           Hours Source note         #N/A           KWh/ry savings note         USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.           KWh/ry savings note         USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.           KW reduction note         #N/A           Gas Heat MMBtu/yr savings note         #N/A           Mational Grid assumption based on regional PA working groups. Assumptions based on historical steam trap surveys. Steam losses in Ibs/hr are found using "Boiler Efficiency Institute (1987). Steam Efficiency inste institute (1987). Steam Efficiency institute (1987).	Savings unit	Installed vending miser.
Savings Equation       Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit. Delta kW = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.         Hours Source       #N/A         Hours source note       #N/A         KWh/ry savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/ry savings note       #N/A         KW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Moltonal Grid assumption based on regional PA working groups. Assumptions based on historical steam trap surveys. Steam losses in lbs/hr are found using "Boiler Efficiency Institute (1987). Steam Efficiency Improvement; Page 34, Table 4.1 under Steam Leak         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note <td></td> <td></td>		
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kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Mational Grid assumption based on regional PA working groups. Assumptions based on historical steam trap surveys. Steam losses in lbs/hr are found using "Boiler Efficiency Institute (1987). Steam Efficiency Improvement; Page 34, Table 4.1 under Steam Leak         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00		
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Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00	., .	
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Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00		
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In-service rate (ISR) 1.00	measure life note	#N/A

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In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

TRL Reference Number	RI_0386
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	Direct Install
Measure Name	Faucet Aerator
Measure Description	Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow.
Baseline Description	The baseline efficiency case is a 2.2 GPM faucet.
Savings Principle	The high efficiency is a low-flow faucet aerator.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	387.4
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.07
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A

RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	5460.00
Sewer savings: gallons/yr	5460.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0389
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Spray Valve
Program Name	Direct Install
Measure Name	Salon Nozzle
Measure Description	The installation of a high efficiency salon nozzle.
Baseline Description	Standard salon nozzle.
Savings Principle	An efficient salon nozzle.
Energy Savings calculation method	Deemed
Savings unit	Installed salon nozzle
	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
Savings Equation	Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	4648.9
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.79
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	* #N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
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Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	28639.00
Sewer savings: gallons/yr	28639.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	RI_0388
Fuel	Electric
Sector	C&I
Project Type	Direct Install
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	Direct Install
Measure Name	Low-Flow Showerhead
Magging Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with
Measure Description	service water heated by natural gas.
Baseline Description	The baseline efficiency case is a 2.5 GPM showerhead.
Savings Principle	The high efficiency case is a 1.5 GPM showerhead.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Where:
Savings Equation	
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1185
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.2
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A

RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	7300.00
Sewer savings: gallons/yr	7300.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

TRL Reference Number	DI 0207
	RI_0387
Fuel	Electric C&I
Sector	
Project Type	Direct Install
Category	Water Heating
Type	Flow Control
Sub-type	Low Flow Spray Valve
Program Name	Direct Install
Measure Name	Pre-Rinse Spray Valve
Measure Description	Retrofitting existing standard spray nozzles in locations where service water is supplied by natural gas fired hot water heater with new low flow pre-rinse spray nozzles with an average flow rate of 1.6 GPM.
Baseline Description	Standard spray valve.
Savings Principle	The high efficiency case is a low flow pre-rinse spray valve with an average flow rate of 1.6 GPM.
Energy Savings calculation method	Deemed
Savings unit	Installed pre-rinse spray valve.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
1	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	2871.4
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.75
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	8
measure life source	veritec Consulting (2005). Region of Waterloo Pre-Rinse Spray Valve Pilot Study.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
in demand (mu) winter peak	1.00

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RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	6410.00
Sewer savings: gallons/yr	6410.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.01
Net-to-Gross	0.97
Not to Cross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.76 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.53 /kWh

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	DL 0051
TRL Reference Number	RI_0051
Fuel	Electric
Sector	
Project Type	New Construction
Category	Compressed Air
Туре	Refrigerated Air Dryers
Sub-type	Refrigerated Air Dryer
Program Name	Commercial New Construction
Measure Name	Dryer (100<=CFM<200)
Measure Description	The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers. Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air dryers used in a single-compressor system are eligible.
Baseline Description	The baseline efficiency case is a non-cycling refrigerated air dryer.
Savings Principle	The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total CFM of installed air dryer capacity.
Savings Equation	Gross kWh = CFM_dryer × deltakW/CFM × Hours Gross kW = CFM_dryer × deltakW/CFM Where: CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM Hours = Annual operating hours of the refrigerated air dryer: site-specific
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
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Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

	DL 0052
TRL Reference Number Fuel	RI_0052 Electric
Sector	C&I
Project Type	New Construction
Category	Compressed Air
Type	Refrigerated Air Dryers
Sub-type	Refrigerated Air Dryer
Program Name	Commercial New Construction
Measure Name	Dryer (200<=CFM<300)
Measure Description	The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers. Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air dryers used in a single-compressor system are eligible.
Baseline Description	The baseline efficiency case is a non-cycling refrigerated air dryer.
Savings Principle	The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total CFM of installed air dryer capacity.
Savings Equation	Gross kWh = CFM_dryer × deltakW/CFM × Hours Gross kW = CFM_dryer × deltakW/CFM Where: CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically
	obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM Hours = Annual operating hours of the refrigerated air dryer: site-specific
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
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Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

Evel         Deckric           Sector         C&I           Project Type         New Construction           Calegory         Compressed Ar           Sector         CAI           Sub-type         Refigerated Ar torgers           Sub-type         Refigerated Ar torgers           Sub-type         Refigerated Ar torgers           Sub-type         Refigerated Ar torgers           Wessure Name         Onyer (300-crCM-6400)           Messure Description         The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air drivers.           Messure Description         The installation of cycling or variable frequency drive (VFD)-equipped refrigerated air drivers.           Baseline Description         The baseline efficiency case is a non-cycling refrigerated driver.           Swings Fonciple         The high efficiency case is a non-cycling refrigerated driver.           Swings ont         Total CFM of installed air driver capacity.           Swings fourition         Total CFM of installed air driver capacity.           Swings fourition         CFM_driver + CHL show C/CFM           Where:         CFM_driver + CHL show C/CFM           Swings fourition         CFM_driver + CHL show C/CFM           Wessure Annual hours of operation are site specific and will be determined on a case by case basis. <th></th> <th></th>		
Sertor         Cell           Direct Type         New Construction           Category         Compressed Air           Type         Refrigerated Air Dryer           Sub-Type         Refrigerated Air Dryer           Direct Type         Refrigerated Air Dryer           Sub-Type         Refrigerated Air Dryer           Dryer (200-CFM-6400)         Commercial New Construction           Wessure Name         Dryer (200-CFM-6400)           Baseline Description         The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air actient of unving controlously. only properly sized refrigerated air dryer.           Baseline Description         The baseline efficiency case is a non-cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.           Energy Swings calculation method         Calculated using site specific inputs           Swings Unit         Total CFM of installed air dryer capacity.           Gross Win C Eff. dryer = full flow rated capacity of the refrigerated air dryer. Site specific delta:WWCFM Hours = Annual operation hours of the refrigerated air dryer: Site specific delta:WWCFM Hours = Annual operation hours of operation are site specific and will be determined on a case by case basis.           Hours         The annual hours of operation are site specific and will be determined	TRL Reference Number	RI_0053
Project Type         New Construction           Category         Compressed Air Drivers           Type         Refrigerated Air Drivers           Sub type         Refrigerated Air Drivers           Program Name         Commercial New Construction           Measure Name         Driver (DOC-CFN-6400)           Measure Description         Refrigerated air drivers remove the moliture from a compressed air system to enhance ovall system           Measure Description         The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air drivers remove the moliture from a compressed air system to enhance ovall system           Measure Description         The baseline efficient crigrarated driver cyclic and off or uses a variable speed drive as required by the demand for compressed air drivers can encycling refrigerated in driver.           Savings Principle         The high efficiencry case is a on-cycling refrigerated in driver.           Savings unit         Total CPM of installed air driver capacity.           Gross KWh = CFM_driver × dettatW/CFM × Hours         Gross KWh = CFM_driver × dettatW/CFM           Savings Equation         Where:         CFM_driver = Full flow rated capacity of the refrigerated air driver : site specific           Hours Source         MVA         MVA         Where:           Savings Singus Calculation method         Calculated air driver KW reduction or driver sitte specific           Hour		
Category         Compressed Air           Type         Refrigerated Air Dryers           Sub-type         Refrigerated Air Dryers           Sub-type         Commercial New Construction           Measure Name         Dryer (300+::CFM<400)		
Type         Berligerated Air Dryers           Debype         Refrigerated Air Dryer           Program Name         Commercial New Construction           Measure Name         Dryer (300er-CFM-400)           The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers.           Refrigerated Air dryers remove the moisture from a compressed air system to ethnice overall system           Measure Description         The baseline efficiency case is a one cycling continuous). Only properly sized refrigerated air dryers used in a single-compressor system are elliptile.           Baseline Description         The baseline efficiency case is a cycling refrigerated dryer or a refrigerated dryer or equipped with a VFD.           Energy Swings calculation method         Calculated using site specific inputs           Savings Principle         The high efficiency case is a cycling refrigerated air dryer in cubic feet per minute (CFM), hypically obtained from equipment's Compressed Air Gas institute Datasheet: site specific           Savings Equation         CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), hypically obtained from equipment's Compressed Air Gas institute Datasheet: site specific           Hours S         The annual hours of operation are site specific and will be determined on a case by case basis.           Hours S         MrA           Hours S and operating hous of the refrigerated air dryers: is eqordific and williple 3rd part impact evaluations		
Sub-type         Refrigerated Air Dyver           Program Name         Commercial New Construction           Measure Name         Dryver (300+CFM+400)           The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryvers.           Measure Description         The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryvers used in a single-compressed intesda of running continuously. Only properly sized refrigerated air dryver used in a single-compresson are eligible.           Baseline Description         The bigs efficiency case is a non-cycling refrigerated dryver or a refrigerated dryver equipped with a VFD.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Total CFM of installed air dryver capacity.           Gross KWh = CFM_dryver × deltaKW/CFM × Hours         Gross KWh = CFM_dryver × deltaKW/CFM           Where:         CFM_dryver = Full flow rated capacity of the refrigerated air dryver in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas institute Datasheet: site-specific           Hours         The annual hours of operation are site specific and will be determined on a case by case basis.           Hours source         MV/A           MW/A         MW/A           Wereduction note         Algorithm input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gros KWP redu		
Program Name         Commercial New Construction           Measure Name         Dryer (300+=CF M=400)           Measure Name         Dryer (300+=CF M=400)           Measure Description         The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers. Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system dryers used in single-compressed sir instead of running continuously. Only properly sized refrigerated air dryers used in single-compressor system are eligible.           Baseline Description         The baseline efficiency case is a non-cycling refrigerated dryer cycles on and off or uses a variable single-compressor system are eligible.           Savings Principle         The high efficiency case is a cycling refrigerated dryer cycles dryers used in single-compressor system are eligible.           Savings Signal Culation method         Calculated using site-specific inputs           Gross KW = CFM_dryer × deltakW/CFM × Hours Gross KW = CFM_dryer × deltakW/CFM × Hours Gross KW = CFM_dryer × deltakW/CFM × Hours Gross KW = CFM_dryer × deltakW/CFM           Savings Equation         Where:           CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained for me equipment's Compressed Air Gas institute Datasheet: site specific detaxW/CFM = Refrigerated air dryer K veduction per dryer full flow rated CFM Hours Source           Hours Source         BN/A           Mours Source note         BN/A           MV/A vstrings outce         BN/A <td>Туре</td> <td></td>	Туре	
Messure Name         Dryer (300CFM-400)           The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers. Refrigerated air dryers remove the moisture from a compressed pair system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuous). Only properly sized refrigerated air dryers used in a single compressor system are eligible.           Baseline Description         The baseline efficiency case is a non-cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.           Calculated using site-specific inputs         Savings source         Calculated using site-specific inputs           Savings source         Gross KWH = CFM_dryer × deltakW/CFM × Hours Gross KWH = CFM_dryer × deltakW/CFM         Where:           Savings Equation         CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer is reduction per dryer (110 flow rated CFM Hours = Annual operating hours of the refrigerated air dryer: site-specific           Hours Source         HN/A           Workyr's savings source         HN/A           Workyr's varing source         HN/A           Workyr's savings source         HN/A           Workyr's varings source         HN/A           Workyr's varings source         HN/A           MW reduction note	Sub-type	
The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers.           Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient critegreated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air dryers.           Baseline Description         The baseline efficiency case is a non cycling refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressor system are eligible.           Baseline Description         The baseline efficiency case is a one cycling refrigerated air dryer.           Savings Principle         The high efficiency case is a one cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.           Cacluated using site-specific inputs         Savings cacluation method           Gross KWh = CFM_dryer × deltakW/CFM × Hours         Gross KWh = CFM_dryer × deltakW/CFM × Hours           Gross KW = CFM_dryer × deltakW/CFM         Hours           Hours         The annual hours of operation are site specific and will be determined on a case by case basis.           HOUrs Source         #N/A           HV/A         Refrigerated air dryer: site-specific           Hours Source         #N/A           HV/A         Refrigerated air dryer in cubic feet per minute (CFM), typically obtained form equipment's Compressed Air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed	Program Name	Commercial New Construction
Berginarted air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air insted of running continuously. Only properly sized refrigerated air dryers used in a single compressor system are eligible.           Baseline Description         The baseline efficiency case is a one cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.           Energy Savings calculation method         Calculated using site-specific inputs           Savings trinciple         The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.           Energy Savings calculation method         Calculated using site-specific inputs           Savings trinciple         Total CFM of installed air dryer capacity.           Gross KWh = CFM_dryer × deltakW/CFM > Hours         Gross KWh = CFM_dryer × deltakW/CFM > Hours           Savings Equation         CFM_dryer = Full flow rated capacity of the refrigerated air dryer full flow rated CFM           Hours         The annual hours of operation are site specific and will be determined on a case by case basis.           Hours Source         #N/A           Hours Source         #N/A           Why resultion source         #N/A           Worky savings note         Algorithm input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gas Heat MMEtu/ry savings         0 <td>Measure Name</td> <td>Dryer (300&lt;=CFM&lt;400)</td>	Measure Name	Dryer (300<=CFM<400)
Savings Principle         The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VED.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Total CFM of installed air dryer capacity.           Gross KW = CFM_dryer × deltakW/CFM × Hours Gross KW = CFM_dryer × deltakW/CFM           Savings Equation         Where:           CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer KW reduction per dryer full flow rated CFM Hours = Annual operating hours of the refrigerated air dryer; site-specific           Hours Surce         #N/A           Hours source         #N/A           Hours source         #N/A           Whyry savings source         #N/A           WWrlyr savings source         #N/A           WWrduction note         Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gas Heat MMBtu/yr savings note         #N/A           @W reduction note         #N/A           @Gas Heat MMBtu/yr savings ource         #N/A           @Gas Heat MMBtu/yr savings note         #N/A           @Gas Heat MMBtu/yr savings note         #N/A           @Gas Heat MMBtu/yr savings note         #N/A <td>Measure Description</td> <td>Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air</td>	Measure Description	Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air
Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Total CFM of installed air dryer capacity.           Gross KW = CFM_dryer × deltakW/CFM × Hours         Gross kW = CFM_dryer × deltakW/CFM           Savings Equation         Where:           CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM Hours = Annual operating hours of the refrigerated air dryer: site-specific           Hours         The annual hours of operation are site specific and will be determined on a case by case basis.           Hours Source         HN/A           Hours Source N         N/A           Whyr Savings         Calc           KWh/yr Savings note         Mi/A           We reduction         Calc           KW reduction note         Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gas Heat MMBtu/yr savings note         HN/A           DII MMBtu/yr savings note         HN/A	Baseline Description	The baseline efficiency case is a non-cycling refrigerated air dryer.
Savings unit         Total CFM of installed air dryer capacity.           Gross KWH = CFM_dryer × deltakW/CFM × Hours         Gross KW = CFM_dryer × deltakW/CFM           Savings Equation         CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific dettakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM           Hours         The annual hours of operation are site specific and will be determined on a case by case basis.           Hours Source         #N/A           Hours source         #N/A           KW reduction         Calc           KW reduction         Calc           KW reduction source         #N/A           KW reduction note         Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gas Heat MMBtu/yr savings note         #N/A           KW reduction note         Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gas Heat MMBtu/yr savings note         #N/A           MU/A         Calc           KW reduction note         Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gas Heat MMBtu/yr savings note         #N/A           O         O	Savings Principle	The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.
Gross KWh = CFM_dryer × deltakW/CFM × Hours         Gross KW = CFM_dryer × deltakW/CFM         Savings Equation         CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific dettakW/CFM = Refrigerated air dryer W reduction per dryer full flow rated CFM Hours = Annual operating hours of the refrigerated air dryer: site-specific         Hours       The annual hours of operation are site specific and will be determined on a case by case basis.         Hours Source       HV/A         Hours source note       HV/A         KWh/tyr savings source       HV/A         KWh/tyr savings note       Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations         KW reduction note       Calc         KW reduction note       Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas How MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note	Energy Savings calculation method	Calculated using site-specific inputs
Gross KW = CFM_dryer × deltakW/CFM         Savings Equation         Gross KW = CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer KW reduction per dryer full flow rated CFM Hours = Annual operating hours of the refrigerated air dryer: site-specific         Hours       The annual hours of operation are site specific and will be determined on a case by case basis.         Hours Source       #W/A         Hours source note       #N/A         KWh/tyr savings source       #N/A         KW/tyr savings source       #N/A         KW/tyr savings source       #N/A         KW reduction       Calc         KW reduction source       #N/A         KW reduction source       #N/A         KW reduction source       #N/A         KW reduction source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gin MMBtu/yr s	Savings unit	Total CFM of installed air dryer capacity.
Hours         The annual hours of operation are site specific and will be determined on a case by case basis.           Hours Source         #N/A           Hours Source note         #N/A           KWh/yr savings         Calc           KWh/yr savings note         #N/A           evaluations         evaluations           KW reduction         Calc           KW reduction source         #N/A           KW reduction note         Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings note         #N/A           Gas Heat MMBtu/yr savings note         #N/A           OII MMBtu/yr savings note         #N/A           OII MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Energy Reference(s) & table(s) notes         0           measure life note         15           measure life note         #N/A           In-service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.	Savings Equation	Gross kW = CFM_dryer × deltakW/CFM Where: CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM
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Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.	Propane MMBtu/yr savings source	#N/A
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measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.	Energy Reference(s) & table(s) notes	0
measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.	measure life	15
In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.	measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.	measure life note	#N/A
In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.	In-service rate (ISR)	
In-service rate note All installations have 100% in-service rate since programs include verification of equipment installations.	In-service rate source	#N/A
Savings Persistence Factor (SPF) 1.00	In-service rate note	
	Savings Persistence Factor (SPF)	1.00

Coulogo Doveletoneo Fostor course	461/0
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0054
Fuel	Electric
Sector	
Project Type	New Construction
Category	Compressed Air
Туре	Refrigerated Air Dryers
Sub-type	Refrigerated Air Dryer
Program Name	Commercial New Construction
Measure Name	Dryer (CFM >=400)
Measure Description	The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers. Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air dryers used in a single-compressor system are eligible.
Baseline Description	The baseline efficiency case is a non-cycling refrigerated air dryer.
Savings Principle	The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total CFM of installed air dryer capacity.
Savings Equation	Gross kWh = CFM_dryer × deltakW/CFM × Hours Gross kW = CFM_dryer × deltakW/CFM Where: CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM
Hours	Hours = Annual operating hours of the refrigerated air dryer: site-specific The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source kWh/yr savings note	#N/A Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact
	evaluations
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	0 #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 #N/A #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	0 #N/A #N/A 0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 #N/A #N/A 0 #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	0 #N/A #N/A 0 #N/A #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0 #N/A #N/A 0 #N/A #N/A 0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	0 #N/A #N/A 0 #N/A #N/A 0 #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0 #N/A #N/A 0 #N/A #N/A 0 0 #N/A #N/A #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0 #N/A #N/A 0 #N/A #N/A 0 #N/A #N/A 0
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0 #N/A #N/A 0 #N/A #N/A 0 #N/A #N/A 0 15
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	0 #N/A #N/A 0 #N/A #N/A 0 #N/A 0 #N/A 5 5 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note	0 #N/A #N/A 0 #N/A #N/A 0 #N/A #N/A 0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR)	0 #N/A #N/A 0 #N/A #N/A 0 #N/A #N/A 0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A 1.00

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0055
Fuel	Electric
Sector	
Project Type	New Construction
Category	Compressed Air
Туре	Refrigerated Air Dryers
Sub-type	Refrigerated Air Dryer
Program Name	Commercial New Construction
Measure Name	Dryer (CFM<100)
Measure Description	The installation of cycling or variable frequency drive (VFD)-equipped refrigerated compressed air dryers. Refrigerated air dryers remove the moisture from a compressed air system to enhance overall system performance. An efficient refrigerated dryer cycles on and off or uses a variable speed drive as required by the demand for compressed air instead of running continuously. Only properly sized refrigerated air dryers used in a single-compressor system are eligible.
Baseline Description	The baseline efficiency case is a non-cycling refrigerated air dryer.
Savings Principle	The high efficiency case is a cycling refrigerated dryer or a refrigerated dryer equipped with a VFD.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total CFM of installed air dryer capacity.
Savings Equation	Gross kWh = CFM_dryer × deltakW/CFM × Hours Gross kW = CFM_dryer × deltakW/CFM Where: CFM_dryer = Full flow rated capacity of the refrigerated air dryer in cubic feet per minute (CFM), typically obtained from equipment's Compressed Air Gas Institute Datasheet: site-specific deltakW/CFM = Refrigerated air dryer kW reduction per dryer full flow rated CFM Hours = Aprival operating hours of the refrigerated air driver site specific
Hours	Hours = Annual operating hours of the refrigerated air dryer: site-specific The annual hours of operation are site specific and will be determined on a case by case basis.
	цы / л
Hours Source	#N/A
Hours source note	#N/A Calc
kWh/yr Savings kWh/yr savings source	#N/A
kWh/yr savings note	Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm Input kwh/CFM based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
	#N/A
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings	
Oil MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A 0
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A 0 #N/A #N/A 0
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A 0 #N/A #N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A 0 #N/A #N/A 0
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	#N/A 0 #N/A #N/A 0 15
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	<pre>#N/A 0 #N/A #N/A #N/A 0 15 Energy &amp; Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.</pre>
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note	<pre>#N/A 0 #N/A #N/A 0 15 Energy &amp; Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A</pre>
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR)	<pre>#N/A 0 #N/A #N/A 0 Comparison #N/A Energy &amp; Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A 1.00</pre>

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI 0045
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Compressed Air
Туре	High Efficiency Air Compressors
Sub-type	Load/No Load
Program Name	Commercial New Construction
Measure Name	Load/No Load (15<=HP<25)
Measure Description	Covers the installation of oil flooded, rotary screw compressors with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with properly sized air receiver. Efficient air compressors use various control schemes to improve compression efficiencies at partial loads. When an air compressor fitted with Load/No Load, Variable Speed Drive, or Variable Displacement capacity controls is used in conjunction with a properly-sized air receiver, considerable amounts of energy can be saved.
Baseline Description	The baseline efficiency case is a typical modulating compressor with blow down valve.
Savings Principle	The high efficiency case is an oil-flooded, rotary screw compressor with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with a properly sized air receiver. Air receivers are designed to provide a supply buffer to meet short-term demand spikes which can exceed the compressor capacity. Installing a larger receiver tank to meet occasional peak demands can allow for the use of a smaller compressor.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total horsepower (hp) of installed air compressor capacity.
Savings Equation	Gross kWh = HP_compressor × deltakW/HP × Hours Gross kW = HP_compressor × deltakW/HP HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific Hours = Annual operating hours of the air compressor: site-specific deltakW/HP = Air compressor kW reduction per HP
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm Input kwh/horsepower based on NSTAR metering analysis and supported by multiple 3rd part impact evaluations
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life source	
measure life note	#N/A
	#N/A 1.00
measure life note	#N/A
measure life note In-service rate (ISR)	#N/A 1.00
measure life note In-service rate (ISR) In-service rate source	#N/A 1.00 #N/A

Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number Fuel Sector Project Type Category Type Sub-type Program Name Measure Name	RI_0046         Electric         C&I         New Construction         Compressed Air
Sector Project Type Category Type Sub-type Program Name	C&I New Construction
Project Type Category Type Sub-type Program Name	New Construction
Category Type Sub-type Program Name	
Type Sub-type Program Name	ICOmpressed Air
Sub-type Program Name	
Program Name	High Efficiency Air Compressors
	Load/No Load
Neasure Name	Commercial New Construction
	Load/No Load (25<=HP<=75)
Measure Description	Covers the installation of oil flooded, rotary screw compressors with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with properly sized air receiver. Efficient air compressors use various control schemes to improve compression efficiencies at partial loads. When an air compressor fitted with Load/No Load, Variable Speed Drive, or Variable Displacement capacity controls is used in conjunction with a properly-sized air receiver, considerable amounts of energy can be saved.
Baseline Description	The baseline efficiency case is a typical modulating compressor with blow down valve.
Savings Principle	The high efficiency case is an oil-flooded, rotary screw compressor with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with a properly sized air receiver. Air receivers are designed to provide a supply buffer to meet short-term demand spikes which can exceed the compressor capacity. Installing a larger receiver tank to meet occasional peak demands can allow for the use of a smaller compressor.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total horsepower (hp) of installed air compressor capacity.
Savings Equation	Gross kWh = HP_compressor × deltakW/HP × Hours Gross kW = HP_compressor × deltakW/HP HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific Hours = Annual operating hours of the air compressor: site-specific deltakW/HP = Air compressor kW reduction per HP
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	
Savings Persistence Factor source	Savings persistence is assumed to be 100%.

RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0050
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Compressed Air
Туре	Low Pressure Drop Filters
Sub-type	Low Pressure Drop Filter
Program Name	Commercial New Construction
Measure Name	Low pressure drop filter
Measure Description	Filters remove solids and aerosols from compressed air systems. Low pressure drop filters have longer lives and lower pressure drops than traditional coalescing filters resulting in higher efficiencies.
Baseline Description	The baseline efficiency case is a standard coalescing filter with initial drop of between 1 and 2 pounds per sq inch (psi) with an end of life drop of 10 psi.
Savings Principle	The high efficiency case is a low pressure drop filter with initial drop not exceeding 1 psi over life and 3 psi at element change. Filters must be deep-bed, "mist eliminator" style and installed on a single operating compressor rated 15 – 75 HP.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed filter.
	Gross kWh = Qty × HP_compressor × (kW per HP) × %SAVE × Hours
	Gross kW = Qty × HP_compressor × (kW per HP) × %SAVE Where:
Savings Equation	Qty = Number of filters installed: site-specific
	HP_compressor = Average compressor load: site-specific
	kW per HP = Conversion factor
	%SAVE = Percent change in pressure drop: site-specific
	Hours = Annual operating hours of the lower pressure drop filter: site-specific
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	#N/A
measure life note	Based on NSTAR estimates of typical replacement schedule
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Dersistance Factor (SDE)	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00

RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI 0047
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Compressed Air
Туре	High Efficiency Air Compressors
Sub-type	Variable Displacement
Program Name	Commercial New Construction
Measure Name	Variable Displacement (50<=HP<=75)
Measure Description	Covers the installation of oil flooded, rotary screw compressors with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with properly sized air receiver. Efficient air compressors use various control schemes to improve compression efficiencies at partial loads. When an air compressor fitted with Load/No Load, Variable Speed Drive, or Variable Displacement capacity controls is used in conjunction with a properly-sized air receiver, considerable amounts of energy can be saved.
Baseline Description	The baseline efficiency case is a typical modulating compressor with blow down valve.
Savings Principle	The high efficiency case is an oil-flooded, rotary screw compressor with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with a properly sized air receiver. Air receivers are designed to provide a supply buffer to meet short-term demand spikes which can exceed the compressor capacity. Installing a larger receiver tank to meet occasional peak demands can allow for the use of a smaller compressor.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total horsepower (hp) of installed air compressor capacity.
Savings Equation	Gross kWh = HP_compressor × deltakW/HP × Hours Gross kW = HP_compressor × deltakW/HP HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific Hours = Annual operating hours of the air compressor: site-specific deltakW/HP = Air compressor kW reduction per HP
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0 15
measure life measure life source	15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Covingo Develotones 5-star (CDS)	
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A Savings persistence is assumed to be 100%
Savings Persistence Factor note Realization rate energy (RRe)	Savings persistence is assumed to be 100%. 1.00
nealization rate energy (KKE)	1.00

RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0048
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Compressed Air
Туре	High Efficiency Air Compressors
Sub-type	Variable Speed Drive
Program Name	Commercial New Construction
Measure Name	VSD (15<=HP<25)
Measure Description	Covers the installation of oil flooded, rotary screw compressors with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with properly sized air receiver. Efficient air compressors use various control schemes to improve compression efficiencies at partial loads. When an air compressor fitted with Load/No Load, Variable Speed Drive, or Variable Displacement capacity controls is used in conjunction with a properly-sized air receiver, considerable amounts of energy can be saved.
Baseline Description	The baseline efficiency case is a typical modulating compressor with blow down valve.
Savings Principle	The high efficiency case is an oil-flooded, rotary screw compressor with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with a properly sized air receiver. Air receivers are designed to provide a supply buffer to meet short-term demand spikes which can exceed the compressor capacity. Installing a larger receiver tank to meet occasional peak demands can allow for the use of a smaller compressor.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total horsepower (hp) of installed air compressor capacity.
Savings Equation	Gross kWh = HP_compressor × deltakW/HP × Hours Gross kW = HP_compressor × deltakW/HP HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific Hours = Annual operating hours of the air compressor: site-specific deltakW/HP = Air compressor kW reduction per HP
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
neanzation rate energy (NRE)	1.00

RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid. Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0049
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Compressed Air
Туре	High Efficiency Air Compressors
Sub-type	Variable Speed Drive
Program Name	Commercial New Construction
Measure Name	VSD (25<=HP<=75)
Measure Description	Covers the installation of oil flooded, rotary screw compressors with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with properly sized air receiver. Efficient air compressors use various control schemes to improve compression efficiencies at partial loads. When an air compressor fitted with Load/No Load, Variable Speed Drive, or Variable Displacement capacity controls is used in conjunction with a properly-sized air receiver, considerable amounts of energy can be saved.
Baseline Description	The baseline efficiency case is a typical modulating compressor with blow down valve.
Savings Principle	The high efficiency case is an oil-flooded, rotary screw compressor with Load/No Load, Variable Speed Drive, or Variable Displacement capacity control with a properly sized air receiver. Air receivers are designed to provide a supply buffer to meet short-term demand spikes which can exceed the compressor capacity. Installing a larger receiver tank to meet occasional peak demands can allow for the use of a smaller compressor.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Total horsepower (hp) of installed air compressor capacity.
	Gross kWh = HP_compressor × deltakW/HP × Hours
	Gross kW = HP_compressor × deltakW/HP
Savings Equation	HP_compressor = Nominal rated horsepower of high efficiency air compressor: site-specific Hours = Annual operating hours of the air compressor: site-specific deltakW/HP = Air compressor kW reduction per HP
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0
measure life measure life source	15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00

RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0056
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Compressed Air
Туре	Zero Loss Condensate Drains
Sub-type	Zero Loss Condensate Drain
Program Name	Commercial New Construction
Measure Name	Zero loss condensate drain
Measure Description	Drains remove water from a compressed air system. Zero loss condensate drains remove water from a compressed air system without venting any air, resulting in less air demand and consequently greater efficiency.
Baseline Description	The baseline efficiency case is the installation of a standard condensate drain on a compressor system.
Savings Principle	The high efficiency case is the installation of a zero loss condensate drain on a single operating compressor rated <= 75 HP.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed drain.
	Gross kWh = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM × Hours Gross kW = CFM_pipe × deltaCFM/CFM_pipe × deltakW/CFM Where:
Savings Equation	CFM_pipe = CFM capacity of piping: site-specific 0.049 deltaCFM/CFM_pipe = Average CFM saved per CFM of piping capacity 0.24386 deltakW/CFM = Average demand savings per CFM; Based on regional analysis assuming a typical timed drain settings discharge scenario. Hours = Annual operating hours of the zero loss condensate drain: site-specific
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0.244
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings	#N/A
	#N/A
Gas Heat MMBtu/yr savings note	
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00

RRe source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.80
CF summer peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.54
CF winter peak source	DMI (2006). Impact Evaluation of 2004 Compressed Air Prescriptive Rebates. Prepared for National Grid Results analyzed in RLW Analytics (2006). Sample Design and Impact Evaluation.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.43 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI 0061
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Oven
	Commercial New Construction
Program Name Measure Name	Commercial Electric Convection Oven
	Installation of a qualified ENERGY STAR <sup>®</sup> commercial oven. ENERGY STAR <sup>®</sup> commercial ovens save energy
Measure Description	during preheat, cooking and idle times due to improved cooking efficiency, and preheat and idle energy
	rates.
	The baseline efficiency case is a standard oven that meets the baseline cooking energy efficiency
Baseline Description	requirements shown in Table 15 of Appendix A.
	The high efficiency case is an oven that meets or exceeds the high efficiency ratings shown in Table 15 of
Savings Principle	Appendix A.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency commercial electric oven.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty $\times$ deltakWh / Hours
	Where:
Savings Equation	where.
	Oty - Total number of units
	Qty = Total number of units.
	deltakWh = Deemed average annual kWh reduction per unit.
	Hours = Deemed average annual operating hours. Ovens are assumed to operate 313 days per year. Combination ovens are assumed to operate 12 hours a
Hours	day, or 3756 hours per year.
	Technical Assessment of Commercial Ovens
Hours Source	
Hours source note	<pre><http: 7_ovens.pdf="" equipment="" techassessment="" www.fishnick.com="">, pg.23 #N/A</http:></pre>
kWh/yr Savings	1364
	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations
kWh/yr savings source	<pre>chttp://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/commercial_kitchen_equipme</pre>
KWIII yi savings source	nt calculator.xls>
kWh/yr savings note	#N/A
kW reduction	0.436
	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations
kW reduction source	<pre>chttp://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/commercial_kitchen_equipme</pre>
www.reduction.source	Int calculator.xls>
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Food Service Technology Center (2011). Gas Griddle Life-Cycle Cost Calculation. Accessed on 10/12/2011.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
	Pacific Gas & Electric Company – Customer Energy Efficiency Department (2007). Work Paper
measure life source	PGECOFST101, Commercial Convection Oven, Revision #0.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings reconcertactor (SFT)	]

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
Coincidence factor (CF) summer peak	0.90
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.
Coincidence factor (CF) winter peak	0.90
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
	•
Gross Measure TRC note	#N/A

TRL Reference Number	RI 0057
Fuel	Electric
Sector	C&I
Project Type	New Construction
	Food Service
Category	
Type	Cooking Equipment
Sub-type	Fryer Commercial New Construction
Program Name	
Measure Name	Commercial Electric Fryer Installation of a qualified ENERGY STAR <sup>®</sup> commercial fryer, which saves energy during preheating,
Measure Description	cooking, and idling.
Baseline Description	The baseline efficiency case is a deep-fat fryer with a cooking efficiency of 75%, a shortening capacity of up to 65 pounds, daily a preheat energy of 2.3 kWh, and an idle energy rate of 1.05 kW
Savings Principle	The high efficiency case is a deep-fat fryer with a cooking energy efficiency of 80%, a shortening capacity of up to 65 pounds, a daily preheat energy of 2.3 kWh, and an idle energy rate of 1.05 kW.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency electric fryer.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakWh / Hours
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Deemed average annual kWh reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	Fryers are assumed to operate 313 days per year, or 6 days per week.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	760
kWh/yr savings source	ENERGYSTAR Commercial Kitchen Equipment Savings Calculator: Fryer Calculations. www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerRoomAC.xls.
kWh/yr savings note	#N/A
kW reduction	0.202
kW reduction source	ENERGYSTAR Commercial Kitchen Equipment Savings Calculator: Fryer Calculations. www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerRoomAC.xls.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Pacific Gas & Electric Company – Customer Energy Efficiency Department (2007). Work Paper PGECOFST101, Commercial Convection Oven, Revision #0.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	All PAs use 100% savings persistence factors.

RR source       #N/A         Re note       Realization rate is assumed to be 100%         RR demand (RRd) summer peak source       #N/A         RR demand (RRd) winter peak       1.00         RR dwinter peak note       Realization rate is assumed to be 100%         Coincidence factor (CF) summer peak       0.90         CF summer peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak source       #N/A         CF winter peak source       #N/A         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Sware Savings: gallons/yr       0.00         Sware Savings       0.00         Sware Savings Source / description       #N/A         Annual S savings       0.00         One time \$ savings source / description       #N/A         Annual \$ savings source//description       #N/A         Annual \$ savings source//descript		
RRe note         Realization rate is assumed to be 100%           RR demand (RRd) summer peak note         1.00           RRd summer peak note         Realization rate is assumed to be 100%           RRd winter peak source         MN/A           RRd winter peak source         MN/A           RRd winter peak note         Realization rate is assumed to be 100%           Coincidence factor (CF) summer peak         0.90           CF summer peak note         Realization rate is assumed to be 100%           CG summer peak source         MN/A           CF summer peak note         Coincidence factor (CF) summer peak           Coincidence factor (CF) winter peak         0.90           CC incidence factor (CF) winter peak         0.90           CC winter peak source         MN/A           Ce winter peak note         Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.           Councidence Factor (SF) winter peak         0.00           Water savings gallons/yr         0.00           Water / Sewer savings source         MN/A           Annual \$ savings         0.00           Annual \$ savings source / description         MN/A           Annual \$ savings note         MN/A           Annual \$ savings note	Realization rate energy (RRe)	1.00
RR demand (RRd) summer peak       1.00         RRd summer peak note       Realization rate is assumed to be 100%         RR demand (RRd) winter peak note       Realization rate is assumed to be 100%         RRd winter peak note       Realization rate is assumed to be 100%         RRd winter peak note       Realization rate is assumed to be 100%         Coincidence factor (CF) summer peak       0.90         CF summer peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak source       MN/A         Water savings: gallons/yr       0.00         Sewer savings: Source       MN/A         Annual \$ savings note       MN/A         Annual \$ savings note       MN/A         Annual \$ savings note       MN/A         One time \$ savings note       MN/A         Spill-Over (non-participant)       0.04	RRe source	#N/A
RRd summer peak source       #N/A         RRd summer peak note       Realization rate is assumed to be 100%         RR demand (Rd) winter peak       1.00         RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.90         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.90         CF winter peak note       Goincidence factor sere .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Generication (CF) winter peak       0.00         Sever savings: gallons/yr       0.00         Water /Sever savings: Source       #N/A         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Mr/A       Maccounce/description         FV/A	RRe note	Realization rate is assumed to be 100%
RRd summer peak note     Realization rate is assumed to be 100%       RR demand (RRd) winter peak     1.00       RRd winter peak source     #N/A       RRd winter peak note     Realization rate is assumed to be 100%       Coincidence factor (CF) summer peak     0.90       CF summer peak note     Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.       Coincidence factor (CF) winter peak     0.90       CF winter peak note     Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.       CF winter peak note     Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.       Water savings: gallons/yr     0.00       Sewer savings: gallons/yr     0.00       Water / Sewer savings Source     #N/A       Manual S savings     0.00       Annual S savings source / description     #N/A       Annual S savings source/description     #N/A       Preue-Ridership     0.42       Spill-Over (non-participant)     0.00       One time S savings note     #N/A       Spill-Over (non-participant)     0.01       Net-to-Gross source     TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spill	RR demand (RRd) summer peak	
RR demand (RRd) winter peak       1.00         RRd winter peak source       MN/A         RRd winter peak source       MN/A         Coincidence factor (CF) summer peak       0.90         CF summer peak source       MN/A         CG summer peak source       MN/A         CG summer peak source       MN/A         Coincidence factor (CF) winter peak       0.90         CF summer peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Water savings: gallons/yr       0.00         Water / Sewer savings inglons/yr       0.00         Water / Sewer savings note       MN/A         Annual S savings ource / description       #N/A         Annual S savings note       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.42         Spill-Over (participant)       0.42         Spill-O	RRd summer peak source	#N/A
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is assumed to be 100%         Coincidence factor (CF) summer peak       0.90         CF summer peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak note       Goincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Water savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         Preve.Ridership       0.42         Spill-Over (non-participant)       0.14         Net-to-Gross       0.72         TerraTech (2014). 2013	RRd summer peak note	Realization rate is assumed to be 100%
RRd winter peak note     Realization rate is assumed to be 100%       Coincidence factor (CF) summer peak     0.90       CF summer peak source     #N/A       Coincidence factor (CF) winter peak     Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.       Coincidence factor (CF) winter peak     0.90       CF winter peak source     #N/A       CF winter peak note     Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.       Water savings: gallons/yr     0.00       Sewer savings: gallons/yr     0.00       Water / Sewer savings Source     #N/A       Annual \$ savings     0.00       Annual \$ savings     0.00       Annual \$ savings note     #N/A       Annual \$ savings note     #N/A       Annual \$ savings note     #N/A       One time \$ savings note     #N/A       One time \$ savings note     #N/A       One time \$ savings note     #N/A       Pree-Ridership     0.42       Spill-Over (participant)     0.00       Spill-Over (participant)     0.14       Net-to-Gross     0.72       Net-to-Gross source     #N/A       Gross Measure TRC onte     #N/A       Gross	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.90         CF summer peak source       #N/A         CF summer peak note       day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak note       0.90         CF winter peak source       #N/A         CF winter peak note       0.90         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Water savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Mater / Sewer savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.42         Spill-Over (participant)       0.4	RRd winter peak source	#N/A
CF summer peak source       #N/A         CG summer peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Mnual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (participant)       0.14         Net-to-Gross       0.72         Spill-Over (participant)       0.14	RRd winter peak note	Realization rate is assumed to be 100%
Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak source       #W/A         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Water savings: gallons/yr       0.00         Sewer savings is gallons/yr       0.00         Water / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.42         Spill-Over (participant)       0.00         Spill-Over (participant)       0.14         Net-to-Gross note       #N/A         Ret-to-Gross note       #N/A         Ret-to-Gross note       #N/A         Gross Measure TRC note       #N/A	Coincidence factor (CF) summer peak	0.90
CF summer peak note       day per week or may not serve lunch and dinner on weekdays.         Coincidence factor (CF) winter peak       0.90         CF winter peak source       #N/A         Cd winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.42         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.14         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       N/A         Gross Measure TRC source       #N/A <td>CF summer peak source</td> <td>#N/A</td>	CF summer peak source	#N/A
day per week or may not serve lunch and dinner on weekdays.       Coincidence factor (CF) winter peak source     #N/A       CF winter peak note     Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.       Water savings: gallons/yr     0.00       Sewer savings: gallons/yr     0.00       Water / Sewer savings source     #N/A       Water / Sewer savings note     #N/A       Annual \$ savings note     #N/A       Annual \$ savings note     #N/A       One time \$ savings note     #N/A       One time \$ savings note     #N/A       One time \$ savings note     #N/A       Spill-Over (non-participant)     0.42       Spill-Over (non-participant)     0.14       Net-to-Gross note     #N/A       Net-to-Gross note     #N/A       Gross Measure TRC onte     #N/A		Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one
CF winter peak source       #N/A         CF winter peak note       Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.14         Net-to-Gross       0.72         Net-to-Gross note       #N/A         Net-to-Gross note       #N/A         Rorss Measure TRC unit       N/A         Gross Measure TRC conte       #N/A	CF summer peak note	day per week or may not serve lunch and dinner on weekdays.
CF winter peak noteCoincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.Water savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings Source#N/AManual \$ savings0.00Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.14Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unitN/AGross Measure TRC note#N/A	Coincidence factor (CF) winter peak	0.90
CF winter peak noteday per week or may not serve lunch and dinner on weekdays.Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AMater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.42Spill-Over (non-participant)0.14Net-to-Gross0.72Net-to-Gross note#N/AMet-to-Gross note#N/AGross Measure TRC unitN/AGross Measure TRC note#N/A	CF winter peak source	#N/A
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Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.42         Spill-Over (non-participant)       0.14         Net-to-Gross       0.72         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       N/A         Gross Measure TRC unit       N/A         Gross Measure TRC note       #N/A	CF winter peak note	day per week or may not serve lunch and dinner on weekdays.
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One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.00Spill-Over (non-participant)0.14Net-to-Gross0.72Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unitN/AGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.00Spill-Over (non-participant)0.14Net-to-Gross0.72Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unitN/AGross Measure TRC note#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.00Spill-Over (non-participant)0.14Net-to-Gross0.72Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unitN/AGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings	
Free-Ridership       0.42         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.14         Net-to-Gross       0.72         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)0.00Spill-Over (non-participant)0.14Net-to-Gross0.72Net-to-Gross sourceTetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014Net-to-Gross note#N/AGross Measure TRC unitN/AGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.14         Net-to-Gross       0.72         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Free-Ridership	0.42
Net-to-Gross       0.72         Net-to-Gross source       TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.         September, 2014       September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.00
Net-to-Gross source     TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.       September, 2014     September, 2014       Net-to-Gross note     #N/A       Gross Measure TRC unit     N/A       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Spill-Over (non-participant)	0.14
Net-to-Gross source     September, 2014       Net-to-Gross note     #N/A       Gross Measure TRC unit     N/A       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross	0.72
September, 2014         Net-to-Gross note       #N/A         Gross Measure TRC unit       N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A		TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Gross Measure TRC unit     N/A       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross source	September, 2014
Gross Measure TRC unit     N/A       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	#N/A
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Gross Measure TRC unit	
Gross Measure TRC note #N/A	Gross Measure TRC source	
	Gross Measure TRC note	
	Incentive Unit	N/A

TRL Reference Number	RI 0059
Fuel	Electric
Sector	C&I
	New Construction
Project Type	Food Service
Category	
Type	Cooking Equipment
Sub-type	Griddle
Program Name	Commercial New Construction
Measure Name	Commercial electric griddle
Measure Description	Installation of a qualified ENERGY STAR <sup>®</sup> griddle. ENERGY STAR <sup>®</sup> griddles save energy during preheat, cooking and idle times due to improved cooking efficiency, and preheat and idle energy rates.
Baseline Description	The baseline efficiency case is a standard efficiency (30% efficient) gas griddle.
Savings Principle	The high efficiency case is a gas griddle with an efficiency of 38%.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency commercial electric griddle.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakWh / Hours
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Deemed average annual kWh reduction per unit.
	Hours = Deemed average annual operating hours.
	Griddles are assumed to operate 313 days per year. Combination ovens are assumed to operate 12 hours
Hours	a day, or 3756 hours per year.
	Technical Assessment of Commercial Ovens
Hours Source	<pre><http: 7_ovens.pdf="" equipment="" techassessment="" www.fishnick.com="">, pg.23</http:></pre>
Hours source note	#N/A
kWh/yr Savings	2226
	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations
kWh/yr savings source	<pre></pre>
	nt_calculator.xls>
kWh/yr savings note	#N/A
kW reduction	0.593
	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations
kW reduction source	<pre></pre> <pre></pre> <pre></pre> <pre></pre> <pre></pre> <pre>/ia/business/bulk_purchasing/bpsavings_calc/commercial_kitchen_equipme</pre>
www.reddetion.source	Int calculator.xls>
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas field Minibitury i savings	
Gas Heat MMBtu/yr savings source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Gas Fryer.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	Food Service Technology Center (2011). Electric Griddle Life-Cycle Cost Calculator. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
0	

Dealization rate energy (DDa)	1.00
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
Coincidence factor (CF) summer peak	0.90
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.
Coincidence factor (CF) winter peak	0.90
CF winter peak source	#N/A
· · · · ·	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one
CF winter peak note	day per week or may not serve lunch and dinner on weekdays.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	N/A

TRL Reference Number	RI 0062
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Oven
Program Name	Commercial New Construction
Measure Name	Commercial electric oven
	Installation of a qualified ENERGY STAR <sup>®</sup> commercial oven. ENERGY STAR <sup>®</sup> commercial ovens save energy
Measure Description	during preheat, cooking and idle times due to improved cooking efficiency, and preheat and idle energy
	rates.
	The baseline efficiency case is a standard oven that meets the baseline cooking energy efficiency
Baseline Description	requirements shown in Table 15 of Appendix A.
	The high efficiency case is an oven that meets or exceeds the high efficiency ratings shown in Table 15 of
Savings Principle	Appendix A.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency commercial electric oven.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty $\times$ deltakWh / Hours
	Where:
Savings Equation	Where.
	Oty - Total number of units
	Qty = Total number of units.
	deltakWh = Deemed average annual kWh reduction per unit.
	Hours = Deemed average annual operating hours.
Hours	Ovens are assumed to operate 313 days per year. Combination ovens are assumed to operate 12 hours a
	day, or 3756 hours per year.
Hours Source	Technical Assessment of Commercial Ovens
	<pre><http: 7_ovens.pdf="" equipment="" techassessment="" www.fishnick.com="">, pg.23</http:></pre>
Hours source note	#N/A
kWh/yr Savings	9688
	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations
kWh/yr savings source	<pre><http: bpsavings_calc="" bulk_purchasing="" business="" commercial_kitchen_equipme<="" ia="" pre="" www.energystar.gov=""></http:></pre>
	nt_calculator.xls>
kWh/yr savings note	#N/A
kW reduction	2.579
	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations
kW reduction source	<a href="http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/commercial_kitchen_equipme">http://www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/commercial_kitchen_equipme</a>
	nt_calculator.xls>
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Pacific Gas & Electric Company – Customer Energy Efficiency Department (2007). Work Paper
	PGECOFST101, Commercial Convection Oven, Revision #0.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
	All installations have 100% in-service rate since programs include verification of equipment installations.
In-service rate note	
In-service rate note Savings Persistence Factor (SPF)	1.00

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Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
Coincidence factor (CF) summer peak	0.90
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.
Coincidence factor (CF) winter peak	0.90
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one day per week or may not serve lunch and dinner on weekdays.
Water savings: gallons/yr	
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings source	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	N/A

TBL Beference Number	DI 0067
TRL Reference Number Fuel	RI_0067
	Electric
Sector	
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Steamer
Program Name	Commercial New Construction
Measure Name	Commercial electric steamer
Measure Description	Installation of a qualified ENERGY STAR <sup>®</sup> commercial steam cooker. ENERGY STAR <sup>®</sup> steam cookers save energy during cooling and idle times due to improved cooking efficiency and idle energy rates.
Baseline Description	The baseline efficiency case is a conventional electric steam cooker with a cooking energy efficiency of 30%, pan production capacity of 23.3 pounds per hour, and an idle energy rate of 1.2 kW.
Savings Principle	The high efficiency case is an ENERGY STAR <sup>®</sup> electric steam cooker with a cooking energy efficiency of 50%, pan production capacity of 16.7 pounds per hour, and an idle energy rate of 0.4 kW.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency commercial electric steamer.
	Gross kWh = Qty × deltakWh Gross kW = Qty × deltakWh / Hours
Savings Equation	Where:
	Qty = Total number of units. deltakWh = Deemed average annual kWh reduction per unit. Hours = Deemed average annual operating hours.
Hours	Steamers are assumed to operate 313 days per year, 12 hours a day, or 3756 hours per year.
Hours Source	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations <http: bpsavings_calc="" bulk_purchasing="" business="" commercial_kitchen_equipme<br="" ia="" www.energystar.gov="">nt_calculator.xls&gt;</http:>
Hours source note	#N/A
kWh/yr Savings	8381
kWh/yr savings source	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations <http: bpsavings_calc="" bulk_purchasing="" business="" commercial_kitchen_equipme<br="" ia="" www.energystar.gov="">nt_calculator.xls&gt;</http:>
kWh/yr savings note	#N/A
kW reduction	2.231
kW reduction source	ENERGY Star Commercial Kitchen Equipment Savings Calculator: Griddle Calculations <http: bpsavings_calc="" bulk_purchasing="" business="" commercial_kitchen_equipme<br="" ia="" www.energystar.gov="">nt_calculator.xls&gt;</http:>
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	Food Service Technology Center (2011). Gas Conveyor Oven Life-Cycle Cost Calculator.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Environmental Protection Agency (2011). Savings Calculator for ENERGY Star Qualified Commercial Kitchen Equipment: Steam Cooker Calcs. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Covingo Dereistoneo Fostor (CDF)	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
Coincidence factor (CF) summer peak	0.90
CF summer peak source	#N/A
· · · ·	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one
CF summer peak note	day per week or may not serve lunch and dinner on weekdays.
Coincidence factor (CF) winter peak	0.90
CF winter peak source	#N/A
	Coincidence Factors are .9 for both summer and winter seasons to account for restaurants that close one
CF winter peak note	day per week or may not serve lunch and dinner on weekdays.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

TRL Reference Number	RI_0110
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Custom
Sub-type	HVAC
Program Name	Commercial New Construction
Measure Name	Custom HVAC
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives
	under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

Realization rate energy (RRe)	1.10
	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRe source	Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.13
	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRd summer peak source	Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.66
	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRd winter peak source	Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.33
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.67
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.24 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI_0177
Fuel	Electric
Sector	
Project Type	New Construction
Category	HVAC
Туре	Ventilation
Sub-type	Demand Control Ventilation
Program Name	Commercial New Construction
Measure Name	Demand control ventilation
Measure Description	The measure is to control quantity of outside air to an air handling system based on detected space CO2 levels. The installed systems monitor the CO2 in the spaces or return air and reduce the outside air use when possible to save energy while meeting indoor air quality standards.
Baseline Description	The baseline efficiency case for this measure assumes the relevant HVAC equipment has no ventilation control.
Savings Principle	The high efficiency case is the installation of an outside air intake control based on CO2 sensors.
Energy Savings calculation method	Custom
Savings unit	Installed demand control ventilation project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = Gross kWh × deltaMMBtu_Gas/kWh Gross MMBtu Oil = Gross kWh × deltaMMBtu_Oil/kWh deltaMMBtu_Gas/kWh = Deemed average natural gas impact per gross electric energy impact deltaMMBtu_Oil/kWh = Deemed average heating oil impact per gross electric energy impact
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Calculated with the National Grid DCV savings Tool
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Calculated with the National Grid DCV savings Tool
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0 10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	#N/A 1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed 100% because energy savings are custom calculated.
	neuration rate is assumed 100% because energy savings are custom calculated.

RR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is assumed 100% because energy savings are custom calculated.RR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is assumed 100% because energy savings are custom calculated.Coincidence factor (CF) summer peak1.00CF summer peak source#N/A	
RRd summer peak noteRealization rate is assumed 100% because energy savings are custom calculated.RR demand (RRd) winter peak1.00RRd winter peak source#N/ARRd winter peak noteRealization rate is assumed 100% because energy savings are custom calculated.Coincidence factor (CF) summer peak1.00	
RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is assumed 100% because energy savings are custom calculated.         Coincidence factor (CF) summer peak       1.00	
RRd winter peak source#N/ARRd winter peak noteRealization rate is assumed 100% because energy savings are custom calculated.Coincidence factor (CF) summer peak1.00	
RRd winter peak noteRealization rate is assumed 100% because energy savings are custom calculated.Coincidence factor (CF) summer peak1.00	
Coincidence factor (CF) summer peak 1.00	
CF summer peak source #N/A	
CF summer peak note Coincidence Factors are set to 1.00 because coincidence is built into the estimates of Gross kW.	
Coincidence factor (CF) winter peak 1.00	
CF winter peak source #N/A	
CF winter peak note Coincidence Factors are set to 1.00 because coincidence is built into the estimates of Gross kW.	
Water savings: gallons/yr 0.00	
Sewer savings: gallons/yr 0.00	
Water / Sewer savings Source #N/A	
Water / Sewer savings note #N/A	
Annual \$ savings 0.00	
Annual \$ savings source / description #N/A	
Annual \$ savings note #N/A	
One time \$ savings 0.00	
One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.42	
Spill-Over (participant) 0.00	
Spill-Over (non-participant) 0.14	
Net-to-Gross 0.72	
TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.	
Net-to-Gross source September, 2014	
Net-to-Gross note #N/A	
Gross Measure TRC unit \$ 0.64 /kWh	
Gross Measure TRC source #N/A	
Gross Measure TRC note #N/A	
Incentive Unit \$ 0.32 /kWh	

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TDI Deference Number	RI 0069
TRL Reference Number	
Fuel	Electric
Sector	
Project Type	New Construction
Category	HVAC
Type	Controls
Sub-type	Economizer
Program Name	Commercial New Construction
Measure Name	Dual enthalpy economizer controls
Measure Description	The measure is to upgrade the outside-air dry-bulb economizer to a dual enthalpy economizer. The system will continuously monitor the enthalpy of both the outside air and return air. The system will control the system dampers adjust the outside quantity based on the two readings.
Baseline Description	The baseline efficiency case for this measure assumes the relevant HVAC equipment is operating with a fixed dry-bulb economizer.
Savings Principle	The high efficiency case is the installation of an outside air economizer utilizing two enthalpy sensors, one for outdoor air and one for return air.
Energy Savings calculation method	Deemed
Savings unit	Total tons of controlled cooling capacity.
	Gross kWh = Qty × deltakWh
Savings Equation	Gross kW = Qty × deltakW Where:
	Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit. Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	289
kWh/yr savings source	Patel, Dinesh (2001). Energy Analysis: Dual Enthalpy Control. Prepared for NSTAR.
kWh/yr savings note	#N/A
kW reduction	0.289
kW reduction source	Patel, Dinesh (2001). Energy Analysis: Dual Enthalpy Control. Prepared for NSTAR.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.05
RRe source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.

RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.34
CF summer peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI 0172
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Motors
Sub-type	ECM Motor
Program Name	Commercial New Construction
Measure Name	ECM fan motor for HVAC
	This measure is offered through the Cool Choice program and promotes the installation of electronically
Measure Description	commutated motors (ECMs) on fan powered terminal boxes, fan coils, and HVAC supply fans on small
	unitary equipment.
	The baseline efficiency case for this measure assumes the VAV box fans are powered by a single speed
Baseline Description	fractional horsepower permanent split capacitor (PSC) induction motor.
Savings Principle	The high efficiency case must have a motor installed on new, qualifying HVAC equipment.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed ECM fan motor.
	Gross kWh = DesignCFM × BoxSizeFactor × %Flow_Annual × Hours Gross Summer kW = DesignCFM × BoxSizeFactor × %Flow_Summer × Hours
	Gross Summer kW = DesignCFM × BoxSizeFactor × %Flow_Summer × Hours
	Gross Winter kW = DesignCFM × BoxSizeFactor × %Flow_Winter × Hours
	14/h
	Where:
Savings Equation	DesignCFM = Capacity of the VAV box in cubic feet per minute: site-specific.
	BoxSizeFactor = Savings factor in Watts/CFM
	%Flow_Annual = Average % of design flow over all operating hours
	%Flow_Summer = Average % of design flow during summer peak period
	%Flow_Winter = Average % of design flow during winter peak period
	Hours = Estimated annual operating hours for VAV box fans: site-specific.
	DesignCFM = Capacity of the VAV box in cubic feet per minute: site-specific.
	Hours = Estimated annual operating hours for VAV box fans: site-specific.
Hours	The average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137
	hours.
Hours Source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
	Measurement and Verification Forum.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings I CISISTENCE I ACTOL (SFF)	1.00

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Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh
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Fuel         Electric           Getor         C&I           Project Type         New Construction           Category         HVAC           Strippe         Heat Pumps           Strippe         Ground Source           Program Name         Commercial New Construction           Measure Name         Ground Source (Caded loop) heat pump           Measure Name         Commercial New Construction           Measure Name         Commercial New Construction           Measure Description         This measure applications.           Baseline Description         The Heat Refine refinery case as more NH NAC equipments exceeds the specifications of the International Energy Conservation Cade (ECC) 2012.           Barry Savings calculation method         Calculated outing site specific inputs           Barry Savings calculation method         Calculated outing site specific inputs           Barry Savings calculation method         Calculated outing site specific inputs           Barry Savings calculation method         Calculated outing site specific inputs           Barry Savings Calculation         Tons = Rated cooling capacity of the installed equipment: site specific.           12 Multip per ton = Conversion factor         SEER, base = Seasonal Energy Efficiency unit site specific.           12 Multip per ton = Conversion factor         SEER, base = Seasonal Energy Efficienc		
Sector         OAL           Development Type         New Construction           Category         HVAC           Type         Heat Pumps           Status         Ground Source           Program Name         Ground Source (dosted loop) heat pump           Measure Name         Ground source (dosted loop) heat pump           Measure Description         This measure (dosted loop) meat pump           Measure Description         This measure (addition of high efficiency single package or split system air source, water constructions assumes compliance with the efficiency requirements as mandated by thiode island state building code.           Savings Principle         The high efficiency case assumes the VAC equipments exceeds the specifications of the international renergy Conservation Code (ILCC) 2012.           Calculated using the specific Imput of space cooling.         Gross KWh T Torx (RistUr) per tor) × (1/SEER_base - 1/SEER_ee) × Hours_C + CR × (L/HSFF_base - 1/HSFF_e) > Hour	TRL Reference Number	RI_0125
Project Type         New Construction           Calegory         HVAC           Type         Hest Pumps           Sub type         Ground Source (Cosed loop) and groundwater source (propert Name           Measure Description         This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source compliance with the efficiency requirements as mandated by Nation Code (ECC 2012.           Baselline Description         The baselline efficiency case is unique to the installation sassumes compliance with the efficiency requirements as mandated by Nation Code (ECC 2012.           Bareging Sung calculation method         Calculated using site-specific inputs           Swings Sung calculation method         Gross kW = Tors × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/NSF_e) × Hours_U + Tors × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee)           Where:         Tors = Rated cooling capacity of the installed equipment: site-specific.           Savings Equation         SEER_ee = Seasonal Energy Efficiency Ratio of the baseline equipment: code           SEER_ee = Seasonal Energy Efficiency Ratio heave fifteer quipment: site-specific.           Using Equation         HSF_base = Neating Seasonal Performance Factor for near Sector for baseline equipment: code           SEER_ee = Seasonal Energy Efficiency Ratio of baseline equipment: site-specific.           HSF_base = Neating Seasonal Performance Factor for neaveficient equipment with		
Category         HVAC           Type         Heat Pumps           Sub-type         Ground Source (closed loop) heat pump           Program Name         Commercial New Construction           Measure Description         This measure applies to the installations of high efficiency single package or split system air source, water source, put of source (closed loop) heat pump system for space conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by thode island state building code.           Savings Principle         The high efficiency case assumes the HVAC equipments exceeds the specifications of the international Energy Conservation Code (ECC) 2012.           Savings vint         Gross KM+ Tors / RBu/typ pre tors)          (L/EER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/SEER_ee) × Hours_C - CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = CR × (1/HSPF_base - 1/SEFF_ee) × Hours_C - C = C = CR × (1/HSPF_base - 1/S	Sector	
Type         Heat Pumps           Sub-type         Ground Source (Cosed Joop) heat pump           Measure Description         Ground source (Cosed Joop) heat pump           Measure Description         Source, cosed Joop) and groundwater source (open Joop) heat pump systems for space conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Khook Island State Building Code.           Savings Principle         The high efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Khook Island State Building Code.           Savings Principle         The high efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Khook Island State Building Code.           Savings Vinciple         The high efficiency case summes the HVAC equipments exceeds the specifications of the International Energy Conservation Code (IECC 2012.           Energy Savings calculation method         Calculated using site-specific inputs           Gross KW = Tons × (MBU/hr per ton) × (1/SERE_base - 1/SEFE_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ea) × Hours_HI           Gross KW = Tons × (MBU/hr per ton) × (1/SERE_base - 1/SEFE_ee) × Hours_C + CR × (1/HSPF_base - 1/SEFE_ee) × Hours_C + CR × (1/HSPF_base - 1/SEFE_ee) × Hours_HI           Savings Equation         SEEE, base - Seasonal Energy Efficiency Ratio of the high-efficiency unit site-specific.           Savings Equation         SEEE, base - Seasonal En	Project Type	New Construction
Sub-type         Ground Source           Program Name         Commercial New Construction           Measure Name         Ground source (closed loop) heat pump           This measure applies to the installation of high-efficiency single package or split system air source, water source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code.           Savings Principle         The high efficiency case sources the HVAC equipments exceeds the specifications of the International Energy Conservation Code (ECC) 2012.           Savings unit         Installed heat pump system for space cooling.           Gross KW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_e) × Hours_C + CR × (1/HSPF_base - 1/FSF = 0 × Hours, H]           Gross KW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee)           Where:         Tons = Reade cooling capacity of the installed equipment: site-specific.           Savings Equation         SEER, e = Seasonal Energy Efficiency Ratio of the baseline equipment: code SEER, e = Seasonal energy efficiency ratio of the high-efficiency. Unit: site-specific.           Savings Equation         KBtu/hr per ton = Conversion factor SEER, e = Seasonal energy efficiency ratio of the baseline equipment: site-specific.           Savings Equation         KEER, e = Seasonal energy efficiency ratio of the seaseline equipment: site-specific. </td <td>Category</td> <td>HVAC</td>	Category	HVAC
Program Name         Commercial New Construction           Measure Name         Ground source (closed loop) het pump           Measure Description         Source, ground source (closed loop) and groundwater source (open loop) het pump systems for space conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Nhode Island State Building Code.           Savings Principle         The high efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Nhode Island State Building Code.           Savings Vinciple         The high efficiency case for new installed equipments exceeds the specifications of the International Energy Conservation Code (IECC) 2012.           Energy Conservation Code (IECC) 2012.         Gross Wh = Tons x (NBtW/hp per ton) x (I/SEER_base - 1/SEER_ee) × Hours_C + CR x (1/HSPF_base - 1/HSPF_ee) × Hours, H   Gross Wu = Tons x (NBtW/hp per ton) x (I/SEER_base - 1/SEER_ee)           Where:         Tons * Rated cooling capacity of the installed equipment: site-specific.           Savings Equation         SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code SEER_base = Seasonal Energy Efficiency and their physical Seasonal Performance Factor for new efficient equipment: code (SEF, ee = Seasonal Energy Efficiency Ratio of the new efficient equipment: site-specific. Hours_C = Equality Ratio conversion: EER_SEER/L = Seasonal Energy Efficiency Rate of Seasonal Energy Efficiency Ratio of the new efficient equipment: site-specific. Hours_C = Eqacity Ratio conversion: EER=SEER/L = Seasonal Energy Efficiency Ra	Туре	Heat Pumps
Messure Name         Ground source (closed loop) heat pump           Measure Description         This measure apples to the installation of high-efficiency single package or split systems for space conditioning applications.           Baseline Description         The baseline efficiency case sources (closed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.           Baseline Description         The baseline efficiency case sources the VAC equipments exceeds the specifications of the international Energy Conservation Code (IECC) 2012.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Installed heat pump system for space cooling.           Gross KW= Tons × (RBtu/hr per ton) × (1/SEEL base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ee) × Hours_H   Gross KW = Tons × (RBtu/hr per ton) × (1/SEEL base - 1/EER_ee)           Where:         Tons = Rated cooling capacity of the installed equipment: site specific.           Ta KBtu/hr per ton = Conversion factor         SEER_ee = Seasonal energy efficiency Ratio of the baseline equipment: code           Savings Equation         SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.           Hours_C = Equivalent full load cooling hours         HSP_base = Heading Seasonal Performance Factor for baseline equipment: code           HSF_e = Heading Seasonal Performance Factor for base applicate equipment: site specific.         Hours_H = Heading Seasonal Performance Factor for base applicate equipment is the specific.	Sub-type	Ground Source
This measure applies to the installation of high-efficiency single package or split system air source, water source (open loop) heat pump systems for space conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Mode Island State Building Code.           Savings Principle         The high efficiency case assumes the HVAC equipments exceeds the specifications of the International Energy Conservation Code (ECC 2012.           Energy Conservation Code (ECC 2012.         Energy Conservation Code (ECC 2012.           Savings unit         Installed heat pump system for space coling.           Gross KWh = Tons × (kBtu/hr per ton) × ([L/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ee) + Hours_H           Gross KWh = Tons × (kBtu/hr per ton) × (1/L/SEER_base - 1/SEER_ee)           Where:         Tons = Rated cooling capacity of the installed equipment: site-specific.           Savings Equation         SEER_base = Seasonal Energy (Ficiency Ratio of the baseline equipment: code           SEER_base = Conversion factor         SEER_base = Lipuxelent full load cooling hours           HSPF_ge = Heating Seasonal Performance Factor for baseline equipment: code           HSPF_ge = Lequivalent full load cooling capacity to heating capacity. For equipment with cooling capacity for heating the stapecific.           Hours         C = Capavaler Reigy Efficiency Ratio of the baseline equipment: code           HSPF_ge = Lequivalent full load cooling hours	Program Name	Commercial New Construction
Measure Description         source, ground source (doed loop) and groundwater source (open loop) heat pump systems for space conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code.           Savings Principle         The high efficiency case assumes the HVAC equipments exceeds the specifications of the international Energy Conservation Code (ECC) 2012.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Installed heat pump system for space cooling.           Gross KWH = Tons × (KBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/ERS, escence)           Where:         Tons = Rated cooling capacity of the installed equipment: site-specific. 12 kBtu/hr per ton = Conversion factor 12 kBtu/hr per ton = Conversion factor 13 kBtu/hr per ton = Conversion factor 14 kBtu/hr per ton = Conversion factor 15 kBtu/hr per ton = Conversion factor 16 kBts_ee = Energy Efficiency Ratio of the baseline equipment: side-specific. 13 kBtu/hr per ton = Conversion factor 16 kBts_ee = Energy Efficiency Ratio conversion factor 18 kBts_ee = Energy Efficiency Ratio conversion factor 18 kBts_ee = Energy Efficiency Ratio conversion factor 18 kBts_ee = Energy Efficiency Ratio conversion factor for the seline equipment: side-specific. 19 kBts_ee = Energy Efficiency Ratio conversine reator for new efficiency Ratio Energy, NTAR. ERE, b	Measure Name	Ground source (closed loop) heat pump
conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code.           Savings Principle         The high efficiency case assumes the HVAC equipments exceeds the specifications of the International Energy Conservation Code (IECC) 2012.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Installed heat pump system for space cooling.           Gross KWh = Tons × (BtBu/hr per ton) × (1/ISEER_base - 1/EER_ee)         Worker:           Tons = Rated cooling capacity of the installed equipment: site-specific.         12 KBU/hr per ton = Conversion factor           Savings Equation         SEER, base = Sasconal Energy efficiency Ratio of the baseline equipment: code           Ster, e = Sasconal Energy efficiency Ratio of the high-efficiency unit: site-specific.         12 KBU/hr per ton = Conversion factor           Savings Equation         SEER, base = Sasconal Energy efficiency Ratio of the high-efficiency unit: site-specific.           Hours _= C = capacity Ratio Converts rated cooling capacity to heating capacity. To requipment with cooling capacity to heating capacity. To equipment with cooling capacity to heating capacity. To equipment with cooling capacity to heating EFLAs are taken as 132 hours.           Hours _= C = Lensy Efficiency Ratio o face equipment : site-specific. For equipment energy ficiency Ratio for now efficient equipment is site-specific.           Hours _= C = Lens		This measure applies to the installation of high-efficiency single package or split system air source, water
conditioning applications.           Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code.           Savings Principle         The high efficiency case assumes the HVAC equipments exceeds the specifications of the International Energy Conservation Code (IECC) 2012.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Installed heat pump system for space cooling.           Gross KWh = Tons × (BtBu/hr per ton) × (1/ISEER_base - 1/EER_ee)         Worker:           Tons = Rated cooling capacity of the installed equipment: site-specific.         12 KBU/hr per ton = Conversion factor           Savings Equation         SEER, base = Sasconal Energy efficiency Ratio of the baseline equipment: code           Ster, e = Sasconal Energy efficiency Ratio of the high-efficiency unit: site-specific.         12 KBU/hr per ton = Conversion factor           Savings Equation         SEER, base = Sasconal Energy efficiency Ratio of the high-efficiency unit: site-specific.           Hours _= C = capacity Ratio Converts rated cooling capacity to heating capacity. To requipment with cooling capacity to heating capacity. To equipment with cooling capacity to heating capacity. To equipment with cooling capacity to heating EFLAs are taken as 132 hours.           Hours _= C = Lensy Efficiency Ratio o face equipment : site-specific. For equipment energy ficiency Ratio for now efficient equipment is site-specific.           Hours _= C = Lens	Measure Description	source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space
Baseline Description         The baseline efficiency case for new installations assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code.           Savings Principle         The high efficiency case assumes the HVAC equipments exceeds the specifications of the International Code.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Installed heat pump system for space cooling.           Gross KWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_f1           Gross KW = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee)           Where:         Tons = Rated cooling capacity of the installed equipment: site-specific.           12 kBtu/hr per ton = Conversion factor         SEER_ee = Seasonal Energy Efficiency ratio of the baseline equipment: code           SEER_base = Seasonal Energy Efficiency ratio of the baseline equipment: site-specific.         Hours_f1           Us bBtu/hr per ton = Conversion factor         SEER_base = Heating Seasonal Performance Factor for baseline equipment: code           SEER_e = Seasonal Energy Efficiency ratio of the baseline equipment: site-specific.         Hours_f1 = Equivalent full load heating hours           News/Non-Electric Beneric Factor for ew efficient equipment with cooling capacity <5 A tons, assume the following conversion: EER-SEE /1.1		
made beschption         mandated by Rhode Island State Building Code.           Savings Principle         The high efficiency case assumes the HVAC equipments exceeds the specifications of the International Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Installed heat pump system for space cooling.         Installed heat pump system for space cooling.           Savings unit         Installed heat pump system for space cooling.         Installed heat pump system for space cooling.           Savings unit         Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/JHSPF_ee) × Hours_H]           Gross kWh = Tons × (kBtu/hr per ton) × (1/EER_base - 1/SEER_ee)         Where:           Tons = Rated cooling capacity of the installed equipment: site-specific.         12 kBtu/hr per ton = Conversion factor           Savings Equation         SEER_ee = Seasonal energy Efficiency rate of the high-efficiency unit: site-specific.           Hours_J = Evaluation full cold cooling nours         HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code           HSPF_ee = Heating Seasonal Performance Factor for baseline equipment is code         HSPF_ee = Heating Seasonal Perior Park Prepared for Dave Weber, NSTAR.           Hours_L = Energy Efficiency rate of baseline equipment.         Cde         HSPF_base = Leating Seasonal Perior Park Prepared for Dave Weber, NSTAR.           Hours_L = Energy Efficiency rateo deficient equipment.         Cde		
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Gross KWH = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base - 1/HSPF_ee) × Hours_H]           Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/SEER_ee)           Where:           Tons = Rated cooling capacity of the installed equipment: site-specific.           12 KBtu/hr per ton = Conversion factor           SEER_base = Seasonal energy efficiency Ratio of the baseline equipment: code           SEER_ee = Seasonal energy efficiency ratio of the baseline equipment: code           HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code           HSPF_base = Heating Seasonal Performance Factor for new efficient equipment: site-specific.           Hours_H = Equivalent full load cooling capacity to heating capacity to new gene wilcent equipment is tooling           Capacity S 5.4 tons, assume CR-1. For equipment.           EEE_base = Energy Efficiency Ratio of the new efficient equipment.           EEE_base = Energy Efficiency Ratio of the new efficient equipment.           Hours         If site specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average           heating EFLHs are taken as 1137 hours.         Hours Stource           Hours Source         MN/A           WWh/yr savings conce         MN/A           WWh/yr savings conce         MN/A           WWh/yr savings note         MN/A           WWh/yr savings source         MN/A		
J/HSPF_ee) × Hours, H]         Gross KW = Tons × (kBtu/hr per ton) × (J/EER_base - 1/EER_ee)         Where:         Tons = Rated cooling capacity of the installed equipment: site-specific.         12 kBtu/hr per ton = Conversion factor         Sevings Equation         SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code         SEER_base = Seasonal Energy Efficiency ratio of the high-efficiency unit: site-specific.         Hours C = Equivalent full load cooling hours         HSPF_base = Heating Seasonal Performance Factor for baseline equipment: site-specific.         Hours C = Equivalent full load caoling hours         CR = Capacity Ratio converts rated cooling capacity to heating capacity. For equipment with cooling         capacity 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.5; Optimal Energy, Ifficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER=SEER/1.1	Savings unit	Installed heat pump system for space cooling.
J/HSPF_ee) × Hours, H]         Gross KW = Tons × (kBtu/hr per ton) × (J/EER_base - 1/EER_ee)         Where:         Tons = Rated cooling capacity of the installed equipment: site-specific.         12 kBtu/hr per ton = Conversion factor         Sevings Equation         SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code         SEER_base = Seasonal Energy Efficiency ratio of the high-efficiency unit: site-specific.         Hours C = Equivalent full load cooling hours         HSPF_base = Heating Seasonal Performance Factor for baseline equipment: site-specific.         Hours C = Equivalent full load caoling hours         CR = Capacity Ratio converts rated cooling capacity to heating capacity. For equipment with cooling         capacity 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.5; Optimal Energy, Ifficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER=SEER/1.1		Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER base - 1/SEER ee) × Hours C + CR × (1/HSPF base -
Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)           Where:           Tons = Rated cooling capacity of the installed equipment: site-specific.           12 kBtu/hr per ton = Conversion factor           Stern, base = Seasonal energy Efficiency Ratio of the baseline equipment: code           SEER_base = Seasonal energy Efficiency ratio of the high-efficiency unit: site-specific.           Hours_C = Equivalent full load cooling hours           HSFF_base = Heating Seasonal Performance Factor for baseline equipment: site-specific.           Hours_L = Equivalent full load heating hours           CR = Capacity Ratio converts rated cooling capacity to heating capacity. For equipment with cooling           capacity 5.5.4 tons, assume CR=1. For equipment.           Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.           EER_base = Energy Efficiency Ratio of baseline equipment.           EER_base = Energy Efficiency Ratio of baseline equipment.           Hours         Measurement and Verification factor           Hours Source         KKMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.           Hours Source MW/A         KKMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.           Hours Source MW/A         MVA           KWhyry savings source         #N/A		
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capacity ≤ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008).         Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.         EER_base = Energy Efficiency Ratio of the new efficient equipment:         ER_ece = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER=SEER/1.1		Hours_H = Equivalent full load heating hours
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EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER~SEER/1.1		Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER~SEER/1.1		EER base = Energy Efficiency Ratio of baseline equipment.
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Energy Reference(s) & table(s) notes 0	Propane MMBtu/yr savings source	
	Propane MMBtu/yr savings note	#N/A
	Energy Reference(s) & table(s) notes	0
	measure life	15

measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.05
RRe source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.40
CF summer peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC source	#N/A #N/A
	\$ 0.32 /kWh
Incentive Unit	۶.52 / ۲۷۷۱۱

	81.0427
TRL Reference Number	RI_0127
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heat Pumps
Sub-type	Groundwater Source
Program Name	Commercial New Construction
Measure Name	Groundwater source (open loop) heat pump
	This measure applies to the installation of high-efficiency single package or split system air source, water
Measure Description	source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space
·	conditioning applications.
	The baseline efficiency case for new installations assumes compliance with the efficiency requirements as
Baseline Description	mandated by Rhode Island State Building Code.
	The high efficiency case assumes the HVAC equipments exceeds the specifications of the International
Savings Principle	
	Energy Conservation Code (IECC) 2012.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed heat pump system for space cooling.
	Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base -
	1/HSPF_ee) × Hours_H]
	Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)
	W/h ====
	Where:
	Tons = Rated cooling capacity of the installed equipment: site-specific.
	12 kBtu/hr per ton = Conversion factor
	SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code
	SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.
Savings Equation	Hours_C = Equivalent full load cooling hours
	HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code
	HSPF_ee = Heating Seasonal Performance Factor for new efficient equipment: site-specific.
	Hours_H = Equivalent full load heating hours
	CR = Capacity Ratio converts rated cooling capacity to heating capacity. For equipment with cooling
	capacity $\leq$ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008).
	Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
	EER_base = Energy Efficiency Ratio of baseline equipment.
	EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons,
	assume the following conversion: EER≈SEER/1.1
	If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average
Hours	heating EFLHs are taken as 1137 hours.
Hours Source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
	Measurement and Verification Forum.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A #N/A
	#N/A 0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0 15

measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.05
RRe source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.40
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
CF summer peak source	Measurement and Verification Forum.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
CF winter peak source	Measurement and Verification Forum.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC source	#N/A #N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0106
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Cooling
Sub-type	Unitary AC
Program Name	Commercial New Construction
Measure Name	Unitary AC (air cooled)
Measure Description	This measure promotes the installation of high efficiency unitary air conditioning equipment in lost opportunity applications. Air conditioning (AC) systems are a major consumer of electricity and systems that exceed baseline efficiencies can save considerable amounts of energy. This measure applies to air, water, and evaporatively-cooled unitary AC systems, both single-package and split systems.
Baseline Description	The baseline efficiency case for new installations assumes compliance with the International Energy Conservation Code (IECC) 2012 as mandated by Rhode Island State Building Code. Table 7 in Appendix A details the specific efficiency requirements by equipment type.
Savings Principle	The high efficiency case assumes the HVAC equipments exceeds the specifications of the International Energy Conservation Code (IECC) 2012.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed unitary AC system for space cooling.
Savings Equation	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee) Where: Tons = Rated cooling capacity of the installed equipment: site-specific. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific. Hours_C = Equivalent full load cooling hours EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1 EER_base = Energy Efficiency Ratio of baseline equipment: code. Since IECC 2012 does not provide EER requirements for equipment < 5.4 tons, assume the following conversion: EER ≈ SEER/1.1
Hours	If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours. KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
Hours Source	Measurement and Verification Forum.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	0 #N/A
	#N/A #N/A
Propane MMBtu/yr savings note	
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.

measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
RRd winter peak source	Measurement and Verification Forum.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.40
CF summer peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
CF winter peak source	Measurement and Verification Forum.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.42
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh
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TRL Reference Number	RI 0107
Fuel	Electric
Sector	C&I
Project Type	New Construction
- ,.	HVAC
Category	
Туре	Cooling
Sub-type	Unitary AC
Program Name	Commercial New Construction
Measure Name	Unitary AC (evaporatively cooled)
Measure Description	This measure promotes the installation of high efficiency unitary air conditioning equipment in lost opportunity applications. Air conditioning (AC) systems are a major consumer of electricity and systems that exceed baseline efficiencies can save considerable amounts of energy. This measure applies to air, water, and evaporatively-cooled unitary AC systems, both single-package and split systems.
Baseline Description	The baseline efficiency case for new installations assumes compliance with the International Energy Conservation Code (IECC) 2012 as mandated by Rhode Island State Building Code. Table 7 in Appendix A details the specific efficiency requirements by equipment type.
Savings Principle	The high efficiency case assumes the HVAC equipments exceeds the specifications of the International Energy Conservation Code (IECC) 2012.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed unitary AC system for space cooling.
	Gross kWh = Tons × (kBtu/hr per ton) × (1/SEER_base - 1/SEER_ee) × Hours_C Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee) Where:
Savings Equation	Tons = Rated cooling capacity of the installed equipment: site-specific. 12 kBtu/hr per ton = Conversion factor SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific. Hours_C = Equivalent full load cooling hours EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons, assume the following conversion: EER≈SEER/1.1 EER_base = Energy Efficiency Ratio of baseline equipment: code. Since IECC 2012 does not provide EER requirements for equipment < 5.4 tons, assume the following conversion: EER ≈ SEER/1.1
Hours	If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average heating EFLHs are taken as 1137 hours.
Hours Source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
., .	
kW reduction	
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
	#N/A
Propane MMBtu/yr savings note	
Energy Reference(s) & table(s) notes	
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.

measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
RRd winter peak source	Measurement and Verification Forum.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.40
CF summer peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
CF winter peak source	Measurement and Verification Forum.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.42
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh
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TRL Reference Number	RI_0126
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heat Pumps
Sub-type	Ground Source
Program Name	Commercial New Construction
Measure Name	Water source heat pump
	This measure applies to the installation of high-efficiency single package or split system air source, water
Measure Description	source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space
	conditioning applications.
	The baseline efficiency case for new installations assumes compliance with the efficiency requirements as
Baseline Description	mandated by Rhode Island State Building Code.
	The high efficiency case assumes the HVAC equipments exceeds the specifications of the International
Savings Principle	Energy Conservation Code (IECC) 2012.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed heat pump system for space cooling.
	Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base -
	1/HSPF_ee) × Hours_H]
	Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)
	Where:
	Tons = Rated cooling capacity of the installed equipment: site-specific.
	12 kBtu/hr per ton = Conversion factor
	SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code
Savings Equation	SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.
5	Hours_C = Equivalent full load cooling hours
	HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code
	HSPF_ee = Heating Seasonal Performance Factor for new efficient equipment: site-specific.
	Hours_H = Equivalent full load heating hours
	CR = Capacity Ratio converts rated cooling capacity to heating capacity. For equipment with cooling
	capacity ≤ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008).
	Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
	EER_base = Energy Efficiency Ratio of baseline equipment.
	EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons,
	assume the following conversion: EER≈SEER/1.1
Hours	If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average
	heating EFLHs are taken as 1137 hours.
Hours Source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
	Measurement and Verification Forum.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	#N/A #N/A 0
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A #N/A 0 #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A #N/A 0
Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A #N/A 0 #N/A

measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.05
RRe source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.40
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
CF summer peak source	Measurement and Verification Forum.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
CF winter peak source	Measurement and Verification Forum.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC source	#N/A #N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0103
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Cooling
Sub-type	Chiller, Air Cooled
Program Name	Commercial New Construction
Measure Name	Air-cooled chiller
Measure Description	This measure promotes the installation of efficient air-cooled water chilling packages for comfort cooling applications. Eligible chillers include air-cooled chillers for single chiller systems or for the lead chiller only in multi-chiller systems.
Baseline Description	The baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code. As described in Chapter 13 of the aforementioned document, energy efficiency must be met via compliance with the Internationational Energy Conservation Code 2012.
Savings Principle	The high efficiency case assumes water chilling packages that exceed the efficiency levels required by Rhode Island State Building Code and meet the minimum efficiency requirements as stated in the New Construction HVAC energy efficiency rebate forms. Energy and demand savings calculations are base on actual equipment efficiencies should be determined on a case-by-case basis.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed high-efficiency chiller for space cooling.
	Gross kWh = Tons × 12 × (1/EER_base - 1/EER_ee) × Hours_C Gross kW = Tons × 12 × (1/EER_base - 1/EER_ee) × LF Where:
Savings Equation	Tons = Rated cooling capacity of the installed equipment: site-specific. EER_base = Energy Efficiency Ratio of baseline equipment: code Reference Table 9 EER_ee = Energy Efficiency Ratio of the efficient equipment: site-specific. Hours_C = Equivalent full load cooling hours Reference Table 11 LF = Load Factor 12 = Conversion factor: 12 kBtu/hr per ton.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012). 2012 International Energy Conservation Code; Page C-46, Table C403.2.3(7)
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012). 2012 International Energy Conservation Code; Page C-46, Table C403.2.3(7)
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	- #N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
	#N/A #N/A
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A 0
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measure life	<u>کا</u>

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measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.04
RRe source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	1.00
CF summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	
One time \$ savings note	#N/A
	#N/A
Free-Ridership	#N/A 0.42
Free-Ridership Spill-Over (participant)	#N/A 0.42 0.00
Free-Ridership Spill-Over (participant) Spill-Over (non-participant)	#N/A 0.42 0.00 0.14
Free-Ridership Spill-Over (participant)	#N/A 0.42 0.00
Free-Ridership Spill-Over (participant) Spill-Over (non-participant) Net-to-Gross	#N/A 0.42 0.00 0.14 0.72 TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Free-Ridership Spill-Over (participant) Spill-Over (non-participant) Net-to-Gross Net-to-Gross source	#N/A 0.42 0.00 0.14 0.72 TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Free-Ridership Spill-Over (participant) Spill-Over (non-participant) Net-to-Gross Net-to-Gross source Net-to-Gross note	<pre>#N/A 0.42 0.00 0.14 0.72 TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014 #N/A</pre>
Free-Ridership Spill-Over (participant) Spill-Over (non-participant) Net-to-Gross Net-to-Gross source Net-to-Gross note Gross Measure TRC unit	<pre>#N/A 0.42 0.00 0.14 0.72 TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014 #N/A \$ 0.64 /kWh</pre>

TRL Reference Number	RI_0114
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Type	Heat Pumps
Sub-type	Air Source
Program Name	Commercial New Construction
Measure Name	Air-cooled heat pump
	This measure applies to the installation of high-efficiency single package or split system air source, water
Measure Description	source, ground source (closed loop) and groundwater source (open loop) heat pump systems for space
	conditioning applications.
Baseline Description	The baseline efficiency case for new installations assumes compliance with the efficiency requirements as
	mandated by Rhode Island State Building Code.
Savings Principle	The high efficiency case assumes the HVAC equipments exceeds the specifications of the International
	Energy Conservation Code (IECC) 2012.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed heat pump system for space cooling.
	Gross kWh = Tons × (kBtu/hr per ton) × [(1/SEER_base - 1/SEER_ee) × Hours_C + CR × (1/HSPF_base -
	1/HSPF_ee) × Hours_H]
	Gross kW = Tons × (kBtu/hr per ton) × (1/EER_base - 1/EER_ee)
	Where:
	Tons = Rated cooling capacity of the installed equipment: site-specific.
	12 kBtu/hr per ton = Conversion factor
	SEER_base = Seasonal Energy Efficiency Ratio of the baseline equipment: code
	SEER_ee = Seasonal energy efficiency ratio of the high-efficiency unit: site-specific.
Savings Equation	Hours_C = Equivalent full load cooling hours
	HSPF_base = Heating Seasonal Performance Factor for baseline equipment: code
	HSPF_ee = Heating Seasonal Performance Factor for new efficient equipment: site-specific.
	Hours_H = Equivalent full load heating hours
	CR = Capacity Ratio converts rated cooling capacity to heating capacity. For equipment with cooling
	capacity $\leq$ 5.4 tons, assume CR=1. For equipment > 5.4 tons, assume CR=1.15; Optimal Energy, Inc. (2008).
	Memo:Non-Electric Benefits Analysis Update. Prepared for Dave Weber, NSTAR.
	EER_base = Energy Efficiency Ratio of baseline equipment.
	EER_ee = Energy Efficiency Ratio of the new efficient equipment: site-specific. For equipment < 5.4 tons,
	assume the following conversion: EER≈SEER/1.1
	If site-specific data is unavailable, the average cooling EFLHs are taken as 855 hours while the average
Hours	heating EFLHs are taken as 1137 hours.
	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation,
Hours Source	Measurement and Verification Forum.
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council
kwiiyyi saviligs note	(2012). 2012 International Energy Conservation Code; Page C-46, Table C403.2.3(7)
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kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm Inputs based on UI and CL&P Program Savings Documentation for 2011 Program Year, Section
<b>a</b>	2.2.2 C&I LO Cooling - Unitary AC & Heat Pumps
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
	0
Oil MMBtu/yr savings	
Oil MMBtu/yr savings Oil MMBtu/yr savings source	#N/A
	#N/A #N/A
Oil MMBtu/yr savings source	

Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.05
RRe source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.40
CF summer peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	KEMA (2011). C&I Unitary HVAC Load Shape Project Final Report. Prepared for the Regional Evaluation, Measurement and Verification Forum.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh
Incentive Unit	\$ 0.32 /kWh

	DI 0104
TRL Reference Number	RI_0104
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Cooling
Sub-type	Chiller, Water Cooled
Program Name	Commercial New Construction
Measure Name	Water-cooled chiller
Measure Description	This measure promotes the installation of efficient water-cooled and air-cooled water chilling packages for comfort cooling applications. Eligible chillers include air-cooled, water cooled rotary screw and scroll, and water cooled centrifugal chillers for single chiller systems or for the lead chiller only in multi-chiller systems.
Baseline Description	The baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code. As described in Chapter 13 of the aforementioned document, energy efficiency must be met via compliance with the Internationational Energy Conservation Code 2012.
Savings Principle	The high efficiency case assumes water chilling packages that exceed the efficiency levels required by Rhode Island State Building Code and meet the minimum efficiency requirements as stated in the New Construction HVAC energy efficiency rebate forms. Energy and demand savings calculations are base on actual equipment efficiencies should be determined on a case-by-case basis.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed high-efficiency chiller for space cooling.
	Gross kWh = Tons × (kW/ton_base - kW/ton_ee) × Hours_C Gross kW = Tons × (kW/ton_base - kW/ton_ee) × LF Where:
Savings Equation	Tons = Rated cooling capacity of the installed equipment: site-specific. kW/ton_base = Rated efficiency of baseline equipment: code kW/ton_ee = Energy efficiency rating of the efficient equipment: site-specific. Hours_C = Equivalent full load cooling hours LF = Load Factor
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012). 2012 International Energy Conservation Code; Page C-46, Table C403.2.3(7)
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorithm inputs are based on engineering estimates of cooling hours and 2012 International Code Council (2012). 2012 International Energy Conservation Code; Page C-46, Table C403.2.3(7)
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	5 #N/A
Propane MMBtu/yr savings source	#N/A #N/A
	#N/A 0
Energy Reference(s) & table(s) notes	23
measure life	
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.

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measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.04
RRe source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	1.00
CF summer peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 2, Energy Efficient HVAC and Process Cooling Equipment. Prepared for NE Power Service Co.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI 0184
	Electric
Fuel	
Sector	
Project Type	New Construction
Category	Lighting
Туре	Custom
Sub-type	Lighting
Program Name	Commercial New Construction
Measure Name	Custom lighting
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	National Grid assumption based on regional PA working groups. Assumptions based on historical steam trap surveys. Steam losses in lbs/hr are found using "Boiler Efficiency Institute (1987). Steam Efficiency Improvement; Page 34, Table 4.1 under Steam Leak
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.92
RRe source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.11
RRd summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.79
RRd winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.33
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.67
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.24 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI_0180
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Lighting
Туре	Controls
Sub-type	Dimming
Program Name	Commercial New Construction
Measure Name	Daylight dimming
Measure Description	This measure promotes the installation of lighting controls in both lost-opportunity and retrofit applications. Promoted technologies include occupancy sensors and daylight dimming controls.
Baseline Description	The baseline efficiency case assumes no controls (retrofit) or code-compliant controls (new construction).
Savings Principle	The high efficiency case involves lighting fixtures connected to controls that reduce the pre-retrofit or baseline hours of operation.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed lighting controls project.
	Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)
	Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW)
Savings Equation	QTY_i = Quantity in controlled fixtures in location i Watts_i = Connected wattage of controlled fixtures in location i Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations). Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented.
	1,000 Watts per kW = Conversion factor deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved. deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved. The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
	Invert

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.38
RRe source	RLW Analytics (2007). Lighting Controls Impact Evaluation Final Report, 2005 Energy Initiative, Design 2000plus and Small Business Services Program. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	0.96
	RLW Analytics (2007). Lighting Controls Impact Evaluation Final Report, 2005 Energy Initiative, Design
RRd summer peak source	2000plus and Small Business Services Program. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.96
	RLW Analytics (2007). Lighting Controls Impact Evaluation Final Report, 2005 Energy Initiative, Design
RRd winter peak source	2000plus and Small Business Services Program. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.15
	RLW Analytics (2007). Lighting Controls Impact Evaluation Final Report, 2005 Energy Initiative, Design
CF summer peak source	2000plus and Small Business Services Program. Prepared for National Grid.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
	RLW Analytics (2007). Lighting Controls Impact Evaluation Final Report, 2005 Energy Initiative, Design
CF winter peak source	2000plus and Small Business Services Program. Prepared for National Grid.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.27 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.20 /kWh

	DL 0225
TRL Reference Number	RI_0225
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Lighting
Туре	Exterior
Sub-type	Street Lighting
Program Name	Commercial New Construction
Measure Name	LED Street Lights
Measure Description	The installation of LED street lights.
Baseline Description	The baseline case is customer owned high-pressure sodium, incandescent, or mercury vapor street lighting.
Savings Principle	The high efficiency case is the installation of LED street lighting.
0 1	Calculated using site-specific inputs
Energy Savings calculation method	
Savings unit	Installed LED Streetlight
	Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) Where:
Savings Equation	QTY_base_i = Quantity of baseline fixtures in location i Watts_base_i = Connected wattage of baseline fixtures in location i QTY_ee_j = Quantity of efficient fixtures in location j Watts_ee_j = Connected wattage of efficient fixtures in location j 1,000 Watts per kW = Conversion factor Hours = Lighting annual hours of operation: site-specific. deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved. deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/vr savings source	I#N/A
kWh/yr savings source kWh/yr savings note	#N/A #N/Δ
kWh/yr savings note	#N/A
kWh/yr savings note kW reduction	#N/A Calc
kWh/yr savings note kW reduction kW reduction source	#N/A Calc #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note	#N/A Calc #N/A #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings	#N/A Calc #N/A #N/A 0
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	#N/A Calc #N/A #N/A 0 #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	#N/A Calc #N/A #N/A 0 #N/A #N/A #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	#N/A Calc #N/A #N/A 0 #N/A #N/A 0
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	#N/A Calc #N/A #N/A 0 #N/A #N/A 0 #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A         Calc         #N/A         #N/A         0         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         0         #N/A         0         0         #N/A         0         #N/A         0         0         0         0         0
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A         Calc         #N/A         #N/A         0         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         0         #N/A         0         #N/A         0         0         #N/A         0         0         #N/A         0
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         12
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         #N/A         10         12         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         12
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         #N/A         10         12         #N/A
kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings source Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source measure life note	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         0         #N/A         #N/A         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         Ø         #N/A         Ø         #N/A         #N/A         Based on National Grid Staff estimates
kWh/yr savings note         kW reduction         kW reduction note         Gas Heat MMBtu/yr savings         Gas Heat MMBtu/yr savings source         Gas Heat MMBtu/yr savings note         Oil MMBtu/yr savings         Oil MMBtu/yr savings source         Oil MMBtu/yr savings note         Propane MMBtu/yr savings note         Propane MMBtu/yr savings source         Propane MMBtu/yr savings note         Energy Reference(s) & table(s) notes         measure life         measure life note         In-service rate (ISR)	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         0         #N/A         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         Based on National Grid Staff estimates         1.00
kWh/yr savings note         kW reduction         kW reduction note         Gas Heat MMBtu/yr savings         Gas Heat MMBtu/yr savings source         Gas Heat MMBtu/yr savings note         Oil MMBtu/yr savings         Oil MMBtu/yr savings source         Oil MMBtu/yr savings note         Propane MMBtu/yr savings source         Propane MMBtu/yr savings note         Propane MMBtu/yr savings note         Energy Reference(s) & table(s) notes         measure life         measure life note         In-service rate (ISR)         In-service rate source	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         Based on National Grid Staff estimates         1.00         #N/A
kWh/yr savings note         kW reduction         kW reduction note         Gas Heat MMBtu/yr savings         Gas Heat MMBtu/yr savings source         Gas Heat MMBtu/yr savings note         Oil MMBtu/yr savings         Oil MMBtu/yr savings source         Oil MMBtu/yr savings source         Oil MMBtu/yr savings source         Oil MMBtu/yr savings source         Oil MMBtu/yr savings note         Propane MMBtu/yr savings note         Propane MMBtu/yr savings note         Energy Reference(s) & table(s) notes         measure life         measure life note         In-service rate (ISR)         In-service rate note         Savings Persistence Factor (SPF)	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         12         #N/A         Based on National Grid Staff estimates         1.00         #N/A         All installations have 100% in-service rate since programs include verification of equipment installations.
kWh/yr savings note         kW reduction         kW reduction source         kW reduction note         Gas Heat MMBtu/yr savings         Gas Heat MMBtu/yr savings source         Gas Heat MMBtu/yr savings note         Oil MMBtu/yr savings         Oil MMBtu/yr savings source         Oil MMBtu/yr savings source         Oil MMBtu/yr savings source         Oil MMBtu/yr savings source         Propane MMBtu/yr savings note         Propane MMBtu/yr savings note         Energy Reference(s) & table(s) notes         measure life         measure life source         measure life note         In-service rate source         In-service rate note	#N/A         Calc         #N/A         #N/A         0         #N/A         #N/A         0         #N/A         Based on National Grid Staff estimates         1.00         #N/A         All installations have 100% in-service rate since programs include verification of equipment installations.         1.00

Declipation rate energy (DDc)	1.00
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	Calc
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	Calc
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 0.27 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.20 /kWh

Fuel         Electric           Sector         CB1           Project Type         New Construction           Category         Lighting           Type         Interior           Sub-type         Interior           Sub-type         Efficient Lighting           Progen         Interior           Sub-type         Efficient Lighting           Progen         Nume           Commercial New Construction         Morescent Image, solitasts, and factures, solid state lighting, and efficient tighting including, but not limited to, efficient facture states are provided in the Table 4 of Appendix A. For lost counts from the existing space. Listing facture witages are provided in the Table 4 of Appendix A. For lost coupportunity installations, the baseline case is based on comparable code compliant installations and standard practices.           Savings Principle         For both new construction and retrofit installations, the high efficiency case is project specific and is determined using actual facture cours for the project and watages found in Tables 3 and 5 in Appendix / Energy Sovings calculation method           Calculated using site specific inputs           Savings sunt         Gross NMn = [SUM(QTY_base_] × Watts_base_]) - SUM(QTY_ee_] × Watts_ee_]]) / (Watts per kW) × Hour Gross NW = [SUM(QTY_base_] = watts_ee_]) / Watts per kW) + Hours Strate Regionand and retrofit installation in the data and standard practices.           Savings Equation         Watts_base_] = Counstitut of baseline factures in location i		
Sector         CRI           Project Type         New Construction           Category         Lighting           Type         Interfor           Sub-type         Efficient Lighting           Sympamma         Commercial New Construction           Measure Name         Lighting stytems           Measure Description         Hain reasoure promotes the installation of efficient lighting including, but not limited to, afficient fluctures, solid state lighting, and efficient vigos and counts from the existing space. Existing fature watages are provided in the Table 4 of Appendix A. Pro lost apportunity installations, the baseline efficiency case is project-specific and is determined using actual fature types and counts from the existing space. Existing fature watages are provided in the Table 4 of Appendix A. Pro lost apportunity installations, the baseline efficiency case is project-specific and is determined using actual fature counts for the project and watages found in Tables 3 and 5 in Appendix A. Pro lost apportunity installations, the baseline fature watages found in Tables 3 and 5 in Appendix A. Pro lost apportunity installations, the baseline fatures in location i attraction in tracting site specific inputs           Savings wint         Installed high-efficiency lighting project.           Gross KWH = [SUM(QTV_base_i × Watts_base_i) - SUM(QTV_ee_i × Watts_ee_j)] / (Watts per kW) × Hour Gross kWH = [SUM(QTV_base_i × Watts_base_i) - SUM(QTV_ee_i × Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTV_base_i × Gross hasting oil MMBtu reduction per gross kWh saved.           Savings Equation         The annual hours of operation: site-specific.	TRL Reference Number	RI_0208
Project Type         New Construction           Creategory         Lighting           Type         Introfor           Sub-type         Introfor           Sub-type         Introfor           Sub-type         Introfor           Sub-type         Introfor           Sub-type         Introfor           Type main         Commercial New Construction           Measure Description         Introfor           Baseline Description         For retroft installations, the baseline effciency case is project-specific and is determined using actual future watages are provided in the Table 4 of Appendix A. For lost           opportunitly installations, the baseline case is based on comparable code-compliant installations and standard practices.           Savings Principle         For both new construction and retroft installations, the high efficiency case is project-specific and is determined using actual future counts for the project and wattages found in Tables 3 and 5 in Appendix.           Savings Varings calculation method         Calculated using site: specific inputs           Savings sequation         Installed high-efficiency lighting project.           Carculated using actual future counts for the project and wattage of unit in Tables 3 and 5 in Appendix.           Savings Equation         Installed high-efficiency lighting project.           Carculated using site: specific inputs         Installed high-efficiency lighting		
Cartegory         Uphing           Type         Interior           Sub-type         Efficient Lighting           Program Name         Commercial New Construction           Measure Name         Lighting systems           Measure Name         Lighting systems           Measure Name         Lighting systems           Measure Name         Lighting systems           Measure Description         The measure promotes the installation of efficient lighting including, but not limited to, efficient lighting including.           Baseline Description         For retrofit installations, the baseline efficiency case is project-specific and is determined using actual future counts for the project and watages found in Tables 3 and 5 in Appendix A: Tor Iost opportunity installations and retrofit installations, the high efficiency case is project-specific and is determined using actual future counts for the project and watages found in Tables 3 and 5 in Appendix A: Swings unit           Swings Vinciple         For both new construction and retrofit installations, the base_1) - SUM(QTY_ee_j × Watts_ee_j)) / (Watts per kW) × Hour Gross kWh = [SUM(QTY_base_j × Watts_base_j) - SUM(QTY_ee_j × Watts_ee_j)) / (Watts per kW) × Hour Gross kWh = [SUM(QTY_base_j = Quantity of baseline futures in location i           Swings Equation         Watts_base_j = Connected wattage of fiftient futures in location i           Watts_ee_j = Connected wattage of efficient futures in location i         Watts_ee_j = Connected wattage of fiftient fitures in location j           Watts_ee_j	Sector	
Type         Interior           Sol-type         Efficient Lighting           Program Name         Commercial New Construction           Measure Name         Lighting systems           Measure Name         Uptiting systems           Measure Description         This measure promotes the installation of efficient lighting including, but not limited to, efficient lighting, and efficient lighting including, but not limited to, efficient lighting, and efficient lighting including, but not limited in the Table 4 of Appendix A. For lost           Baseline Description         For retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost           Savings Principle         For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix. Savings unit           Savings calculation method         Calculated using site specific inputs           Savings unit         installed high-efficiency lighting project.           Savings Equation         Gross KWH = [SUM(QTY_base_i > Watts_base_i] - SUM(QTY_ee_i > Watts_ee_j)] / (Watts per KW)           Where:         QTY_basing i = Quantity of baseline fixtures in location i           Savings Equation         Watts_base_i = Gounacted wattage of baseline fixtures in location i           Watts_base_i = Q	Project Type	
Sub-type         Efficient Lighting           Program Name         Commercial New Construction           Measure Name         Lighting systems           This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures.           Baseline Description         For retorit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For Isst.           Savings Principle         For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix / Borry Savings calculation method           Calculated using site-specific inputs           Savings unit         Installed high-efficiency lighting project.           Gross kWh = [SUM(QTY_base_i = Watts_base_i]) - SUM(QTY_ee_i = Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_i = Watts_base_i]) - SUM(QTY_ee_i = Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_i = Connected wattage of baseline fixtures in location i           Savings Equation         Watts_base_i = Connected wattage of baseline fixtures in location i           Watts_base_i = connected wattage of baseline fixtures in location j         U/Watts_per kW)           Watts_ce_i = Connected wattage of baseline fixtures in location j         U/W		Lighting
Program Name         Commercial New Construction           Measure Name         Lighting systems           Measure Description         This measure promotes the installation of efficient lighting including, but not limited to, efficient flag           Baseline Description         For retroft installations, the baseline efficiency case is project-specific and is determined using actual factors, solid state lighting, and efficient flag intensity discharge (HID)           Baseline Description         For retroft installations, the baseline efficiency case is project-specific and is gradual interactions, and focures.           Baseline Description         For retroft installations, the baseline case is based on comparable code-compliant installations and standard practices.           Savings Principle         For both new construction and retroft installations, the high efficiency case is project specific and is determined using actual future counts for the project and wattages found in Tables 3 and 5 in Appendix.           Savings unit         installed high-efficiency lighting project.           Gross KWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)] / (Watts per KW) × Hour Gross KWh = [SUM(QTY_base_i = Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)] / (Watts per KW) = (QTY_ee_i = Quantity of afficient futures in location i           Savings Equation         Watts_base_i = connected wattage of futures in location i           Watts_base_i = connected wattage of futures in location i         (Watts_ee_i = Quantity of afficient futures in location i           Watts_base_i = connected wattage of anisotion i	Туре	Interior
Measure Name         Lighting systems.           Measure Description         This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures, solid state lighting, and efficient viages are provided in the Table 4 of Appendix A. For Isst.           Baseline Description         For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and watages found in Tables 3 and 5 in Appendix.           Savings Principle         For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using atte-specific inputs           Savings unit         Installed high-efficiency lighting project.           Gross kWh = [SUM(QTY_base_] × Watts_base_]) - SUM(QTY_ee_] × Watts_ee_]]) / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_] = Quantity of baseline fixtures in location i           Savings Equation         Writs_base_] = Connected wattage of baseline fixtures in location i           QTY_base_] = Quantity of baseline fixtures in location i         QTY watts_ee_]]) / (Watts per kW) × Hour detamation just is specific.           detamMetu_Gas/Wh = Gross natural gas MMABtu reduction per gross kWh saved.         detaMMe	Sub-type	Efficient Lighting
This measure promotes the installation of efficient lighting including, but not limited to, efficient           Measure Description         fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID)           Baseline Description         For retrofit installations, the baseline efficiency case is project-specific and is determined using actual           fluorescent high installations, the baseline case is based on comparable code-compliant installations and standard practices.           Savings Principle         For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix.           Energy Savings calculation method         Calculated using site-specific inputs           Savings unit         Installed high-efficiency lighting project.           Savings unit         Gross KW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)) / (Watts per kW) × Hour Gross KW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)) / (Watts per kW) × Hour Gross KW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)) / (Watts per kW) × Hour Gross KW = [SUM(QTY_base_i × Growesian factor in USU = [Connected wattage of efficient futures in location i           Savings Equation         City base(i = Quantity of facting futures in location i           Watts_base_i = Connected wattage of efficient futures in location i         Watts_base_i = Connected wattage of efficient futures in location i           Watts_basor_i = Gautatty of obseline ratures in steras in lo	Program Name	Commercial New Construction
Measure Description         Illuorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID)           Baseline Description         For retrofit installations, the baseline efficiency case is project-specific and is determined using actual future types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost.           Savings Principle         For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix / determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix / Energy Savings calculation method           Calculated using after specific inputs         Savings unit         Installed high-efficiency lighting project.           Savings unit         Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_i = Quantity of baseline fixtures in location i Watts_base_i = Connected wattage of efficient fixtures in location i Watts_base_i = Connected wattage of efficient fixtures in location i Watts_base_i = Connected wattage of efficient fixtures in location i Watts_base_i = Connected wattage of efficient fixtures in location i Watts_base_i = Connected wattage of efficient fixtures in location i Watts_base_i = Connected wattage of efficient fixtures in location i Watts_base_i = Connected wattage of efficient fixtures in location i WADMAMEU_ONI/WMH = Gross heating oil MMBtu reduction per gross	Measure Name	Lighting systems
Baseline Description         Appendix A. For lost opportunity installations, the baseline case is based on comparable code-compilant installations and standard practices.           Savings Principle         For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fisture counts for the project and wattages found in Tables 3 and 5 in Appendix. A calculated using site specific inputs           Savings unit         Installed high-efficiency lighting project.           Savings calculation method         Calculated using site specific inputs           Savings unit         Installed high-efficiency lighting project.           Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_i × Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_i = Quantity of baseline fixtures in location i Watts_base_i = Connected wattage of baseline fixtures in location i Watts_base_i = Connected wattage of baseline fixtures in location i Watts_base_i = Connected wattage of province in location i Watts_base_i = Connected wattage of appendix in location i Watts_cal = Connected wattage of appendix	Measure Description	fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID)
Savings Principle       determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix /         Energy Savings calculation method       Calculated using site-specific inputs         Savings unit       Installed high-efficiency lighting project.         Savings unit       Installed high-efficiency lighting project.         Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_i = Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hour Gross kW = [SUM(QTY_base_i = Connected wattage of baseline fixtures in location i         Savings Equation       QTY_base_i = Connected wattage of baseline fixtures in location i         Watts_base_j = Connected wattage of efficient fixtures in location i       QTY_ee_j = Quantity of ficient fixtures in location i         Watts_ee_j = Connected wattage of efficient fixtures in location i       Watts_ee_j = Connected wattage of operation: site-specific.         Hours       The annual hours of operation are site specific and will be determined on a case by case basis.         Hours Source       #N/A         KWh/yr savings source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         Gross heating oil MMBtu/yr savings note       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note	Baseline Description	fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost opportunity installations, the baseline case is based on comparable code-compliant installations and
Savings unit       Installed high-efficiency lighting project.         Gross KWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hour         Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)         Where:         QTY_base_i = Quantity of baseline fixtures in location i         Watts_base_i = Connected wattage of baseline fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Utry = Uighting annual hours of operation: site-specific.         deltaMMBtu_Gas/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         Hours       the annual hours of operation are site specific and will be determined on a case by case basis.         Hours Source       #N/A         KWh/ry savings note       #N/A         KWh/ry savings note       #N/A         KWh/ry savings note       #N/A         KWh/ry savings note       #N/A         Gas Heat MMBtu/ry savings note <td< td=""><td>Savings Principle</td><td>For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix A.</td></td<>	Savings Principle	For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix A.
Savings unit       Installed high-efficiency lighting project.         Gross KWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hour         Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)         Where:         QTY_base_i = Quantity of baseline fixtures in location i         Watts_base_i = Connected wattage of baseline fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Watts_base_i = Quantity of efficient fixtures in location i         Utry = Uighting annual hours of operation: site-specific.         deltaMMBtu_Gas/kWh = Gross heating oil MMBtu reduction per gross kWh saved.         Hours       the annual hours of operation are site specific and will be determined on a case by case basis.         Hours Source       #N/A         KWh/ry savings note       #N/A         KWh/ry savings note       #N/A         KWh/ry savings note       #N/A         KWh/ry savings note       #N/A         Gas Heat MMBtu/ry savings note <td< td=""><td>Energy Savings calculation method</td><td>Calculated using site-specific inputs</td></td<>	Energy Savings calculation method	Calculated using site-specific inputs
Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hour         Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW)         Where:       QTY_base_i = Quantity of baseline fixtures in location i         QTY_ee_j = Quantity of efficient fixtures in location i       QTY_ee_j = Quantity of efficient fixtures in location i         Watts_base_i = Connected wattage of baseline fixtures in location j       Watts_ee_j = Quantity of efficient fixtures in location j         Watts_ee_j = Connected wattage of efficient fixtures in location j       Watts_ee_j = Connected wattage of efficient fixtures in location j         Hours       Hours = Lighting annual hours of operation       Steversion factor         Hours       The annual hours of operation are site specific and will be determined on a case by case basis.         Hours Source       #N/A         Hours source note       #N/A         KWh/ry savings calc       Calc         KWh/ry savings source       #N/A         KW reduction source       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/ry savings source       #N/A         MIMA       Galc         MW reduction note       #N/A         Gas Heat MMBtu/ry savings source       #N/A         MIMA       Galc         MIMA       Galc <t< td=""><td></td><td></td></t<>		
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Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0	Oil MMBtu/yr savings	Calc
Propane MMBtu/yr savings     0       Propane MMBtu/yr savings source     #N/A       Propane MMBtu/yr savings note     #N/A       Energy Reference(s) & table(s) notes     0	Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings     0       Propane MMBtu/yr savings source     #N/A       Propane MMBtu/yr savings note     #N/A       Energy Reference(s) & table(s) notes     0	Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0		
Propane MMBtu/yr savings note #N/A Energy Reference(s) & table(s) notes 0		#N/A
Energy Reference(s) & table(s) notes 0		
	measure life	15

	Novus Market Personsh and PLW Analytics (2004) Impact Evaluation of the Massachusette, Phada Island
moosure life source	Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
measure life source	and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
mooduum life note	Public Service Department for Efficiency Vermont, N
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.89
RRe source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRe note	#N/A
RR demand (RRd) summer peak	0.97
RRd summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.97
RRd winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.65
CF summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.49
CF winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.42
Spill-Over (participant) Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
100000000000000000000000000000000000000	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.27 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.20 /kWh

TRL Reference Number Fuel Sector	
	RI_0181
Sector	Electric
	C&I
Project Type	New Construction
Category	Lighting
Туре	Controls
Sub-type	Occupancy Sensor
Program Name	Commercial New Construction
Measure Name	Occupancy sensors
Measure Description	This measure promotes the installation of lighting controls in both lost-opportunity and retrofit applications. Promoted technologies include occupancy sensors and daylight dimming controls.
Baseline Description	The baseline efficiency case assumes no controls (retrofit) or code-compliant controls (new construction).
Savings Principle	The high efficiency case involves lighting fixtures connected to controls that reduce the pre-retrofit or baseline hours of operation.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed lighting controls project.
	Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)
	Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW) Where:
Savings Equation	where: QTY_i = Quantity in controlled fixtures in location i Watts_i = Connected wattage of controlled fixtures in location i Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations). Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented.
Hours	1,000 Watts per kW = Conversion factor deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved. deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved. The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	Calc ERS (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of
Gas Heat MMBtu/yr savings note	Massachusetts #N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings note	#N/A #N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	5 #N/A
Propane MMBtu/yr savings note	#N/A #N/A
i i opune iviividuu yi saviiigs note	0
	10
Energy Reference(s) & table(s) notes	10
	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
Energy Reference(s) & table(s) notes measure life	
Energy Reference(s) & table(s) notes measure life measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A 1.00

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.68
RRe source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRe note	#N/A
RR demand (RRd) summer peak	0.96
RRd summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.96
RRd winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.15
CF summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
CF winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.27 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.20 /kWh

TRL Reference Number	RI_0211
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Lighting
Туре	Interior
Sub-type	Efficient Lighting
Program Name	Commercial New Construction
Measure Name	Performance lighting
Measure Description	Advanced lighting design refers to the implementation of various lighting design principles aimed at creating a quality and appropriate lighting experience while reducing unnecessary light usage. This is often done by a professional in a new construction situation. Advanced lighting design uses techniques like maximizing task lighting and efficient fixtures to create a system of
Baseline Description	optimal energy efficiency and functionality. The baseline efficiency assumes compliance with lighting power density requirements as mandated by Rhode Island State Building Code. Energy efficiency must be met via compliance with the International Energy Conservation Code (IECC) 2012, as described in Appendix A Table 1 and Table 2.
Savings Principle	The high efficiency case assumes lighting systems with lighting power densities below those required by Rhode Island State Building Code. Installed lighting wattage should be determined using the installed fixture counts and wattages.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed lighting fixture project.
Savings Equation	Gross kWh = [SUM(LPD_base_i × Area_i × Hours_i) - SUM(QTY_ee_j × Watts_ee_j × Hours_j)] / (Watts per kW) Gross kW = [SUM(LPD_base_i × Area_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) Where: Area_i = Floor area of location i (SQFT) Hours_base_i = Total annual operating hours for baseline lighting equipment in location i QTY_ee_j = Quantity of efficient fixtures in location j Watts_ee_j = Connected wattage of efficient fixtures in location j Hours_j = Lighting annual hours of operation: site-specific. 1,000 Watts per kW = Conversion factor deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.

measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.07
RRe source	KEMA (2009). National Grid USA 2008 Custom Lighting Impact Evaluation, Final Report. Prepared for National Grid. KEMA (2009). // Sample Design and Impact Evaluation Analysis of the 2008 Custom Program. Prepared for National Grid; Table 19.
RRe note	#N/A
RR demand (RRd) summer peak	0.80
RRd summer peak source	KEMA (2009). National Grid USA 2008 Custom Lighting Impact Evaluation, Final Report. Prepared for National Grid. KEMA (2009). // Sample Design and Impact Evaluation Analysis of the 2008 Custom Program. Prepared for National Grid; Table 19.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.73
RRd winter peak source	KEMA (2009). National Grid USA 2008 Custom Lighting Impact Evaluation, Final Report. Prepared for National Grid. KEMA (2009). // Sample Design and Impact Evaluation Analysis of the 2008 Custom Program. Prepared for National Grid; Table 19.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.27 /kWh
	#N/A
Gross Measure TRC source	
Gross Measure TRC source Gross Measure TRC note	#N/A

TRL Reference Number	RI 0224
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Lighting Interior
Type	
Sub-type	Linear Fluorescent
Program Name	Commercial Retrofit
Measure Name	Upstream Fluorescents
Measure Description	The installation of efficient lighting discounted at the distribution level.
Baseline Description	The baseline case is a mix of fluorescent and halogen fixtures for LEDs and low efficiency fluorescents for
	high efficiency fluorescents.
Savings Principle	The high efficiency case is high efficiency LED or linear fluorescent lighting. Please refer to Table 6 in
	Appendix A for wattage details.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency lighting project.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	The annual hours of operation are application specific and can be seen in Table 6: Upstream Lighting.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Table 6
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Table 6
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A #N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A 0
Energy Reference(s) & table(s) notes measure life	Table 6
measure life source	
	#N/A
measure life note In-service rate (ISR)	Massachusetts Common Assumption 1.00
In-service rate source	#N/A
In-service rate note	Impact factor incorporated into other parameters
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	
RRe source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
RRe note	#N/A
RR demand (RRd) summer peak	
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.94
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program

RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.58
CF summer peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.56
CF winter peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.93
	DNV KEMA (2013), Process Evaluation of the 2012 Bright Opportunities Program, Final Report, June 14,
Net-to-Gross source	2013
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.37 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.18 /kWh

TRL Reference Number	RI 0222
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Lighting
Type	Interior
Sub-type	LED Screw Base
Program Name	Commercial Retrofit
Measure Name	Upstream LEDs
Measure Description	The installation of efficient lighting discounted at the distribution level.
Baseline Description	The baseline case is a mix of fluorescent and halogen fixtures for LEDs and low efficiency fluorescents for
	high efficiency fluorescents.
Savings Principle	The high efficiency case is high efficiency LED or linear fluorescent lighting. Please refer to Table 6 in
	Appendix A for wattage details.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency lighting project.
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
Savings Equation	Where:
	Qty = Total number of units.
	Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit.
Hours	The annual hours of operation are application specific and can be seen in Table 6: Upstream Lighting.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Table 6
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Table 6
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	Table 6
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	
In-service rate source	#N/A
In-service rate note	Impact factor incorporated into other parameters
Savings Persistence Factor (SPF)	
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	
RRe source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
RRe note	#N/A
RR demand (RRd) summer peak	0.87
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
RRd summer peak note	#N/A
RR demand (RRd) winter peak	
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program

RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.61
CF summer peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.58
CF winter peak source	DNV GL (2014) impact Evaluation of Rhode Island C&I Upstream Lighting Program
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.25
Spill-Over (non-participant)	0.00
Net-to-Gross	1.16
Net-to-Gross source	Note To File, Jeremy Newberger
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.37 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.18 /kWh

TRL Reference Number	RI_0415
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Motor
Туре	Custom
Sub-type	Motor
Program Name	Commercial New Construction
Measure Name	Custom Motor
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe) RRe source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
PRo poto	HNI/A
RRe note	#N/A

RR demand (RRd) summer peak	1.14
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.17
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.33
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.67
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.24 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI_0230
Fuel	Electric
Sector	C&I
Project Type	New Construction Motors/Drives
Category	Variable Speed Drive
Type Sub-type	Variable speed brive
Program Name	Commercial New Construction
Measure Name	Variable speed drives
Measure Description	This measure covers the installation of variable speed drives for multiple end uses and building types.
Baseline Description	The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.
Savings Principle	In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed variable speed drive on exisitng motor or with new NEMA premium efficiency motor.
Savings Equation	Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP Where: HP_motor = Total horsepower of controlled motor: site-specific. MotorEff = Motor efficiency: site-specific. deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type HP_motor = Total horsepower of controlled motor: site-specific. deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 #N/A
Oil MMBtu/yr savings source	#N/A #N/A
Propane MMBtu/yr savings	#N/A 0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISR)	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.94
RRe source	KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.19 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.14 /kWh

TRL Reference Number	RI_0232
Fuel	Electric
Sector	C&I
Project Type	New Construction Motors/Drives
Category	Variable Speed Drive
Type Sub-type	Variable Speed Drive
Program Name	Commercial New Construction
Measure Name	Variable speed drives w/motor
Measure Description	This measure covers the installation of variable speed drives for multiple end uses and building types.
Baseline Description	The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.
Savings Principle	In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed variable speed drive on exisitng motor or with new NEMA premium efficiency motor.
Savings Equation	Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP Where: HP_motor = Total horsepower of controlled motor: site-specific. MotorEff = Motor efficiency: site-specific. deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type HP_motor = Total horsepower of controlled motor: site-specific. deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 #N/A
Oil MMBtu/yr savings source	#N/A #N/A
Propane MMBtu/yr savings	#N/A 0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.94
RRe source	KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.19 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.14 /kWh

TRL Reference Number	RI 0380
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Other
Туре	Custom
Sub-type	Other
Program Name	Commercial New Construction
Measure Name	Custom Other
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
	Savings persistence is assumed to be 100%.
Savings Persistence Factor note	
	1.00
Savings Persistence Factor note Realization rate energy (RRe) RRe source	1.00 DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures

RR demand (RRd) summer peak	1.14
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.17
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.33
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.67
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.24 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

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TRL Reference Number	RI 0248
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Process
Туре	Custom
Sub-type	Process
Program Name	Commercial New Construction
Measure Name	Custom process
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00 #N/A
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

Realization rate energy (RRe)	0.93
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRe source	National Grid; Table 17.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRd summer peak source	National Grid; Table 17.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.04
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRd winter peak source	National Grid; Table 17.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.33
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.67
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.24 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI 0379
Fuel	Electric
	C&I
Sector	
Project Type	New Construction
Category	Refrigeration
Туре	Custom
Sub-type	Refrigeration
Program Name	Commercial New Construction
Measure Name	Custom Refrigeration
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe) RRe source	1.00 DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRe note	#N/A

RR demand (RRd) summer peak	1.14
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.17
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.33
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.67
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.24 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI 0276
Fuel	Electric
Sector	C&I
Project Type	New Construction
	Refrigeration
Category	
Type	Refrigeration Lighting
Sub-type	Refrigerator Case LED
Program Name	Commercial New Construction
Measure Name	LEDs for freezer/cooler cases
Measure Description	Installation of LED lighting in freezer and/or cooler cases. The LED lighting consumes less energy, and
Deceline Description	results in less waste heat which reduces the cooling/freezing load.
Baseline Description	The baseline efficiency case is the existing lighting fixtures in the cooler or freezer cases.
Savings Principle	The high efficiency case is the installation of LED lighting fixtures on the cooler or freezer cases, replacing
Energy Sovings calculation method	the existing lighting fixtures.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed lighting project.
	Gross kWh = [SUM(QTY_base × Watts_base × Hours_base) - SUM(QTY_ee × kW_ee × Hours_ee)] × (1 +
	EffRefrig × (Btu/hr per kW) / (Btu/hr per ton))
	Gross kW = Gross kWh / Hours_ee
	Where:
	QTY_base = Quantity of baseline lighting fixtures in cooler/freezer case
	Watts_base = Connected wattage of baseline lighting fixtures in cooler/freezer case
Savings Equation	Hours_base = Annual operating hours of baseline lighting fixtures in cooler/freezer case
	QTY_ee = Quantity of efficient lighting fixtures in cooler/freezer case
	Watts_ee = Connected wattage of efficient lighting fixtures in cooler/freezer case
	Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case
	1.9 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field
	experience.
	3413 Btu/hr per kW = Conversion factor
	12,000 Btu/hr per ton = Conversion factor
	Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case
Hours	The average annual operating hours are 8760 hours/year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	13
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.94
RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.01
RRd summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.01
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.14
Net-to-Gross	0.72
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.27 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.20 /kWh

TRL Reference Number	RI 0350
Fuel	Electric
Sector	C&I
Project Type	New Construction
Category	Whole Building
Туре	Custom
Sub-type	Whole Building
Program Name	Commercial New Construction
Measure Name	Comprehensive Design (CDA)
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	Calc
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A 0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
mozsura lifa nota	
measure life note In-service rate (ISR)	#N/A 1.00
In-service rate (ISR) In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	Participa becopretier in appartice to be 100%.

Realization rate energy (RRe)	1.20
Realization rate energy (RRe)	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRe source	Grid.
RRe note	#N/A
RR demand (RRd) summer peak	0.84
	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRd summer peak source	Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.50
RRd winter peak source	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
	Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.11
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.89
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.24 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh
	-γ ν.∠+ / KWII

TRL Reference Number	RI 0425
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	CHP
Туре	Custom
••	CHP
Sub-type	Commercial Retrofit
Program Name	
Measure Name	Custom CHP
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	Calc
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	HN1/A
	#N/A 1.00
In-service rate (ISR)	#N/A
In-service rate source In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Dersistance Easter (SDE)	1.00
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.95
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	1.00

RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.52 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.26 /kWh
	12 0.20 / KWII

TRL Reference Number	RI 0390
Fuel	Electric
Sector	C&I
Project Type	Retrofit
	Compressed Air
Category	•
Type	Custom
Sub-type	Compressed Air
Program Name	Commercial Retrofit
Measure Name	Custom Compressed Air
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	5 #N/A
Propane MMBtu/yr savings source	#N/A
	0
Energy Reference(s) & table(s) notes measure life	mult
measure life measure life source	mult Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	#N/A 1.00
In-service rate (ISR) In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Dersistonco Eastor (SDE)	1.00
Savings Persistence Factor (SPF)	1.00 #N/A
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe) RRe source	0.93 KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for National Grid; Table 17.
BBo noto	
RRe note	#N/A

RR demand (RRd) summer peak	1.00
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRd summer peak source	National Grid; Table 17.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.04
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRd winter peak source	National Grid; Table 17.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
·	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
Not to Cross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI 0111
	Electric
Fuel	C&I
Sector	
Project Type	Retrofit HVAC
Category	
Type	Custom HVAC
Sub-type	
Program Name Measure Name	Commercial Retrofit Custom HVAC
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life measure life source	mult Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00 #N/A
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Solvings Dessistance Factor (CDF)	
Savings Persistence Factor (SPF)	1.00 #N/A
Savings Persistence Factor source	#N/A Savings paggistance is assumed to be 100%
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

Realization rate energy (PRe)	1.10
Realization rate energy (RRe)	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRe source	Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.13
	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRd summer peak source	Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.66
RRd winter peak source	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak source	
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh
	2 0.27 / KWII

TRL Reference Number	RI 0074
Fuel	R_0074 Electric
Sector	C&I
	Retrofit
Project Type	HVAC
Category	Controls
Type	
Sub-type	Energy Management System Commercial Retrofit
Program Name Measure Name	
	Energy management system The measure is the installation of a new building energy management system (EMS) or the expansion of
Measure Description	an existing energy management system for control of non-lighting electric and gas end-uses in an existing
Measure Description	building on existing equipment.
Baseline Description	The baseline case is the existing equipment and systems without the implemented controls.
	The high efficiency case is the installation of a new EMS or the expansion of an existing EMS to control
Savings Principle	additional non-lighting electric and/or gas equipment. The EMS must be installed in an existing building on
Javings i mapie	existing equipment.
Energy Savings calculation method	Custom
Savings unit	Upgrade to existing energy management system.
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
	Gross MMBtu Gas = Gross kWh × deltaMMBtu Gas/kWh
Savings Equation	Gross MMBtu Oil = Gross kWh × deltaMMBtu_Oil/kWh
	deltaMMBtu_Gas/kWh = Deemed average natural gas impact per gross electric energy impact
	deltaMMBtu_Oil/kWh = Deemed average heating oil impact per gross electric energy impact
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Impact Evaluation of the 2012-2013 Boiler Reset Control Pilot Program. Prepared for the Electric and Gas Energy Efficiency Program Administrators of Massachusetts.
Cas Hast MMADtu (un servinge note	451/6
Gas Heat MMBtu/yr savings note	#N/A Calc
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A 0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life measure life source	10 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.04
incurration rate energy (NNC)	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 3,
RRe source	Energy Management Control Systems. Prepared for NE Power Service Co.

RRe note	#N/A
RR demand (RRd) summer peak	1.03
	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 3,
RRd summer peak source	Energy Management Control Systems. Prepared for NE Power Service Co.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.03
	The Fleming Group (1994). Persistence of Commercial/Industrial Non-Lighting Measures, Volume 3,
RRd winter peak source	Energy Management Control Systems. Prepared for NE Power Service Co.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI_0075
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Occupancy Sensor
Program Name	Commercial Retrofit
Measure Name	Hotel occupancy sensor
Measure Description	The measure is to the installation of hotel occupancy sensors (HOS) to control packaged terminal AC units (PTACs) with electric heat, heat pump units and/or fan coil units in hotels that operate all 12 months of
	the year.
Baseline Description	The baseline efficiency case assumes the equipment has no occupancy based controls.
Savings Principle	The high efficiency case is the installation of controls that include (a) occupancy sensors, (b) window/door switches for rooms that have operable window or patio doors, and (c) set back to 65 degrees Fahrenheit in the heating mode and set forward to 78 F in the cooling mode when occupancy detector is in the unoccupied mode. Sensors controlled by a front desk system are not eligible.
Energy Savings calculation method	Deemed
Savings unit	Installed hotel occupancy sensor.
	Gross kWh = Qty × deltakWh Gross kW = Qty × deltakW Where:
Savings Equation	Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit. Delta kW = Deemed average kW reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	438
kWh/yr savings source	National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.
kWh/yr savings note	#N/A
kW reduction	0.09
kW reduction source	National Grid and NSTAR (2010). Energy Analysis: Hotel Guest Occupancy Sensors.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	
	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

RRd summer peak note       #N/A         RRd summer peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.30         CF summer peak source       #N/A         C5 summer peak source       #N/A         C6 winter peak source       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak source       #N/A         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (parcipant)       0.07		
RRd summer peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.30         CF summer peak note       Coincidence factor (CF) summer peak         Coincidence factor (CF) winter peak       0.70         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (partic	RR demand (RRd) summer peak	1.00
RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.30         CF summer peak source       #N/A         CF summer peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         CF winter peak source       #N/A         CF winter peak source       #N/A         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A <td< td=""><td></td><td>#N/A</td></td<>		#N/A
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.30         CF summer peak source       #N/A         CF summer peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pre-Ridership       0.28         Spill-Over (participant)       0.00	RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.30         CF summer peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factors are custom calculated based on project-specific detail.       0.00         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Mater / Sewer savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         One time \$ savings       0.00         One time \$ savings note       #N/A         One time \$ savings onte       #N/A         One time \$ savings note       #N/A         Fore-Ridership       0.28         Spill-Over (participant)       0.07         Spill-Over (non-participant)       0.00	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak0.30CF summer peak source#N/ACF summer peak noteCoincidence factors are custom calculated based on project-specific detail.Coincidence factor (CF) winter peak0.70CF winter peak source#N/ACF winter peak source#N/ACF winter peak noteCoincidence factors are custom calculated based on project-specific detail.Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings Source#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/ACone time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00	RRd winter peak source	#N/A
CF summer peak source       #N/A         CF summer peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak source       #N/A         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.07         Spill-Over (non-participant)       0.00	RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
CF summer peak note       Coincidence factors are custom calculated based on project-specific detail.         Coincidence factor (CF) winter peak       0.70         CF winter peak source       #N/A         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.07         Spill-Over (non-participant)       0.00	Coincidence factor (CF) summer peak	0.30
Coincidence factor (CF) winter peak0.70CF winter peak source#N/ACF winter peak noteCoincidence factors are custom calculated based on project-specific detail.Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00	CF summer peak source	#N/A
CF winter peak source       #N/A         CF winter peak note       Coincidence factors are custom calculated based on project-specific detail.         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A	CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
CF winter peak noteCoincidence factors are custom calculated based on project-specific detail.Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.00	Coincidence factor (CF) winter peak	0.70
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.07Spill-Over (non-participant)0.00	CF winter peak source	#N/A
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00	CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/APree-Ridership0.28Spill-Over (participant)0.00	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/APree-Ridership0.28Spill-Over (participant)0.00Spill-Over (non-participant)0.00	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Water / Sewer savings Source	#N/A
Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Annual \$ savings	0.00
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Annual \$ savings source / description	#N/A
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.28Spill-Over (participant)0.07Spill-Over (non-participant)0.00	One time \$ savings	0.00
Free-Ridership     0.28       Spill-Over (participant)     0.07       Spill-Over (non-participant)     0.00		#N/A
Spill-Over (participant)0.07Spill-Over (non-participant)0.00	One time \$ savings note	#N/A
Spill-Over (non-participant) 0.00	Free-Ridership	0.28
	Spill-Over (participant)	0.07
Net-to-Gross 0.79	Spill-Over (non-participant)	0.00
0.75	Net-to-Gross	0.79
Net-to-Gross source TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014	Net-to-Gross source	
Net-to-Gross note #N/A	Net-to-Gross note	#N/A
Gross Measure TRC unit \$ 0.64 /kWh	Gross Measure TRC unit	\$ 0.64 /kWh
Gross Measure TRC source #N/A	Gross Measure TRC source	#N/A
Gross Measure TRC note #N/A	Gross Measure TRC note	#N/A
Incentive Unit \$ 0.32 /kWh	Incentive Unit	\$ 0.32 /kWh

TRL Reference Number	RI 0185
Fuel	Electric
Sector	
Project Type	Retrofit
Category	Lighting
Туре	Custom
Sub-type	Lighting
Program Name	Commercial Retrofit
Measure Name	Custom lighting
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	National Grid assumption based on regional PA working groups. Assumptions based on historical steam trap surveys. Steam losses in lbs/hr are found using "Boiler Efficiency Institute (1987). Steam Efficiency Improvement; Page 34, Table 4.1 under Steam Leak
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
	1.00

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.92
RRe source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.11
RRd summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.79
RRd winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Custom Lighting Installations. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

	DL 0200
TRL Reference Number	RI_0209
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Lighting
Туре	Interior
Sub-type	Efficient Lighting
Program Name	Commercial Retrofit
Measure Name	Lighting systems
Measure Description	This measure promotes the installation of efficient lighting including, but not limited to, efficient fluorescent lamps, ballasts, and fixtures, solid state lighting, and efficient high intensity discharge (HID) lamps, ballasts, and fixtures.
Baseline Description	For retrofit installations, the baseline efficiency case is project-specific and is determined using actual fixture types and counts from the existing space. Existing fixture wattages are provided in the Table 4 of Appendix A. For lost opportunity installations, the baseline case is based on comparable code-compliant installations and standard practices.
Savings Principle	For both new construction and retrofit installations, the high efficiency case is project-specific and is determined using actual fixture counts for the project and wattages found in Tables 3 and 5 in Appendix A.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed high-efficiency lighting project.
Savings Equation	Gross kWh = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) × Hours Gross kW = [SUM(QTY_base_i × Watts_base_i) - SUM(QTY_ee_j × Watts_ee_j)] / (Watts per kW) Where: QTY_base_i = Quantity of baseline fixtures in location i Watts_base_i = Connected wattage of baseline fixtures in location i QTY_ee_j = Quantity of efficient fixtures in location j Watts_ee_j = Connected wattage of efficient fixtures in location j 1,000 Watts per kW = Conversion factor Hours = Lighting annual hours of operation: site-specific. deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved. deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
	16

News Market Descendent of DIM Architics (2004) June of Further of the Marco shurette. Dhe de Jalend
Nexus Market Research and RLW Analytics (2004). Impact Evaluation of the Massachusetts, Rhode Island,
and Vermont 2003 Residential Lighting Programs. Submitted to The Cape Light Compact, State of Vermont
Public Service Department for Efficiency Vermont, N
#N/A 1.00
#N/A
All installations have 100% in-service rate since programs include verification of equipment installations.
1.00
#N/A
Savings persistence is assumed to be 100%.
0.89
KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
#N/A
0.97
KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
#N/A
0.97
KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
#N/A
0.65
KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
#N/A
0.49
KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.28
0.07
0.00
0.79
TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
#N/A
IS U 464 /KW/D
\$ 0.464 /kWh #N/A
\$ 0.464 /kWn #N/A #N/A

TRL Reference Number	RI_0182
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Lighting
Туре	Controls
Sub-type	Occupancy Sensor
Program Name	Commercial Retrofit
Measure Name	Occupancy sensors
Measure Description	This measure promotes the installation of lighting controls in both lost-opportunity and retrofit applications. Promoted technologies include occupancy sensors and daylight dimming controls.
Baseline Description	The baseline efficiency case assumes no controls (retrofit) or code-compliant controls (new construction).
Savings Principle	The high efficiency case involves lighting fixtures connected to controls that reduce the pre-retrofit or baseline hours of operation.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed lighting controls project.
	Gross kWh = SUM[QTY_i × Watts_i × (Hours_base_i - Hours_ee_i)] / (Watts per kW)
	Gross kW = SUM(QTY_i × Watts_i) / (Watts per kW) Where:
Savings Equation	QTY_i = Quantity in controlled fixtures in location i Watts_i = Connected wattage of controlled fixtures in location i Hours_base_i = Total annual hours that the connected lighting in location i operated without controls (for retrofit installations) or would have operated with code-compliance controls (for new construction installations). Hours_ee_i = Total annual hours that the connected lighting in location i operates with the lighting controls implemented. 1,000 Watts per kW = Conversion factor deltaMMBtu_Gas/kWh = Gross natural gas MMBtu reduction per gross kWh saved. deltaMMBtu_Oil/kWh = Gross heating oil MMBtu reduction per gross kWh saved.
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
	1 •

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.68
RRe source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRe note	#N/A
RR demand (RRd) summer peak	0.96
RRd summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.96
RRd winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.15
CF summer peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.18
CF winter peak source	KEMA (2013). Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
	0.28
	0.07
	0.00
Net-to-Gross	0.79
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	
	#N/A
	,
One time \$ savings One time \$ savings source/description One time \$ savings note Free-Ridership Spill-Over (participant) Spill-Over (non-participant) Net-to-Gross Net-to-Gross source Net-to-Gross note	<pre>#N/A #N/A 0.28 0.07 0.00 0.79 TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014 #N/A \$ 0.464 /kWh #N/A</pre>

TRL Reference Number	RI 0392
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Motor
Туре	Custom
Sub-type	Motor
Program Name	Commercial Retrofit
Measure Name	Custom Motor
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	11.00
Realization rate energy (RRe)	1.00 DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures

RR demand (RRd) summer peak	1.14
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.17
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	
	RI_0231
Fuel	Electric C&I
Sector	Retrofit
Project Type Category	Motors/Drives
Туре	Variable Speed Drive
Sub-type	Variable Speed Drive
Program Name	Commercial Retrofit
Measure Name	Variable speed drives
Measure Description	This measure covers the installation of variable speed drives for multiple end uses and building types.
Baseline Description	The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.
Savings Principle	In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed variable speed drive on exisitng motor or with new NEMA premium efficiency motor.
Savings Equation	Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP Where: HP_motor = Total horsepower of controlled motor: site-specific. MotorEff = Motor efficiency: site-specific. deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type HP_motor = Total horsepower of controlled motor: site-specific. deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A #N/A
	#N/A 0
Energy Reference(s) & table(s) notes	13
	13 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
Energy Reference(s) & table(s) notes measure life measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
Energy Reference(s) & table(s) notes measure life	

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.94
RRe source	KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.60 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.30 /kWh

TRL Reference Number	RI_0233
Fuel	Electric C&I
Sector	Retrofit
Project Type Category	Motors/Drives
Туре	Variable Speed Drive
Sub-type	VSD with Motor
Program Name	Commercial Retrofit
Measure Name	Variable speed drives w/motor
Measure Description	This measure covers the installation of variable speed drives for multiple end uses and building types.
Baseline Description	The baseline efficiency case for this measure varies with the equipment type. All baselines assume either a constant speed motor or 2-speed motor. In the baselines, air or water volume/temperature is controlled using valves, dampers, and/or reheats.
Savings Principle	In the high efficiency case, pump flow or fan air volume is directly controlled using downstream information. The pump or fan will automatically adjust its speed based on inputted set points and the downstream feedback it receives.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed variable speed drive on exisitng motor or with new NEMA premium efficiency motor.
Savings Equation	Gross kWh = HP_motor × 1/MotorEff × deltakWh/HP Gross Summer kW = HP_motor × 1/MotorEff × deltakW_SP/HP Gross Winter kW = HP_motor × 1/MotorEff × deltakW_WP/HP Where: HP_motor = Total horsepower of controlled motor: site-specific. MotorEff = Motor efficiency: site-specific. deltakWh/HP = Average annual kWh reduction per horsepower based on building and equipment type HP_motor = Total horsepower of controlled motor: site-specific. deltakW_SP/HP = Average summer peak reduction per horsepower based on building and equipment type deltakW_WP/HP = Average winter peak reduction per horsepower based on building and equipment type
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0 13
measure life measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	#N/A 1.00
In-service rate (ISK)	#N/A
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In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.94
RRe source	KEMA, Inc. and DMI, Inc. (2013). 2011-2012 Massachusetts Prescriptive VSD Impact Evaluation. Prepared for the Massahusetts Program Administrators and the Massachusetts Energy Efficiency Advisory Council
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	The MA evaluation did not provide realization rates within sufficient precision so the they are assumed to be 100%, pending a future study by NEEP
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.60 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.30 /kWh

TRL Reference Number	RI 0393
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Other
Туре	Custom
Sub-type	Other
Program Name	Commercial Retrofit
Measure Name	Custom Other
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	1.00
Realization rate energy (RRe)	1.00 DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures

RR demand (RRd) summer peak	1.14
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.17
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

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TRL Reference Number	RI 0249
Fuel	Electric
Sector	C&I
	Retrofit
Project Type	Process
Category Type	Custom
Sub-type	Process
	Commercial Retrofit
Program Name Measure Name	Custom process
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
	1.00 #N/A
In-service rate (ISR)	
In-service rate (ISR) In-service rate source	#N/A
In-service rate (ISR) In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.

Realization rate energy (RRe)	0.93
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRe source	National Grid; Table 17.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRd summer peak source	National Grid; Table 17.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.04
	KEMA (2010). Sample Design and Impact Evaluation Analysis of 2009 Custom Program. Prepared for
RRd winter peak source	National Grid; Table 17.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
· ·	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
· · · ·	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI_0270
Fuel	Electric
Sector	
Project Type	Retrofit
Category	Refrigeration
Туре	Motors
Sub-type	ECM
Program Name	Commercial Retrofit
Measure Name	Case ECMs
Measure Description	Installation of various sizes of electronically commutated motors (ECMs) in walk-in coolers and freezers to
	replace existing evaporator fan motors.
Baseline Description	The baseline efficiency case is an existing case motor.
Savings Principle	The high efficiency case is the replacement of an existing case with an ECM.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed electronically commutated motor for evaporator fans in existing cooler/freezer.
	Gross kWh = kW_motor × LRF × Hours × (1 + RefrigEff × (Btu/hr per kW) / (Btu/hr per ton)) Gross kW = Gross kWh / Hours Where:
Savings Equation	kW_motor = Metered load of existing case motor: site-specific LRF = Load reduction factor: 53% when shaded pole motors are replaced, 29% when PSC motors are replaced Hours = Average runtime of case motors; Estimate based on NRM field experience. RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field experience. 3413 Btu/hr per kW = Conversion factor 12,000 Btu/hr per ton = Conversion factor
Hours	Hours are the annual operating hours of the case motors.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
r i opane iviividiu/ yi saviiigs note	
Energy Reference(s) & table(s) notes	0
Energy Reference(s) & table(s) notes	0
Energy Reference(s) & table(s) notes measure life measure life source	0 15
Energy Reference(s) & table(s) notes measure life measure life source measure life note	0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR)	0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A
Energy Reference(s) & table(s) notes measure life	0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A 1.00
Energy Reference(s) & table(s) notes measure life measure life source measure life note In-service rate (ISR) In-service rate source	0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities. #N/A 1.00 #N/A

Souings Dersistance Factor note	Sovings parsistance is assumed to be 100%
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	
RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
	Grid.
RRe note	#N/A
RR demand (RRd) summer peak	
RRd summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
	Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
	Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.87
CF summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
	Grid.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.51
CF winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
	Grid.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A #N/A
Incentive Unit	\$ 0.147 /kWh
	> 0.147 / KWII

TRL Reference Number	RI_0287
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Temp Maintain
Sub-type	Night Cover
Program Name	Commercial Retrofit
Measure Name	Cooler night cover
	Installation of retractable aluminum woven fabric covers for open-type refrigerated display cases, where
Measure Description	the covers are deployed during the facility unoccupied hours in order to reduce refrigeration energy
	consumption.
Baseline Description	The baseline efficiency case is the annual operation of open-display cooler cases.
Cautings Dringinla	The high efficiency case is the use of night covers to protect the exposed area of display cooler cases
Savings Principle	during unoccupied hours.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Linear feet of installed night covers on existing cooler cases.
6	Gross kWh = Width × deltakW/feet × Hours
	Gross kW = Width × deltakW/feet
	Where:
Savings Equation	
	Width = Width in feet of the opening that the night covers protect: site-specific
	deltakW/feet = Savings factor based on the temperature of the case
	Hours = Annual hours that the night covers are in use: site-specific
Hours	Hours represent the number of annual hours that the night covers are in use, and should be determined
	on a case-by-case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

	-
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.147 /kWh

	DL 0004
TRL Reference Number	RI_0391
Fuel	Electric
Sector	
Project Type	Retrofit
Category	Refrigeration
Туре	Custom
Sub-type	Refrigeration
Program Name	Commercial Retrofit
Measure Name	Custom Refrigeration
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	Defined per project.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe) RRe source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
PRo poto	HNI/A
RRe note	#N/A

RR demand (RRd) summer peak	1.14
RRd summer peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.17
RRd winter peak source	DNV GL (2014) impact Evaluation of Rhode Island Custom Refrigeration, Motor, and Other Measures
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based on project-specific information. The actual or measured coincidence factors are included in the summer and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh

TRL Reference Number	RI 0252
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Controls
Sub-type	Defrost Control
Program Name	Commercial Retrofit
Measure Name	Defrost control
Measure Description	A control mechanism to skip defrost cycles when defrost is unnecessary.
	The baseline efficiency case is an evaporator fan electric defrost system that uses a time clock mechanism
Baseline Description	to initiate defrost.
Cavingo Drinoinla	
Savings Principle	The high efficiency case is an evaporator fan defrost system with electric defrost controls.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed defrost controls in existing cooler/freezer.
	Gross kWh = kW_Defrost × DRF × Hours × (1 + RefrigEff × (Btu/hr per kW) / (Btu/hr per ton))
	Gross kW = Gross kWh / Hours
	Where:
Savings Equation	kW_Defrost = Load of electric defrost: site-specific
J- 1	DRF = Defrost reduction factor- percent reduction in defrosts required per year: 35%
	Hours = Number of hours defrost occurs over a year without the defrost controls
	1.6 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field
	experience.
	3413 Btu/hr per kW = Conversion factor
	12 kBtu/hr per ton = Conversion factor
	The number of defrost cycles is estimated to decrease by 35% from an average number of defrost cycles
Hours	of 1460 defrosts/year at 40 minutes each for a total of 973 hours/year. The number of defrost cycles with
	the defrost controls is 949 cycles/year, or 633
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Dersistance Easter (SDE)	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A

RRe note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	Coincidence factors set to 1.00 since gross kW is the average kW reduction during operation.
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	Coincidence factors set to 1.00 since gross kW is the average kW reduction during operation.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.147 /kWh
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TRL Reference Number	RI 0253
Fuel	Electric
Sector	C&I
Project Type	Retrofit
, ,,	Refrigeration
Category Type	Controls
Sub-type	Door Heater Control
Program Name	Commercial Retrofit
Measure Name	Door heater control
	The Installation of controls to reduce the run time of door and frame heaters for freezers and walk-in or
Measure Description	reach-in coolers. The reduced heating results in a reduced cooling load.
	The baseline efficiency case is a cooler or freezer door heater that operates 8,760 hours per year without
Baseline Description	any controls.
Savings Principle	The high efficiency case is a cooler or freezer door heater connected to a heater control system, which controls the door heaters by measuring the ambient humidity and temperature of the store, calculating the dew point, and using pulse width modulation (PWM) to control the anti-sweat heater based on specific algorithms for freezer and cooler doors. Door temperature is typically maintained about 5 degrees Fahrenheit above the store air dew point temperature with the heaters operating at 80% (adjustable).
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed door heater controls on existing cooler/freezer.
	Gross kWh = kW_DoorHeater × %OFF × Hours Gross kW = kW_DoorHeater × %OFF Where:
Savings Equation	Where: kW_DoorHeater = Total demand of the door heater, calculated as Volts * Amps / 1000: site-specific %OFF = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters Hours = Door heater annual run hours before controls
Hours	Pre-retrofit hours are 8,760 hours per year. After controls are installed, the door heaters in freezers are on for an average 4,730.4 hours/year (46% off time) and the door heaters for coolers are on for an average 2,277.6 hours/year (74% off time).
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed 100% because savings are based on researched assumptions.
Coincidence factor (CF) summer peak	0.50
CF summer peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.147 /kWh

TRL Reference Number	RI_0272
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Motors
Sub-type	ECM
Program Name	Commercial Retrofit
Measure Name	ECM Evaporator fan Motors for Walk-in coolers
Measure Description	Installation of electronically commutated motors (ECMs) in multi-deck and freestanding coolers and freezers, typically on the retail floor of convenience stores, liquor stores, and grocery stores.
Baseline Description	The baseline efficiency case is the existing case motor.
Savings Principle	The high efficiency case is the replacement of the existing case motor with an ECM.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed electronically commutated motor for evaporator fans in existing cooler/freezer.
	Gross kWh = kW_Fan × LRF × Hours × (1 + RefrigEff × (Btu/hr per kW) / (Btu/hr per ton))
	Gross kW = Gross kWh / Hours Where:
Savings Equation	kW_Fan = Power demand of evaporator fan calculated from equipment nameplate data and estimated 0.55 power factor/adjustment
	LRF = Load reduction factor for motor replacement
	Hours = Annual fan operating hours: site-specific
	1.6 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field
	experience.
	3413 Btu/hr per kW = Conversion factor
	12,000 Btu/hr per ton = Conversion factor
	The annual operating hours are assumed to be 8,760 * (1-%OFF), where %OFF = 0 if the facility does not
Hours	have evaporator fan controls or %OFF > 0 if the facility has evaporator fan controls. See section:
	Refrigeration – Evaporator Fan Controls for %OFF valu
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	
	#N/A
Propane MMBtu/yr savings	#N/A 0
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	0 #N/A
Propane MMBtu/yr savings Propane MMBtu/yr savings source	0 #N/A #N/A
Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	0 #N/A #N/A 0
Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life	0 #N/A #N/A 0 15
Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes measure life measure life source	0 #N/A #N/A 0 15 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
	Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RPd winter neak noto	#N/A
RRd winter peak note Coincidence factor (CF) summer peak	0.87
CF summer peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.51
CF winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.147 /kWh
	IY 0.2 /

TRL Reference Number	RI_0256
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Controls
Sub-type	Fan Control
Program Name	Commercial Retrofit
Measure Name	Evaporator fan control
Measure Description	Installation of controls to modulate the evaporator fans based on temperature control. Energy savings include: fan energy savings from reduced fan operating hours, refrigeration energy savings from reduced waste heat, and compressor energy savings resulting from the electronic temperature control. Electronic controls allow less fluctuation in temperature, thereby creating savings.
Baseline Description	The baseline efficiency case assumes evaporator fans that run 8760 annual hours with no temperature control.
Savings Principle	The high efficiency case is the use of an energy management system to control evaporator fan operation based on temperature.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed controls on evaporator fans in existing cooler/freezer.
	Gross kWh = kW_Fan × %OFF × (Hours per year) × (1 + RefrigEff × (Btu/hr per kW) / (Btu/hr per ton)) + [kW_cp × Hours_cp + kW_fan × (Hours per year) × (1-%OFF)] × %SAVE Gross kW = Gross kWh / Hours Where:
Savings Equation	<ul> <li>kW_Fan = Power demand of evaporator fan calculated from equipment nameplate data and estimated 0.55 power factor/adjustment</li> <li>%OFF_heater = Door heater Off time: 46% for freezer door heaters or 74% for cooler door heaters 8760 Hours per year = Conversion factor</li> <li>1.6 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field experience.</li> <li>3,413 Btu/hr per kW = Conversion factor</li> <li>12 kBtu/hr per ton = Conversion factor</li> <li>kW_cp = Total power demand of compressor motor and condenser fan calculated from equipment nameplate data and estimated 0.85 power factor</li> <li>Hours_cp = Equivalent annual full load hours of compressor operation; Estimate based on NRM field experience.</li> <li>%OFF_evap = Percent of annual hours that the evaporator is turned off; Estimate based on NRM field experience.</li> <li>%SAVE = Reduced run-time of compressor and evaporator due to electronic controls; Estimate based on NRM field experience.</li> </ul>
Hours	The average annual operating hours are 4072 hours/year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source kW reduction note	<ul> <li>#N/A</li> <li>Algorith Inputs are based field experience and evaluation from National Resource Management.</li> <li>Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.</li> </ul>
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	#N/A 0
Oil MMBtu/yr savings source	#N/A

Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.58
RRe source	HEC, Inc. (1996). Analysis of Savings from Walk-In Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSCo.
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	HEC, Inc. (1996). Analysis of Savings from Walk-In Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSCo.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.00
RRd winter peak source	HEC, Inc. (1996). Analysis of Savings from Walk-In Cooler Air Economizers and Evaporator Fan Controls. Prepared for NEPSCo.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.23
	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10
CF summer peak source	Sites in MA. Prepared for NEPSCo; Table 9.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.84
CF winter peak source	HEC, Inc. (1995). Analysis of Door Master Walk-In Cooler Anti-Sweat Door Heater Controls Installed at 10 Sites in MA. Prepared for NEPSCo; Table 9.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.147 /kWh
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TRL Reference Number	RI_0260
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Controls
Sub-type	Vending Miser
Program Name	Commercial Retrofit
Measure Name	Glass front refrigerated coolers
Measure Description	Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR <sup>®</sup> qualified vending machines, as they already have built-in controls.
Baseline Description	The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.
Savings Principle	The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.
Energy Savings calculation method	Deemed
Savings unit	Installed vending miser.
Savings Equation	Gross kWh = Qty × deltakWh Gross kW = Qty × deltakW Where:
	Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit. Delta kW = Deemed average kW reduction per unit.
Hours	It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	1208
kWh/yr savings source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kWh/yr savings note	#N/A
kW reduction	0.138
kW reduction source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	4N/A 0
measure life	5
measure life measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

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Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC source Gross Measure TRC note	#N/A #N/A

TRL Reference Number	RI 0277
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Refrigeration Lighting
Sub-type	Refrigerator Case LED
Program Name	Commercial Retrofit
Measure Name	LEDs for freezer/cooler cases
ivieasure ivallie	Installation of LED lighting in freezer and/or cooler cases. The LED lighting consumes less energy, and
Measure Description	results in less waste heat which reduces the cooling/freezing load.
Baseline Description	The baseline efficiency case is the existing lighting fixtures in the cooler or freezer cases.
	The high efficiency case is the installation of LED lighting fixtures on the cooler or freezer cases, replacing
Savings Principle	the existing lighting fixtures.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed lighting project.
Savings unit	Gross kWh = [SUM(QTY_base × Watts_base × Hours_base) - SUM(QTY_ee × kW_ee × Hours_ee)] × (1 +
	EffRefrig × (Btu/hr per kW) / (Btu/hr per ton))
	Gross kW = Gross kWh / Hours_ee
	Gloss kw – Gloss kwil/ Houls_ee
	W/h area
	Where:
	QTY_base = Quantity of baseline lighting fixtures in cooler/freezer case
	Watts_base = Connected wattage of baseline lighting fixtures in cooler/freezer case
Savings Equation	Hours_base = Annual operating hours of baseline lighting fixtures in cooler/freezer case
	QTY_ee = Quantity of efficient lighting fixtures in cooler/freezer case
	Watts_ee = Connected wattage of efficient lighting fixtures in cooler/freezer case
	Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case
	1.9 RefrigEff = Efficiency of typical refrigeration system (kW/ton); Estimate based on NRM field
	experience.
	3413 Btu/hr per kW = Conversion factor
	12,000 Btu/hr per ton = Conversion factor
	Hours_ee = Annual operating hours of efficient lighting fixtures in cooler/freezer case
Hours	The average annual operating hours are 8760 hours/year.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	13
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00

Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.94
RRe source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	1.01
	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National
RRd summer peak source	Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	1.01
RRd winter peak source	RLW Analytics (2007). Small Business Services Custom Measure Impact Evaluation. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	1.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Coincidence factor (CF) winter peak	1.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are assumed to be 1.0 since exit signs are on 8,760 hours a year
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
Net-to-Gross source	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study. September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.464 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.232 /kWh

TRL Reference Number	RI_0258
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Controls
Sub-type	Novelty Cooler Control
Program Name	Commercial Retrofit
Measure Name	Novelty cooler shutoff
Measure Description	Installation of controls to shut off a facility's novelty coolers for non-perishable goods based on pre- programmed store hours. Energy savings occur as coolers cycle off during facility unoccupied hours.
Baseline Description	The baseline efficiency case is the novelty coolers operating 8,760 hours per year.
Savings Principle	The high efficiency case is the novelty coolers operating fewer than 8,760 hours per year since they are controlled to cycle each night based on pre-programmed facility unoccupied hours.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Installed controls on existing cooler/freezer.
	Gross kWh = kW_nc × DC_nc × HoursOff
	Gross kW = 0 Where:
Savings Equation	kW_nc = Power demand of novelty cooler calculated from equipment nameplate data and estimated 0.85 power factor.
	DC_nc = Weighted average annual duty cycle; Estimate based on NRM field experience. HoursOff = Potential hours off every night per year, estimated as one less than the number of hours the store is closed per day: site-specific.
Hours	Energy and demand savings are based on the reduced operation hours of the cooler equipment. Hours reduced per day are estimated on a case-by-case basis, and are typically calculated as one less than the number of hours per day that the facility is closed
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	Algorith Inputs are based field experience and evaluation from National Resource Management. Supported by Select Energy (2004). Cooler Control Measure Impact Spreadsheet User's Manual. Prepared for NSTAR.
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	10
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.

Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence Factor note         Savings Persistence Factor note       Savings persistence Factor note         Realization rate energy (RRe)       1.00         RR enote       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         RR demand (RRd) summer peak       1.00         RR demand (RRd) summer peak       1.00         RR dsummer peak source       #N/A         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak       0.00         RR demand (RRd) winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Cincidence factor (CF) summer peak source       #N/A         RR dwinter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.00         CF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours	
Savings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteRealization rate is assumed to be 100% since evaluation adjusts deemed savings valueRR demand (RRd) summer peak1.00RRd summer peak source#N/ARRd summer peak noteRealization rate is assumed to be 100% since evaluation adjusts deemed savings valueRR demand (RRd) winter peak1.00RRd winter peak noteRealization rate is assumed to be 100% since evaluation adjusts deemed savings valueRR demand (RRd) winter peak1.00RRd winter peak noteRealization rate is assumed to be 100% since evaluation adjusts deemed savings valueCoincidence factor (CF) summer peak0.00CF summer peak noteRealization rate is assumed to be 100% since evaluation adjusts deemed savings valueCoincidence factor (CF) winter peak0.00CF summer peak source#N/ACF summer peak noteCoincidence Factors are set to zero since demand savings typically occur during off-peak hoursCoincidence factor (CF) winter peak0.00CF winter peak noteCoincidence Factors are set to zero since demand savings typically occur during off-peak hoursWater savings: gallons/yr0.00Water / Sewer savings Source#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One ti	
Realization rate energy (RRe)       1.00         RRe source       #W/A         RRe note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         RR demand (RRd) summer peak       1.00         RRd summer peak source       #N/A         RRd full       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         RR demand (RRd) winter peak       1.00         RRd winter peak source       #W/A         Criscidence factor (CF) summer peak       0.00         CF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence Factors are set to zero since demand savings typically occur during off-peak hours       Water savings: gallons/yr         Vater savings: gallons/yr       0.00       0.00         Sewer savings is gallo	
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RRe note         Realization rate is assumed to be 100% since evaluation adjusts deemed savings value           RR demand (RRd) summer peak source         #N/A           RRd summer peak source         #N/A           RR demand (RRd) winter peak         1.00           RR demand (RRd) winter peak note         Realization rate is assumed to be 100% since evaluation adjusts deemed savings value           RR demand (RRd) winter peak note         Realization rate is assumed to be 100% since evaluation adjusts deemed savings value           RRd winter peak source         #N/A           RRd winter peak note         Realization rate is assumed to be 100% since evaluation adjusts deemed savings value           Coincidence factor (CF) summer peak         0.00           CF summer peak note         Coincidence Factors are set to zero since demand savings typically occur during off-peak hours           Coincidence factor (CF) winter peak         0.00           CF winter peak note         Coincidence Factors are set to zero since demand savings typically occur during off-peak hours           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water / Sewer savings Source         #N/A           Manual \$ savings note         #N/A           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           Annual \$ saving	
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RRd winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         CF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings       0.00	
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CF winter peak source#N/ACF winter peak noteCoincidence Factors are set to zero since demand savings typically occur during off-peak hoursWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/A	s
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Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A	
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/A	s
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/A	
Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A	
Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A	
Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A	
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A	
One time \$ savings     0.00       One time \$ savings source/description     #N/A	
One time \$ savings     0.00       One time \$ savings source/description     #N/A	
One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.28	
Spill-Over (participant) 0.07	
Spill-Over (non-participant) 0.00	
Net-to-Gross 0.79	
TetraTech (2014) 2013 Commercial and Industrial Programs Free-ridershin and Snillover Study	ly.
Net-to-Gross source September, 2014	,
Net-to-Gross note #N/A	
Gross Measure TRC unit \$ 0.294 /kWh	
Gross Measure TRC source #N/A	
Gross Measure TRC note #N/A	
Incentive Unit \$ 0.147 /kWh	

Fuel       Electric         Sector       C&I         Project Type       Retrofit         Category       Refrigeration         Type       Controls         Sub-type       Vending Miser         Program Name       Commercial Retrofit         Measure Name       Refrigerated beverage vending machine         Measure Description       Refrigerated beverage vending machine, must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machine, non-refrigerated servarge vending machine, non-refrigerated snack vending machine, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR* qualified vending machine, or glass front refrigerated cooler without a control system capable or powering down lighting and refrigeration systems during periods of inactivity.         Baseline Description       The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable or powering down lighting and refrigeration systems during periods of inactivity.         Savings Principle       The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated societ with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.         Energy Savings calculation method       Deemed         Saving		
Sector         C&I           Project Type         Betrofit           Category         Betrofit           Sub-Type         Controls           Sub-Type         Commercial Retrofit           Messure Name         Commercial Retrofit           Messure Name         Controls           Messure Name         Controls           Messure Name         Controls           Messure Name         Controls in significantly reduce the energy consumption of vending machine gerids of inactivity but, in the case of refrigerated barverage vending machines, non-refrigerated stack vending machine, and glass front refrigerated coolers. This messure should not be applied to ENERGY STAR* qualified vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Baseline Description         The big efficiency case is a standard efficiency refrigerated beverage vending machine, non refrigerated sock wending machine, or glass front refrigerated beverage vending machine, non refrigerated sock wending machine, or glass front refrigerated beverage vending machine, or glass front refrigerated beverage vending machine, non refrigerated sock wending machine, or glass front refrigerated beverage vending machine, for Gross WM = Qty × dettaWM           Savings unit         Installed vending miser.           Savings aution         Op = Total number of units.           Dest wending machine, so glass front refrigerated beverage vending machine, for otal annui	TRL Reference Number	RI_0264
Project Type         Refriguration           Category         Refriguration           Type         Controls           Sol-type         Vending Miser           Program Name         Controls           Measure Name         Refrigurated beverage vending machine           Measure Description         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must and ways maintain a cool product that meets customer expectations. This measure abulat on the applied to EMERGY STAR* qualified wending machines, as they already have bull-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock wending machine, or gass trans should not be applied to EMERGY STAR* qualified wending machine, or gass transformer offigerated baverage vending machine, non-refrigerated baverage vending machine, non-refrig	Fuel	
Category         Refigeration           Type         Controls           Sub-type         Vending Miser           Program Name         Commonical Netrofit           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and the support of the suppor	Sector	C&I
Type         Controls           Sub-type         Vending Miser           Program Name         Commercial Retrofit           Measure Name         Refrigerated beverage vending machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of neutrols. This measure acol product that meets customer expectations. This measure acol product that meets customer expectations. This measure should not be applied to ENERGY STAR* qualified wending machine, and plass from terfigerated beverage vending machine, non-refrigerated method controls. This measure should not be applied to ENERGY STAR* qualified wending machine, or glass from terfigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency refrigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency refrigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency refrigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency refrigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency refrigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency refrigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated filtery case is a standard efficiency refrigerated beverage vending machine, non-refrigerated for the standard efficiency refrigerated beverage vending machine, non-refrigerated beverage vending machine, non-refrigerated for the standard efficiency case is a	Project Type	Retrofit
Sub-type         Vending Miser           Program Name         Commercial Retring           Measure Name         Refrigerated beverage vending machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Clause power down these systems during periods of machine/hub, in, the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure should not be applied to ENERGY STAR® qualified vending machine, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machine, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated stack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The hage inferiory case is a standard efficiency refrigerated beverage vending machine, non-refrigerated stack vending machine, or glass front refrigerated cooler with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deerned           Baseline Mines         Gross KWH - Qty × detakWh           Gross KW - Qty × detakW         Gross KW - Qty × detakWh           Gross KW - Qty × detakWh         Deerned           Gross KW - Qty × detakWh         Gross KW - Qty × detakWh	Category	Refrigeration
Program Name         Commercial Retrofit           Measure Name         Refrigerated beverage vending machine           Measure Name         Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of nactivity but, in the case of refrigerated machines, must advays maintain a coll product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated sock vending machine, and plass from terffererated collers. This measure should not be applied to ENERGY STAR* qualified vending machine, oras is a standard efficiency refrigerated beverage vending machine, non-refrigerated coller without a control system capable o powering down lighting and refrigeration systems during periods of inactivity.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock vending machine, or gass from terffigerated coller with a control system capable o powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The high efficiency case is a standard efficiency refrigerated beverage wending machine, non-refrigerated sock average machine, or gass from terfficience coller with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.           Swings Equation         Where:           Qity = Total number of units.           Deta ket Decemed average annual kWh reduction per unit.           Hours Source         #N/A           Hours Source         #N/A	Туре	Controls
Measure Name         Refrigerated beverage vending machine           Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls was power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that mets customer expectations. This measure applies to refrigerated beverage vending machines, non- refrigerated snack vending machines, and gass front refrigerated coolers. This measure should not be applied to ENERGY STAR* qualified vending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated cooler without a control system capable o powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings vinit         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.           Savings calculation method         Deemed           Savings unit         Gross KW = Qty × dettakW           Gross KW = Qty × dettakW         Gross KW = Qty × dettakW           Nours Source         MN/A           Hours	Sub-type	Vending Miser
Measure Name         Refrigerated beverage vending machine           Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls wust power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that mets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack wending machine, or particle beverage vending machines, non-refrigerated sock wending machine, or particle beverage vending periods of inactivity.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with out a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock wending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Swings Principle         The basel efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated sock wending machine, or glass front refrigerated cooler with a control system capable of powering dow lighting and refrigeration systems during periods of inactivity.           Swings unit         Installed vending miser.           Swings unit         Installed vending miser.           Swings unit         Installed vending miser.           Swings unit	Program Name	Commercial Retrofit
Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must haves maintain a cool product that meets customer expectations. This measure applies to effigerated beverage vending machines, non-refrigerated sources must avaire maintain a cool product that meets customer expectations. This measure applied to ENERGY STAR* qualified vending machines, as they already have built-in controls.           Baseline Description         The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated source with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Savings Principle         The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated source with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           Energy Savings calculation method         Deemed           Savings unit         Installed vending miser.           Savings Equation         Gross KWh = Qty × detaKWh           Gross KWh = Qty × detaKW         Savings be unit.           Deta KWh'r Deemed average W meducion per unit.           Deta KWh'r Deemed average W reduction per unit.           Deta KWh'r Savings         Gorss KW = Qty × detaKW           Why resource         #N/A           KWhyry savings         Gorss KW = QtelakWh           Hours Source		Refrigerated beverage vending machine
Baseline Description         refrigerated snack vending machine, or glass front refrigerated notic without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.           The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated savings Principle         savings Principle           Energy Savings calculation method         Deemed         Deemed           Savings unit         Installed vending miser.         Gross kWh = Qt y A dettakWh           Gross kWh = Qt y A dettakWh         Gross kWh = Qt y A dettakWh         Gross kWh = Qt y A dettakW           Savings Equation         Where:         Deemed average annual kWh reduction per unit.           Detta kWh = Deemed average annual kWh reduction per unit.         Detta kWh = Deemed average annual kWh reduction per unit.           Hours         Detta kWh = Deemed average annual kWh reduction per unit.         Detta kWh = Deemed average annual kWh reduction per unit.           Hours Source         #N/A         #N/A         #N/A           Hours Source         #N/A         #N/A         #N/A           KWh/ry savings note         #N/A         #N/A         #N/A           KW reduction note         0.184         KW reduction note         0.90/1/2009.           KWh/ry savings note         #N/A         #N/A         #N/A           Gas Heat MMBtu/ry savings note         <	Measure Description	Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR <sup>®</sup> qualified
Savings Principle       instack vending machine, or glass front refrigerated cooler with a control system capable of powering dow         Energy Savings calculation method       Deemed         Savings unit       Installed vending miser.         Gross kW = Qty veltakWh       Gross kW = Qty veltakW         Savings Equation       Where:         Qty = Total number of units.       Detta kWh - Deemed average annual kWh reduction per unit.         Detta kWh - Deemed average annual kWh reduction per unit.       Detta kWh - Deemed average kW reduction per unit.         Hours       Detta kWh - Deemed average kW reduction per unit.         Hours Source       #N/A         Hours source note       #N/A         KWh/ry savings       1612         KWh/ry savings note       #N/A         KW reduction source       #N/A         KW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/ry savings note       #N/A         II MMBtu/ry savings note       #N/A         OI MMBtu/ry savings note       #N/A         Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KW/ry ravings note       #N/A         Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KWh/ry savings note       #N/A         Gas Heat M	Baseline Description	refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of
Savings unit       Installed vending miser.         Gross KW = Qty × deltakWh       Gross KW = Qty × deltakWh         Savings Equation       Where:         Qty = Total number of units.       Delta kWh = Deemed average annual kWh reduction per unit.         Delta KW = Deemed average kW reduction per unit.       Delta kWh = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annua operating hours of 8,760.         Hours Source       #N/A         KWh/yr savings       1612         KWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KWh/yr savings note       #N/A         KW reduction notre       #N/A         KW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KW W reduction notre       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note	Savings Principle	The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.
Gross kWh = Qty × deltakWh         Gross kW = Qty × deltakW         Gross kW = Qty × deltakW         Where:         Qty = Total number of units.         Delta kWh = Deemed average annual kWh reduction per unit.         Delta kW = Deemed average kW reduction per unit.         Delta kW = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.         Hours source       #N/A         Hours source note       #N/A         KWh/yr savings       1612         KWh/yr savings note       #N/A         KW reduction       0.184         KW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A		
Gross kW = Qty × deltakW         Savings Equation       Where: Deta kWh = Deemed average annual kWh reduction per unit. Deta kWh = Deemed average annual kWh reduction per unit. Deta kW = Deemed average kW reduction per unit.         Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.         Hours Source       #N/A         Hours Source note       #N/A         KWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         KWh/yr savings note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Ener	Savings unit	Installed vending miser.
Hours       It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual operating hours of 8,760.         Hours Source note       #N/A         Hours source note       #M/A         KWh/yr Savings       1612         KWh/yr savings note       #N/A         KW reduction       0.184         KW reduction note       #M/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings       0         Oil MMBtu/yr savings       0         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Energy & Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A <td>Savings Equation</td> <td>Gross kW = Qty × deltakW Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.</td>	Savings Equation	Gross kW = Qty × deltakW Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
Hours Source       #N/A         Hours source note       #N/A         kWh/yr Savings       1612         kWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	Hours	It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual
Hours source note       #N/A         kWh/yr Savings       1612         kWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A		
kWh/yr Savings       1612         kWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate source	Hours Source	
kWh/yr savings source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	Hours source note	#N/A
kWh/yr savings note       #N/A         kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kWh/yr Savings	1612
kW reduction       0.184         kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kWh/yr savings source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kW reduction source       USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life note       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kWh/yr savings note	#N/A
kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A	kW reduction	0.184
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Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence Factor note         Savings Persistence Factor note       Savings persistence Factor note         Realization rate energy (RRe)       1.00         RR enote       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         RR demand (RRd) summer peak       1.00         RR demand (RRd) summer peak       1.00         RR dsummer peak source       #N/A         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak       1.00         RR demand (RRd) winter peak       0.00         RR demand (RRd) winter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Cincidence factor (CF) summer peak source       #N/A         RR dwinter peak note       Realization rate is assumed to be 100% since evaluation adjusts deemed savings value         Coincidence factor (CF) summer peak       0.00         CF summer peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours         Coincidence factor (CF) winter peak       0.00         CF winter peak note       Coincidence Factors are set to zero since demand savings typically occur during off-peak hours	
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One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.28	
Spill-Over (participant) 0.07	
Spill-Over (non-participant) 0.00	
Net-to-Gross 0.79	
TetraTech (2014) 2013 Commercial and Industrial Programs Free-ridershin and Snillover Study	ly.
Net-to-Gross source September, 2014	,
Net-to-Gross note #N/A	
Gross Measure TRC unit \$ 0.294 /kWh	
Gross Measure TRC source #N/A	
Gross Measure TRC note #N/A	
Incentive Unit \$ 0.147 /kWh	

TRL Reference Number	RI_0262
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Refrigeration
Туре	Controls
Sub-type	Vending Miser
Program Name	Commercial Retrofit
Measure Name	Non-refrigerated snack vending machine
Measure Description	Controls can significantly reduce the energy consumption of vending machine lighting and refrigeration systems. Qualifying controls must power down these systems during periods of inactivity but, in the case of refrigerated machines, must always maintain a cool product that meets customer expectations. This measure applies to refrigerated beverage vending machines, non-refrigerated snack vending machines, and glass front refrigerated coolers. This measure should not be applied to ENERGY STAR® qualified vending machines, as they already have built-in controls.
Baseline Description	The baseline efficiency case is a standard efficiency refrigerated beverage vending machine, non- refrigerated snack vending machine, or glass front refrigerated cooler without a control system capable of powering down lighting and refrigeration systems during periods of inactivity.
Savings Principle	The high efficiency case is a standard efficiency refrigerated beverage vending machine, non-refrigerated snack vending machine, or glass front refrigerated cooler with a control system capable of powering down lighting and refrigeration systems during periods of inactivity.
Energy Savings calculation method	Deemed
Savings unit	Installed vending miser.
Savings Equation	Gross kWh = Qty × deltakWh Gross kW = Qty × deltakW Where: Qty = Total number of units. Delta kWh = Deemed average annual kWh reduction per unit.
	Delta kW = Deemed average kW reduction per unit. It is assumed that the connected equipment operates 24 hours per day, 7 days per week for a total annual
Hours	operating hours of 8,760.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	343
kWh/yr savings source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kWh/yr savings note	#N/A
kW reduction	0.039
kW reduction source	USA Technologies Energy Management Product Sheets (2006). Accessed on 09/01/2009.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0
Gas Heat MMBtu/yr savings source	National Grid assumption based on regional PA working groups. Assumptions based on historical steam trap surveys. Steam losses in lbs/hr are found using "Boiler Efficiency Institute (1987). Steam Efficiency Improvement; Page 34, Table 4.1 under Steam Leak
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
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In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.79
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.294 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.147 /kWh

TRL Reference Number	RI 0351
Fuel	Electric
Sector	C&I
Project Type	Retrofit
Category	Whole Building
Туре	Custom
Sub-type	Whole Building
Program Name	Commercial Retrofit
Measure Name	Comprehensive Retrofit (CR)
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom energy-efficiency project.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	The annual hours of operation are site specific and will be determined on a case by case basis.
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	Calc
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
	#N/A
measure life note	
measure life note In-service rate (ISR)	1.00
	1.00 #N/A
In-service rate (ISR)	
In-service rate (ISR) In-service rate source	#N/A
In-service rate (ISR) In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.

Realization rate energy (RRe)	1.20
	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRe source	Grid.
RRe note	#N/A
RR demand (RRd) summer peak	0.84
	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National
RRd summer peak source	Grid.
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.50
RRd winter peak source	KEMA (2011). Impact Evaluation of Custom Comprehensive and HVAC Installations. Prepared for National Grid.
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	·
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF summer peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
	For all custom projects, gross summer and winter peak coincidence factors are custom-calculated based
CF winter peak note	on project-specific information. The actual or measured coincidence factors are included in the summer
	and winter demand realization rates.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.07
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
	TetraTech (2014). 2013 Commercial and Industrial Programs Free-ridership and Spillover Study.
Net-to-Gross source	September, 2014
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 0.48 /kWh
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 0.24 /kWh
	2 0.2-7 / KWII

TRL Reference Number	RI 0014
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Building Shell
Type	Insulation
Sub-type	Heating
Program Name	Residential New Construction
Measure Name	Renovation Rehab Heating
Measure Description	Renovation Rehab projects include the installation of roof, wall, and basement insulation
Baseline Description	The baseline case is the performance of the house before participation in the program
Savings Principle	The efficient case is the post-retrofit performance of a house participating the program
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Complete Renovation Rehab project
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
Savings Equation	Gross Winter kW = deltakW_wp_custom
	Gross MMBtu Gas = deltaMMBtu_Gas_custom
	Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
White the application application	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
kWh/yr savings source	Single-Family Residential New Construction. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	Calc
	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
kW reduction source	Single-Family Residential New Construction. Prepared for National Grid.
kW reduction note	Calculated, per 100ft2
Gas Heat MMBtu/yr savings	Calc
	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
Gas Heat MMBtu/yr savings source	Single-Family Residential New Construction. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
measure life source	Single-Family Residential New Construction. Prepared for National Grid.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.

Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI_0128
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	EnergyStar HVAC
Measure Name	Boiler (forced hot water) >= 95% AFUE
Measure Description	Installation of a new space heating gas-fired condensing boiler.
Baseline Description	The baseline efficiency case is a boiler with an AFUE equal to 82%.
Savings Principle	The high efficiency case is a boiler with an AFUE greater than or equal to 90% or 95%.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency boiler
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	14.1
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	19
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A

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CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	379.29
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.32
Spill-Over (participant)	0.08
Spill-Over (non-participant)	0.00
Net-to-Gross	0.76
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 4044.15 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 700 per measure

TRL Reference Number	RI_0154
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Furnace
Program Name	EnergyStar HVAC
Measure Name	Furnace (forced hot air) >= 97% AFUE
Measure Description	Installation of a new high efficiency space heating gas-fired furnace with an electronically commutated
Measure Description	motor (ECM) for the fan.
Baseline Description	The baseline efficiency case is a 85% AFUE (negotiated) furnace.
Cautings Dringinla	The high efficiency case is a new furnace with AFUE >= 95% and an electronically commutated motor or a
Savings Principle	new furnace with AFUE $\geq$ 97% and an electronically commutated motor.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency furnace with ECM
-	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	9.2
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
moasuro lifo source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas
measure life source	Residential Furnace.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor source	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
	#N/A
RRe source	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RR demand (iRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings       0.00         Water / Sewer savings       W/A         Manual \$ savings       47.16         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.22         Spill-Over (participant)       0.22         Spill-Over (participant)		
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.16         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings       0.00         Water / Sewer savings       0.00         Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       379.29         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.22         Spill-Over (participant)       0.22         Spill-Over (participant	RRd summer peak note	
RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.41         Spill-Over (non-participant)       0.22         Spill-Over (non-participant)       0.22         Spill-Over (non-participant)       0.22         Spill-Over (non-participant)       0.21         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heatin	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #W/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)       0.22         Spill-Over (non-participant)       0.21         Spill-Over (non-participant)       0.21         Spill-Over (non-participant)       0.20         Net-to-Gross note       #N/A <t< td=""><td>RRd winter peak source</td><td>#N/A</td></t<>	RRd winter peak source	#N/A
CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water savings: gallons/yr       0.00         Water savings source       #N/A         Manual S savings source / description       #N/A         Annual S savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings source/description       #N/A         Spill-Over (non-participant)       0.22         Spill-Over (non-participant)       0.22         Spill-Over (non-participant)       0.20         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:         Net-to-Gro	RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
CF summer peak source       Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Mater / Sewer savings Source       #N/A         Annual S savings       47.16         Annual S savings note       #N/A         Annual S savings note       #N/A         One time S savings note       #N/A         Spill-Over (participant)       0.22         Spill-Over (participant)       0.23         Spill-Over (non-participant)       0.24         Spill-Over (participant)       0.21         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Eq	Coincidence factor (CF) summer peak	0.00
Program Administrators of Massachusetts.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Sewer savings source#N/AMater savings source#N/AMater savings source#N/AAnnual S savings47.16Annual S savings note#N/AAnnual S savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.22Spill-Over (participant)0.00Net-to-Gross noteThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteMet-to-Gross note#N/AGross Measure TRC unit\$ 1855.98 per measure #N/A	CF summer peak source	
Coincidence factor (CF) winter peak0.16Cr winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.22Spill-Over (non-participant)0.22Spill-Over (non-participant)0.22Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteWhy/A#N/AStave TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A		
CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings source#N/AAnnual \$ savings47.16Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross note#N/AMictar Carlos source#N/AMet-to-Gross note#N/AMode Savere TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A		
CF winter peak sourceProgram Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings note / description#N/AAnnual \$ savings note / description#N/AAnnual \$ savings note / description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteMet-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	Coincidence factor (CF) winter peak	
Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross noteThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	CE winter park source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross noteThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A		Program Administrators of Massachusetts.
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross sourceNet-to-Gross, Market Effects, and Equipment Replacement Timing.Net-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A		#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.41Spill-Over (non-participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross note#N/AMet-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/APree-Ridership0.41Spill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	Sewer savings: gallons/yr	0.00
Annual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.41Spill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	Water / Sewer savings Source	#N/A
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       379.29         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.41         Spill-Over (participant)       0.22         Spill-Over (non-participant)       0.00         Net-to-Gross       0.81         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross note         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1865.98 per measure         Gross Measure TRC source       #N/A	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.41Spill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	Annual \$ savings	47.16
One time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.41Spill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	Annual \$ savings source / description	#N/A
One time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.41Spill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.41Spill-Over (participant)0.22Spill-Over (non-participant)0.00Net-to-Gross0.81Net-to-Gross sourceThe Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross noteNet-to-Gross note#N/AGross Measure TRC unit\$ 1865.98 per measureGross Measure TRC source#N/A		379.29
Free-Ridership       0.41         Spill-Over (participant)       0.22         Spill-Over (non-participant)       0.00         Net-to-Gross       0.81         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross note         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1865.98 per measure         Gross Measure TRC source       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.22         Spill-Over (non-participant)       0.00         Net-to-Gross       0.81         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross note         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1865.98 per measure         Gross Measure TRC source       #N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.00         Net-to-Gross       0.81         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross note         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1865.98 per measure         Gross Measure TRC source       #N/A	Free-Ridership	0.41
Net-to-Gross       0.81         Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1865.98 per measure         Gross Measure TRC source       #N/A	Spill-Over (participant)	0.22
Net-to-Gross source       The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1865.98 per measure         Gross Measure TRC source       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross source     Net-to-Gross, Market Effects, and Equipment Replacement Timing.       Net-to-Gross note     #N/A       Gross Measure TRC unit     \$ 1865.98 per measure       Gross Measure TRC source     #N/A	Net-to-Gross	0.81
Net-to-Gross, Market Effects, and Equipment Replacement Timing.         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1865.98 per measure         Gross Measure TRC source       #N/A		The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Gross Measure TRC unit     \$ 1865.98 per measure       Gross Measure TRC source     #N/A	Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Gross Measure TRC source #N/A	Net-to-Gross note	#N/A
Gross Measure TRC source #N/A	Gross Measure TRC unit	\$ 1865.98 per measure
	Gross Measure TRC source	
	Gross Measure TRC note	
Incentive Unit \$ 300 per measure	Incentive Unit	\$ 300 per measure

TRL Reference Number	RI_0155
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Furnace
Program Name	EnergyStar HVAC
Measure Name	Furnace (forced hot air) 95% AFUE w/ECM
Manager Description	Installation of a new high efficiency space heating gas-fired furnace with an electronically commutated
Measure Description	motor (ECM) for the fan.
Baseline Description	The baseline efficiency case is a 85% AFUE (negotiated) furnace.
	The high efficiency case is a new furnace with AFUE >= 95% and an electronically commutated motor or a
Savings Principle	new furnace with AFUE $\geq$ 97% and an electronically commutated motor.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency furnace with ECM
	Gross kWh = Qty × deltakWh
	Gross $kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	8.1
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas
ineasure me source	Residential Furnace.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
nnu summer peak source	

RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A		-
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak note       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	RRd winter peak source	#N/A
CF summer peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/A	RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
CF summer peak source       Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	Coincidence factor (CF) summer peak	0.00
Program Administrators of Massachusetts.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/A	CE summer neak source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
Coincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/A		Program Administrators of Massachusetts.
CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/A	CF summer peak note	#N/A
CF winter peak source       Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	Coincidence factor (CF) winter peak	0.16
Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A		Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/A	CF willer peak source	Program Administrators of Massachusetts.
Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	CF winter peak note	#N/A
Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	Water savings: gallons/yr	0.00
Water / Sewer savings note       #N/A         Annual \$ savings       47.16         Annual \$ savings source / description       #N/A	Sewer savings: gallons/yr	0.00
Annual \$ savings     47.16       Annual \$ savings source / description     #N/A	Water / Sewer savings Source	#N/A
Annual \$ savings source / description #N/A	Water / Sewer savings note	#N/A
	Annual \$ savings	47.16
Annual S savings note #N/A	Annual \$ savings source / description	#N/A
	Annual \$ savings note	#N/A
One time \$ savings 379.29	One time \$ savings	379.29
One time \$ savings source/description #N/A	One time \$ savings source/description	#N/A
One time \$ savings note #N/A	One time \$ savings note	#N/A
Free-Ridership 0.41	Free-Ridership	0.41
Spill-Over (participant) 0.22	Spill-Over (participant)	0.22
Spill-Over (non-participant) 0.00	Spill-Over (non-participant)	0.00
Net-to-Gross 0.81	Net-to-Gross	0.81
The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation	Not to Cross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source Net-to-Gross, Market Effects, and Equipment Replacement Timing.	Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note #N/A	Net-to-Gross note	#N/A
Gross Measure TRC unit \$ 1703.82 per measure	Gross Measure TRC unit	\$ 1703.82 per measure
Gross Measure TRC source #N/A	Gross Measure TRC source	#N/A
Gross Measure TRC note #N/A	Gross Measure TRC note	#N/A
Incentive Unit \$ 300 per measure		

TRL Reference Number	RI 0149
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Efficient Heating
Program Name	Residential New Construction
Measure Name	Heating
Measure Description	This measure involves the installation of a high-efficiency natural gas heating system.
Baseline Description	The baseline efficiency case is a standard efficiency natural gas heating system.
Savings Principle	The high efficiency case is the installation of a high-efficiency natural gas heating system.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency natural gas heating system.
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW wp custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
kWh/yr savings source	Single-Family Residential New Construction. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
	Single-Family Residential New Construction. Prepared for National Grid.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
In-service rate note Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor (SFF)	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
	TA.

CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI_0147
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	EnergyStar HVAC
Measure Name	Integrated water heater/condensing boiler
	This measure promotes the installation of a combined high-efficiency boiler and water heating unit.
Measure Description	Combined boiler and water heating systems are more efficient than separate systems because they
Neasure Description	eliminate the standby heat losses of an additional tank.
Decelie - Decerietie -	
Baseline Description	The baseline efficiency case is an 80% AFUE boiler with a 0.594 EF water heater.
Savings Principle	The high efficiency case is an integrated water heater/condensing boiler with a 90% AFUE boiler and a 0.9
	EF water heater.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency integrated boiler/water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	
	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A

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RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	379.29
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.34
Spill-Over (participant)	0.08
Spill-Over (non-participant)	0.00
Net-to-Gross	0.74
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1728.48 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI_0431
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	EnergyStar HVAC
Measure Name	Integrated water heater/condensing boiler 95
	This measure promotes the installation of a combined condensing high-efficiency boiler and water heating
Measure Description	unit. Combined boiler and water heating systems are more efficient than separate systems because they
	eliminate the standby heat losses of an additional tank.
Baseline Description	The baseline efficiency case is an 80% AFUE boiler with a 0.594 EF water heater.
Savings Principle	The high efficiency case is an integrated water heater/condensing boiler with a 95% AFUE boiler and a 0.95 EF water heater.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency integrated boiler/water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gloss Minible_Gas – Qly × deltaminible_Gas
	Where
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	12.8
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	#N/A 0
	17
measure life	1/
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
	0.00
PR domand (PRd) summar pools	
RR demand (RRd) summer peak	4N1/A
RRd summer peak source	#N/A
RRd summer peak source RRd summer peak note	#N/A
RRd summer peak source	

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RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	379.29
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.34
Spill-Over (participant)	0.08
Spill-Over (non-participant)	0.00
Net-to-Gross	0.74
	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1000 per measure

TRL Reference Number	RI_0140
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	EnergyStar HVAC
Measure Name	Hard-to-reach Boiler (forced hot water) >= 95% AFUE
Measure Description	Installation of a new space heating gas-fired condensing boiler.
Baseline Description	The baseline efficiency case is a boiler with an AFUE equal to 82%.
Savings Principle	The high efficiency case is a boiler with an AFUE greater than or equal to 90% or 95%.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency boiler
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units.
Hours	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A 0
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	14.1
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	19
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
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CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	379.29
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.32
Spill-Over (participant)	0.08
Spill-Over (non-participant)	0.00
Net-to-Gross	0.76
Net-to-Gross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 4044.15 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 700 per measure

TRL Reference Number	RI_0141
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	EnergyStar HVAC
Measure Name	Hard-To-Reach Boiler (forced hot water) 90% AFUE
Measure Description	Installation of a new space heating gas-fired condensing boiler.
Baseline Description	The baseline efficiency case is a boiler with an AFUE equal to 82%.
Savings Principle	The high efficiency case is a boiler with an AFUE greater than or equal to 90% or 95%.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency boiler
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where:
	Qty = Total number of units.
11	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	11.4
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A

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CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	379.29
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.11
Spill-Over (participant)	0.03
Spill-Over (non-participant)	0.00
Net-to-Gross	0.92
Net-to-Gross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 300
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 100

TRL Reference Number	RI_0158
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Furnace
Program Name	EnergyStar HVAC
Measure Name	Hard-to-reach Furnace (forced hot air) >= 97% AFUE
Measure Description	Installation of a new high efficiency space heating gas-fired furnace with an electronically commutated
Measure Description	motor (ECM) for the fan.
Baseline Description	The baseline efficiency case is a 85% AFUE (negotiated) furnace.
Cavinga Dringinla	The high efficiency case is a new furnace with AFUE >= 95% and an electronically commutated motor or a
Savings Principle	new furnace with AFUE $\geq$ 97% and an electronically commutated motor.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency furnace with ECM
-	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A
	#N/A
Hours Source	
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	9.2
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas
measure me source	Residential Furnace.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor source	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
	#N/A
RRe source	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
CF summer peak source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
	Program Administrators of Massachusetts.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
CF winter peak source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
	Program Administrators of Massachusetts.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	379.29
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.14
Spill-Over (participant)	0.03
Spill-Over (non-participant)	0.00
Net-to-Gross	0.89
Net-to-Gross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2077.71 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 400 per measure

TRL Reference Number	RI_0159
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Furnace
Program Name	EnergyStar HVAC
Measure Name	Hard-to-Reach Furnace (forced hot air) 95% AFUE w/ECM
Measure Description	Installation of a new high efficiency space heating gas-fired furnace with an electronically commutated
Measure Description	motor (ECM) for the fan.
Baseline Description	The baseline efficiency case is a 85% AFUE (negotiated) furnace.
Covingo Drinciplo	The high efficiency case is a new furnace with AFUE >= 95% and an electronically commutated motor or a
Savings Principle	new furnace with AFUE $\geq$ 97% and an electronically commutated motor.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency furnace with ECM
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	8.1
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for an ENERGY STAR Qualified Gas
measure me source	Residential Furnace.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
	#N/A
RRe source	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

RR demand (RRd) winter peak       1.00         RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Genergy & Source/description       #N/A         Annual \$ savings note       #N/A         One t		-
RRd winter peak source       #N/A         RRd winter peak note       Realization rate is 100% since gross savings values are based on evaluation results.         Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$	RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd winter peak note         Realization rate is 100% since gross savings values are based on evaluation results.           Coincidence factor (CF) summer peak         0.00           CF summer peak source         Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.           CF summer peak note         #W/A           Coincidence factor (CF) winter peak         0.16           CF winter peak source         Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.           CF winter peak note         #W/A           Water savings: gallons/yr         0.00           Sewer savings: gallons/yr         0.00           Water / Sewer savings Source         #N/A           Monal \$ savings         47.16           Annual \$ savings note         #N/A           Annual \$ savings note         #N/A           One time \$ savings note         #N/A           Spill-Over (participant)         0.07           Spill-Over (non-partici	RR demand (RRd) winter peak	1.00
Coincidence factor (CF) summer peak       0.00         CF summer peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.16         CF winter peak source       Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings Source       #N/A         Water / Sewer savings Source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Dint im \$ savings note       #N/A         Free-Ridership       0.14         Spill-Over (participant)       0.07         Spill-Over (non-participant)       0.00	RRd winter peak source	#N/A
CF summer peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AMnual \$ savings47.16Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00	RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
CF-summer peak sourceProgram Administrators of Massachusetts.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00	Coincidence factor (CF) summer peak	0.00
Program Administrators of Massachusetts.CF summer peak note#N/ACoincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00	CF summer peak source	
Coincidence factor (CF) winter peak0.16CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings47.16Annual \$ savings47.16Annual \$ savings note#N/AOne time \$ savings379.29One time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00		
CF winter peak sourceEnergy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00		
CF winter peak sourceProgram Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00	Coincidence factor (CF) winter peak	0.16
Program Administrators of Massachusetts.CF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00	CE winter peak source	
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00		-
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.14Spill-Over (non-participant)0.00		#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.14Spill-Over (non-participant)0.00	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.07Spill-Over (non-participant)0.00	Sewer savings: gallons/yr	0.00
Annual \$ savings47.16Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/APree-Ridership0.14Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Water / Sewer savings Source	#N/A
Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.14Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.14Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Annual \$ savings	47.16
One time \$ savings379.29One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.14Spill-Over (participant)0.07Spill-Over (non-participant)0.00	Annual \$ savings source / description	#N/A
One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.14         Spill-Over (participant)       0.07         Spill-Over (non-participant)       0.00	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.14Spill-Over (participant)0.07Spill-Over (non-participant)0.00	One time \$ savings	379.29
Free-Ridership0.14Spill-Over (participant)0.07Spill-Over (non-participant)0.00	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.07         Spill-Over (non-participant)       0.00	One time \$ savings note	#N/A
Spill-Over (non-participant) 0.00	Free-Ridership	0.14
	Spill-Over (participant)	0.07
Net-to-Gross 0.94	Spill-Over (non-participant)	0.00
	Net-to-Gross	0.94
The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:	Net-to-Gross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source Net-to-Gross, Market Effects, and Equipment Replacement Timing.		Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note #N/A	Net-to-Gross note	#N/A
Gross Measure TRC unit \$ 1865.98 per measure	Gross Measure TRC unit	\$ 1865.98 per measure
Gross Measure TRC source #N/A	Gross Measure TRC source	•
Gross Measure TRC note #N/A	Gross Measure TRC note	#N/A
Incentive Unit \$ 300 per measure	Incentive Unit	\$ 300 per measure

TRL Reference Number	RI_0144
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	EnergyStar HVAC
Measure Name	Hard-To-Reach Integrated water heater/condensing boiler
	This measure promotes the installation of a combined high-efficiency boiler and water heating unit.
Measure Description	Combined boiler and water heating systems are more efficient than separate systems because they
	eliminate the standby heat losses of an additional tank.
Baseline Description	The baseline efficiency case is an 80% AFUE boiler with a 0.594 EF water heater.
•	The high efficiency case is an integrated water heater/condensing boiler with a 90% AFUE boiler and a 0.9
Savings Principle	EF water heater.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency integrated boiler/water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Mhara
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	10.4
Gas Heat MMBtu/yr savings source	Cadmus (2015) High Efficiency Heating Equipment Impact Evaluation
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
	0
Energy Reference(s) & table(s) notes	
measure life	17
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A

RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	47.16
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	379.29
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.11
Spill-Over (participant)	0.03
Spill-Over (non-participant)	0.00
Net-to-Gross	0.91
Net-to-Gross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1728.48 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI_0328
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Condensing Water Heater
Program Name	EnergyStar HVAC
Measure Name	Condensing Gas Water Heater (THERMAL EFICIENCY 0.95)
Measure Description	Condensing water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing
	even more energy.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
Savings Principle	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an indirect water heater attached to an ENERGY STAR <sup>®</sup> rated forced hot water gas boiler.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.7
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	DOE (2008). ENERGY STAR <sup>®</sup> Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A

0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.37
0.00
0.00
0.63
Nexus Market Research (2010). HEHE Process and Impact Evaluation. Prepared for GasNetworks
#N/A
\$ 1728.48 per measure
#N/A
#N/A
\$ 1000 per measure

TRL Reference Number	DL 0222
Fuel	RI_0332 Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Efficient Standard Tank Water Heater
Program Name	EnergyStar HVAC
Measure Name	High Efficiency Stand Alone Water Heater (0.67 EF)
Mossuro Description	Stand-alone storage water heaters are high efficiency water heaters that are not combined with space
Measure Description	heating devices.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
Savings Principle	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an indirect water heater attached to an ENERGY STAR <sup>®</sup> rated forced hot water gas boiler.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	1.9
Gas Heat MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	DOE (2008). ENERGY STAR <sup>®</sup> Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISR) In-service rate source	#N/A
In-service rate source	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Eactor (SPE)	1.00
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00

#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.13
0.13
0.00
1.00
The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross, Market Effects, and Equipment Replacement Timing.
#N/A
\$ 562.23 per measure
#N/A
#N/A
\$ 100 per measure

TRL Reference Number	RI 0299
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Type	Flow Control
Sub-type	Flow Control Measures
Program Name	Residential New Construction
Measure Name	Hot water heating
	DHW measures including high-efficiency low-flow showerheads and faucet aerators save water and water
Measure Description	heating energy.
Baseline Description	The baseline efficiency case is the existing domestic hot water equipment.
Savings Principle	The high efficiency case is the installation of high-efficiency domestic hot water equipment such as low- flow showerheads and faucet aerators.
Energy Savings calculation method	Deemed
Savings unit	Installed DHW efficiency measure.
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	
Hours Source	#N/A
Hours source note	#N/A Calc
kWh/yr Savings	
kWh/yr savings source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
	0.00
RR demand (RRd) winter peak	0.00
RR demand (RRd) winter peak RRd winter peak source	#N/A

Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI_0348
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater Insulation
Sub-type	Insulation
Program Name	Residential New Construction
Measure Name	Renovation Rehab Domestic Hot Water
Measure Description	Renovation Rehab projects include the installation of roof, wall, and basement insulation
Baseline Description	The baseline case is the performance of the house before participation in the program
Savings Principle	The efficient case is the post-retrofit performance of a house participating the program
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Complete Renovation Rehab project
	Gross kWh = deltakWh_custom
	Gross Summer kW = deltakW_sp_custom
Savings Equation	Gross Winter kW = deltakW_wp_custom
	Gross MMBtu Gas = deltaMMBtu_Gas_custom
	Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
	Single-Family Residential New Construction. Prepared for National Grid.
kWh/yr savings note	Supplied by vendor
kW reduction	Calc
kW reduction source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
	Single-Family Residential New Construction. Prepared for National Grid.
kW reduction note	Supplied by vendor
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of
Gus neur wivibru/ yr suvings source	Single-Family Residential New Construction. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
	Incomparison rate is 100% since gross savings values are based on evaluation results.

Coincidence factor (CF) summer peak	Custom
CF summer peak source	#N/A
CF summer peak note	Coincidence factors are custom calculated based on project-specific detail.
Coincidence factor (CF) winter peak	Custom
CF winter peak source	#N/A
CF winter peak note	Coincidence factors are custom calculated based on project-specific detail.
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	Assumed to equal incentive amount. per housing Unit
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	Varies by performance tier, housing type & number of units. See Source for details per housing Unit

TRL Reference Number	RI_0414
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Tankless Water Heater
Program Name	EnergyStar HVAC
Measure Name	Tankless Water Heaters (EF 0.94)
Measure Description	Condensing water tankless water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy and circulating water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
Savings Principle	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an indirect water heater attached to an ENERGY STAR <sup>®</sup> rated forced hot water gas boiler.
Energy Savings calculation method	Deemed
Savings unit	Installed condensing tankless water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.6
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note Energy Reference(s) & table(s) notes	#N/A
energy Reference(s) & table(s) notes	0 20
measure life measure life source	20 #N/A
measure life source measure life note	#N/A #N/A
In-service rate (ISR)	#N/A 1.00
In-service rate (ISR)	#N/A
In-service rate source	#N/A #N/A
Savings Persistence Factor (SPF)	0.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A #N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
	l

RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.25
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.75
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2077.71 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 400 per measure

TRL Reference Number	RI_0346
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Tankless Water Heater
Program Name	EnergyStar HVAC
Measure Name	Tankless Water Heaters (EF 0.95)
Measure Description	Condensing water tankless water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy and circulating water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
Savings Principle	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an indirect water heater attached to an ENERGY STAR <sup>®</sup> rated forced hot water gas boiler.
Energy Savings calculation method	Deemed
Savings unit	Installed condensing tankless water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
	#N/A
kWh/yr savings note	•
kW reduction	0 #N/A
kW reduction source	
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.6
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	DOE (2008). ENERGY STAR <sup>®</sup> Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00

RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.28
Spill-Over (participant)	0.25
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Not to Cross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2478.78 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 400 per measure

TRL Reference Number	0220
Fuel	RI_0330 Gas
Sector	Residential
Project Type	New Construction
	Water Heating
Category	Water Heater
Type	Condensing Water Heater
Sub-type Program Name	EnergyStar HVAC
Measure Name	Hard-To-Reach Condensing Gas Water Heater (THERMAL EFICIENCY 0.95)
	Condensing water heaters recover energy by using either a larger heat exchanger or a second heat
Measure Description	exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing
Measure Description	
Baseline Description	even more energy.
	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing
Savings Principle	water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an
	indirect water heater attached to an ENERGY STAR® rated forced hot water gas boiler.
Energy Sovings calculation method	Deemed
Energy Savings calculation method	
Savings unit	Installation of new high-efficiency water heater Gross MMBtu Gas = Qty × deltaMMBtu Gas
	GIUSS WIVIDLU_GAS = QLY × UEILAIVIIVIDLU_GAS
	Where:
Savings Equation	where:
	Otu – Tatal aumhar of unita
	Qty = Total number of units.
11	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.7
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	DOE (2008). ENERGY STAR® Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	#N/A

0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.12
0.00
0.00
0.88
Nexus Market Research (2010). HEHE Process and Impact Evaluation. Prepared for GasNetworks
#N/A
\$ 1785.86 per measure
#N/A
#N/A
\$ 300 per measure

TRL Reference Number	RI_0331
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Efficient Standard Tank Water Heater
Program Name	EnergyStar HVAC
Measure Name	Hard-to-Reach High Efficiency Stand Alone Water Heater (0.67 EF)
	Stand-alone storage water heaters are high efficiency water heaters that are not combined with space
Measure Description	heating devices.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
Savings Principle	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an indirect water heater attached to an ENERGY STAR <sup>®</sup> rated forced hot water gas boiler.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	1
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	1.9
Gas Heat MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	DOE (2008). ENERGY STAR <sup>®</sup> Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	1.00
Realization rate energy (RRe)	
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
	0.00
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
	#N/A #N/A 0.00

#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.04
0.03
0.00
0.98
The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross, Market Effects, and Equipment Replacement Timing.
#N/A
\$ 562.23 per measure
#N/A
#N/A
\$ 100 per measure

TRL Reference Number	RI_0413
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Tankless Water Heater
Program Name	EnergyStar HVAC
Measure Name	Hard-to-Reach Tankless Water Heaters (EF 0.94)
Measure Description	Condensing water tankless water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy and circulating water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.
Baseline Description	Standard efficiency.
Savings Principle	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an indirect water heater attached to an ENERGY STAR <sup>®</sup> rated forced hot water gas boiler.
Energy Savings calculation method	Deemed
Savings unit	Installed tankless water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	5 #N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.6
Gas Heat MMBtu/yr savings	#N/A
	#N/A
Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	0
	#N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	
	#N/A 0
Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	#N/A
measure life note	#N/A #N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	#N/A #N/A
Savings Persistence Factor (SPF)	0.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	#N/A
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A #N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
innu summer peak note	רעיז <i>י</i> ן

RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.08
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.92
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2077.71 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 400 per measure

TRL Reference Number	RI 0342
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Tankless Water Heater
Program Name	EnergyStar HVAC
Measure Name	Hard-to-Reach Tankless Water Heaters (EF 0.95)
Measure Description	Condensing water tankless water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy and circulating water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
Savings Principle	The high efficiency case is a stand-alone storage water heater with an energy factor >= 0.67, a condensing water heater with an energy factor >= 0.95, a tankless water heater with an energy factor >= 0.82, or an indirect water heater attached to an ENERGY STAR <sup>®</sup> rated forced hot water gas boiler.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency water heater
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.6
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	19
measure life source	DOE (2008). ENERGY STAR <sup>®</sup> Residential Water Heaters: Final Criteria Analysis. Prepared for the DOE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00

RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.08
Spill-Over (non-participant)	0.00
Net-to-Gross	0.99
Not to Cross source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation:
Net-to-Gross source	Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2478.78 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 400 per measure

TRL Reference Number	RI 0324
Fuel	Gas
Sector	Residential
Project Type	New Construction
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	Residential New Construction
Measure Name	Low-flow showerhead
Measure Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.
	The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the
Baseline Description	baseline is the existing showerhead.
Savings Principle	The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.48
Gas Heat MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A

Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	3696.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Water / Sewer Savings Source	Prepared for the Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 10 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 10 per measure

TRL Reference Number	RI_0004
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Air Sealing
Sub-type	Air Sealing/Infiltration
Program Name	Income Eligible MultiFamily
Measure Name	LI MF Air Sealing
Measure Description	Thermal shell air leaks are sealed through strategic use and location of air-tight materials.
	The baseline efficiency case is the existing building before the air sealing measure is implemented. The
Baseline Description	baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family
	homes, or the existing air changes per hour (ACHPRE)
	The high efficiency case is the existing building after the air sealing measure is implemented. The high
Savings Principlo	efficiency building is characterized by the new CFM50 measurement for single family homes
Savings Principle	(CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured
	after the air sealing measure is implemented.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed air sealing project.
оот	
	Gross MMBtu Gas = (CFM50_pre - CFM50_post) / LBL × HDD × (Hours per Day) × (Minutes per Hour) ×
	(Btu/ft3-°F) × CorrectionFactor / SeasonalEff / (Btu per MMBtu)
	Where:
	CFM50_pre = CFM50 measurement before air sealing
	CFM50_post = CFM50 measurement after air sealing (cu.ft./min)
	LBL = LBL factor - This factor is determined as the product of the N-factor and a Height Correction Factor
	according to BPI Protocol
Savings Equation	4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree
	Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year
	data. http://www.ncdc.noaa.gov
	24 Hours per Day = Conversion factor
	60 Minutes per Hour = Conversion factor
	0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F
	1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default
	0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with
	natural gas: Default
	1,000,000 Btu per MMBtu = Conversion factor
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A #N/A
Oil MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings	#N/A 0
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A 0 #N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A 0 #N/A #N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings Propane MMBtu/yr savings source	#N/A 0 #N/A

	CDS Accordington Inc. (2007) Mangura Life Banarti Decidential and Commercial (Industrial Lighting and
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings Annual \$ savings source / description	0.00 #N/A
Annual \$ savings note	#N/A #N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 390/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 390/audit with multiple installed measures
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TRL Reference Number	RI_0018
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	Income Eligible MultiFamily
Measure Name	LI MF Other Insulation
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
Baseline Description	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.
Savings Principle	The high efficiency case is the existing facility or equipment after the implementation of additional insulation.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
Hours	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644. This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A Realization rate is 100% since gross savings values are based on evaluation results.
	0.00
RR demand (RRd) summer peak RRd summer peak source	#N/A
RRd summer peak note	#N/A

RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 390/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 390/audit with multiple installed measures

	DL 0047
TRL Reference Number	RI_0017
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	Income Eligible MultiFamily
Measure Name	LI MF Other Insulation
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
Baseline Description	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.
Savings Principle	The high efficiency case is the existing facility or equipment after the implementation of additional insulation.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
Savings unit	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
	0
Energy Reference(s) & table(s) notes measure life	25
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistoneo Easter (SPE)	1.00
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A

#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 390/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A
\$ 390/audit with multiple installed measures

TRL Reference Number	RI_0034
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Shell
Program Name	Income Eligible MultiFamily
Measure Name	LI MF Shell Insulation
Measure Description	Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
	and sidewalls.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed insulation project.
	Gross MMBtu Gas = SQFT × [ 1/R_pre - 1/(R_pre + R_add) ] × HDD × (Hours per Day) × CorrectionFactor × SeasonalEff / (Btu per MMBtu) Where:
Savings Equation	SQFT = Square feet of insulation installed R_pre = Total R-value of the existing attic, basement or sidewall (ft2-hr-°F/Btu) R_add = R-value of the added insulation (ft2-hr-°F/Btu) 4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. http://www.ncdc.noaa.gov 24 Hours per Day = Conversion factor 60 Minutes per Hour = Conversion factor 0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F 1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default 0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with natural gas: Default 1,000,000 Btu per MMBtu = Conversion factor
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
measure life source	Prepared for the Massachusetts Program Administrators.
measure life note	I #NI / A
measure life note	#N/A
measure life note In-service rate (ISR) In-service rate source	#N/A 1.00 #N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 390/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 390/audit with multiple installed measures

TRL Reference Number	RI_0006
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Air Sealing
Sub-type	Air Sealing/Infiltration
Program Name	EnergyWise MultiFamily
Measure Name	MF Air Sealing
Measure Description	Thermal shell air leaks are sealed through strategic use and location of air-tight materials.
Baseline Description	The baseline efficiency case is the existing building before the air sealing measure is implemented. The baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family homes, or the existing air changes per hour (ACHPRE)
Savings Principle	The high efficiency case is the existing building after the air sealing measure is implemented. The high efficiency building is characterized by the new CFM50 measurement for single family homes (CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured after the air sealing measure is implemented.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed air sealing project.
	Gross MMBtu Gas = (CFM50_pre - CFM50_post) / LBL × HDD × (Hours per Day) × (Minutes per Hour) × (Btu/ft3-°F) × CorrectionFactor / SeasonalEff / (Btu per MMBtu)
Savings Equation	Where: CFM50_pre = CFM50 measurement before air sealing CFM50_post = CFM50 measurement after air sealing (cu.ft./min) LBL = LBL factor - This factor is determined as the product of the N-factor and a Height Correction Factor according to BPI Protocol 4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. http://www.ncdc.noaa.gov 24 Hours per Day = Conversion factor 60 Minutes per Hour = Conversion factor 0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F 1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default 0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with natural gas: Default 1,000,000 Btu per MMBtu = Conversion factor
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
	#N/A #N/A
Propane MMBtu/yr savings note	
Energy Reference(s) & table(s) notes	0
measure life	15

	CDS Accordance Inc. (2007) Managura Life Departs Decidential and Commencial Industrial Lighting and
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 601/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 553/audit with multiple installed measures
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TRL Reference Number	RI_0022
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	EnergyWise MultiFamily
Measure Name	MF Other Insulation
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
Baseline Description	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.
Savings Principle	The high efficiency case is the existing facility or equipment after the implementation of additional insulation.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	- #N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	- #N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
measure life source	Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00

RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 601/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 553/audit with multiple installed measures

Fiel         Gas           Sector         Besidential           Project Type         Besidential           Category         Building Shell           Type         Insulation           Sub type         Other           Program Name         EncryWise Multifamily           Measure Name         MP Other Insulation           Measure Name         MP Other Insulation           Measure Name         MP Other Insulation           Swing Principle         The baseline efficiency case is the existing facility or equipment prior to the implementation of addition insulation           Swings Fruinciple         The high Efficiency case is the existing facility or equipment after the implementation of additional insulation           Swings Calculation method         Deemed           Swings Calculation method         Completed insulation project:           Gross MMBRU_Gas = Cay & detaMMBRU_Gas         Marge eacry with a collity, 464.           Hours Source         This value is an evarace/acrited by the healing degree days for the facility, 464.           Hours Source note         mV/A           Ward y swings ontoe         mV/A           Ward eacry swings ontoe<		
Sector         Besidential           Category         Building Shell           Category         Building Shell           Type         Insulation           Mascure Name         Energy/Wise Multifamily           Measure Name         MC Other Insulation           Savings Forcipion         Insulation           Savings Forcipio         The hyse folcinery case is the existing facility or equipment pror to the implementation of additional insulation.           Savings Calculation method         Deemed           Savings Equation         Carpitetel insulation project.           City = Total number of units.         deltaMMBtu. Cas = Average annual natural gas reduction per unit.           Hours Source         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Masachusetts based on NOAA 30-year data.           Hours Source         MN/A           Whyfyr Savings Source         MN/A           Whyfyr Savings source         MN/A           Whyfyr Savings source         MN/A           Savings Source othyfyr Savings source         MN/A	TRL Reference Number	RI_0020
Project Type         Betrofit           Creegory         Building Shell           Type         Installation           Sub type         Other           Type thank         EnergyWise Multifamily           Messare Description         Installation argorades (other than basement, roofs, and walls) applied in existing facilities.           Baseline Description         The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.           Savings Principle         The high efficiency case is the existing facility or equipment prior to the implementation of additional insulation.           Savings vinit         Grass MMBtu_Gas = Dty × deltaMMBtu_Gas           Savings unit         Grass MMBtu_Gas = Dty × deltaMMBtu_Gas           Savings unit         Grass MMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         This value is an average RASE Go Annual Heating Degree Day value for weather stations in Rhode Island           Hours Source         MNA           More source         MNA           More source         MNA           Miny savings source         MNA           MVM/r savings note         MNA           MV/r savings note         MNA           MV/r savings note         MNA           MV reduction note         MNA <t< td=""><td></td><td></td></t<>		
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Gas Heat MMBtu/yr savings         Calc           Gas Heat MMBtu/yr savings source         The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analys Prepared for the Massachusetts Program Administrators.           Gas Heat MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings ource         #N/A           Oil MMBtu/yr savings ource         #N/A           Oil MMBtu/yr savings ource         #N/A           Oropane MMBtu/yr savings outce         #N/A           Propane MMBtu/yr savings note         #N/A           Energy Reference(S) & table(s) note         0           measure life         25           measure life source         The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analys Prepared for the Massachusetts Program Administrators.           measure life note         #N/A           In-service rate (SR)         1.00           In-service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor note         Savings persistence Factor note         Savi	kW reduction note	
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Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analys Prepared for the Massachusetts Program Administrators.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence Factor note         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe note       Realization rate is 100% since gross savings values are bas		The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analys Prepared for the Massachusetts Program Administrators.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak note       #N/A	Gas Heat MMBtu/yr savings note	
Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings o       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analys Prepared for the Massachusetts Program Administrators.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate onte       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor note       Savings persistence Factor note         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak note       0.00         RRd summer peak note       #N/A		
Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analys Prepared for the Massachusetts Program Administrators.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RR enote       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak note       #N/A         RRd summer peak note       #N/A		
Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       25         measure life source       The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analys Prepared for the Massachusetts Program Administrators.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate note       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         RRe note       Realization rate is 100% since gross savings values are based on evaluation results.         RR demand (RRd) summer peak       0.00         RRd summer peak note       #N/A		
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In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installations.Savings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/A		
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Savings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/A	Savings Persistence Factor (SPF)	1.00
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RRe source#N/ARRe noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/A	Savings Persistence Factor note	Savings persistence is assumed to be 100%.
RRe noteRealization rate is 100% since gross savings values are based on evaluation results.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/A	Realization rate energy (RRe)	1.00
RR demand (RRd) summer peak       0.00         RRd summer peak source       #N/A         RRd summer peak note       #N/A	RRe source	#N/A
RR demand (RRd) summer peak       0.00         RRd summer peak source       #N/A         RRd summer peak note       #N/A	RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RRd summer peak source     #N/A       RRd summer peak note     #N/A	RR demand (RRd) summer peak	
RRd summer peak note #N/A	RRd summer peak source	#N/A
	RRd summer peak note	
	RR demand (RRd) winter peak	0.00

Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Grei time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross note       #N/A         Ret-to-Gross note       The	RRd winter peak source	#N/A
CF summer peak source       #N/A         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross note       The Net-to-Gross	RRd winter peak note	#N/A
CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings source       #N/A         Water / Sewer savings source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC unit       \$ 601/audit with mul	Coincidence factor (CF) summer peak	0.00
Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ cource/description       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed	CF summer peak source	#N/A
CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings onte       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TR	CF summer peak note	#N/A
CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Met-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jur	Coincidence factor (CF) winter peak	0.00
Water savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00Spill-Over (non-participant)0.00Net-to-Gross note#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jun	CF winter peak source	#N/A
Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Ret-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jun	CF winter peak note	#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings ource/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jun	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jur	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/APree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jun	Water / Sewer savings Source	#N/A
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jun	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Annual \$ savings	0.00
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Annual \$ savings source / description	#N/A
One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	One time \$ savings	0.00
Free-Ridership       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Free-Ridership	0.00
Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Spill-Over (participant)	0.00
Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Spill-Over (non-participant)	0.00
Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Net-to-Gross	1.00
Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jun	Net-to-Gross source	#N/A
Gross Measure TRC source Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, Jun	Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
	Gross Measure TRC unit	\$ 601/audit with multiple installed measures
	Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note #N/A	Gross Measure TRC note	#N/A
Incentive Unit \$ 553/audit with multiple installed measures	Incentive Unit	\$ 553/audit with multiple installed measures

TRL Reference Number	RI_0036
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Shell
Program Name	EnergyWise MultiFamily
Measure Name	MF Shell Insulation
Measure Description	Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
	and sidewalls.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed insulation project.
	Gross MMBtu Gas = SQFT × [ 1/R_pre - 1/(R_pre + R_add) ] × HDD × (Hours per Day) × CorrectionFactor × SeasonalEff / (Btu per MMBtu) Where: SQFT = Square feet of insulation installed
Savings Equation	R_pre = Total R-value of the existing attic, basement or sidewall (ft2-hr-°F/Btu) R_add = R-value of the added insulation (ft2-hr-°F/Btu) 4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. http://www.ncdc.noaa.gov 24 Hours per Day = Conversion factor 60 Minutes per Hour = Conversion factor 0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F 1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default 0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with natural gas: Default 1,000,000 Btu per MMBtu = Conversion factor
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	
	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	Calc The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	- #N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
	0
Energy Reference(s) & table(s) notes	
measure life	25 The Codmus Crows (2012) Massachusette 2011 Desidential Detrofit Multifernik, Drogrom Import Analysis
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A

In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 601/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 553/audit with multiple installed measures

TRL Reference Number	RI 0007
Fuel	Gas
Sector	Residential
Project Type	Retrofit
	Building Shell
Category	
Type Sub-turne	Air Sealing
Sub-type	Air Sealing/Infiltration
Program Name	EnergyWise
Measure Name	SF Air Sealing
Measure Description	Thermal shell air leaks are sealed through strategic use and location of air-tight materials.
	The baseline efficiency case is the existing building before the air sealing measure is implemented. The
Baseline Description	baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family
	homes, or the existing air changes per hour (ACHPRE)
	The high efficiency case is the existing building after the air sealing measure is implemented. The high
Savings Principle	efficiency building is characterized by the new CFM50 measurement for single family homes
Savings Frinciple	(CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured
	after the air sealing measure is implemented.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed air sealing project.
	Gross MMBtu Gas = (CFM50_pre - CFM50_post) / LBL × HDD × (Hours per Day) × (Minutes per Hour) ×
	(Btu/ft3-°F) × CorrectionFactor / SeasonalEff / (Btu per MMBtu)
	Where:
	CFM50_pre = CFM50 measurement before air sealing
	CFM50_post = CFM50 measurement after air sealing (cu.ft./min)
	LBL = LBL factor - This factor is determined as the product of the N-factor and a Height Correction Factor
	according to BPI Protocol
Savings Equation	4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree
	Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year
	data. http://www.ncdc.noaa.gov
	24 Hours per Day = Conversion factor
	60 Minutes per Hour = Conversion factor
	0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F
	1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default
	0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with
	natural gas: Default
	1,000,000 Btu per MMBtu = Conversion factor
Hours	1,000,000 Btu per MMBtu = Conversion factor
Hours	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Hours Source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours Source Hours source note	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A
Hours Source Hours source note kWh/yr Savings	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0
Hours Source Hours source note kWh/yr Savings kWh/yr savings source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         0
Hours Source Hours source note KWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         0         #N/A         0         #N/A         1,000,000 Btu per MMBtu = Conversion factor
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         Ø         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A
Hours Source Hours source note KWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         Zonc         Calc
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         Column 1         #N/A         Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         Column (Column)         #N/A         Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         Coll         #N/A         Coll         #N/A         Model         0         #N/A         Coll         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #Solution         Galc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         Massachusetts Program Administrators.
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         Column (Column)         #N/A         Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         Coll         #N/A         Coll         #N/A         Model         0         #N/A         Coll         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #N/A         #Solution         Galc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         Massachusetts Program Administrators.
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         Ø         #N/A         Ø         #N/A         Ø         #N/A         Coll         #N/A         Ø         #N/A         Ø         #N/A         Coll         #N/A         #Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         Ø         #N/A         Ø         #N/A         Ø         #N/A         Coll         #N/A         Ø         #N/A         Ø         #N/A         Ø         Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts Program Administrators.         #N/A         Ø         0         0         Ø         Ø         #N/A         #N/A         Ø         Ø         Ø         Ø         Ø         Ø
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings source	1,000,000 Btu per MMBtu = Conversion factor         Heating hours are characterized by the heating degree days for the facility, 4644.         This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         0         #N/A         0         #N/A         0         #N/A         Calc         Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts Program Administrators.         #N/A         0         #N/A
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Oil MMBtu/yr savings Oil MMBtu/yr savings note Oil MMBtu/yr savings note Propane MMBtu/yr savings	1,000,000 Btu per MMBtu = Conversion factor Heating hours are characterized by the heating degree days for the facility, 4644. This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A 0 #N/A 0 #N/A Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators. #N/A 0 #N/A 0 #N/A 0 #N/A 0 #N/A 0 #N/A 0 #N/A 0 #N/A 0
Hours Source Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings Oil MMBtu/yr savings note Oil MMBtu/yr savings note	1,000,000 Btu per MMBtu = Conversion factor Heating hours are characterized by the heating degree days for the facility, 4644. This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A 0 #N/A 0 #N/A Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators. #N/A 0 #N/A 4 #N/A 1 0 #N/A

measure life	15
	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
measure life source	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.99
RRe source	The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for National Grid
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	
-	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
	The Net-to-Gross ratio is Assumed to be 100%.
Net-to-Gross note	
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	
Incentive Unit	\$ 1776/audit with multiple installed measures

TRL Reference Number	RI_0024
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	EnergyWise
Measure Name	SF Other Insulation
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
Baseline Description	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.
Savings Principle	The high efficiency case is the existing facility or equipment after the implementation of additional insulation.
Energy Sovings colculation method	Deemed
Energy Savings calculation method	
Savings unit	Completed insulation project.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	#N/A 0
measure life	25
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.99
RRe source	The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for National Grid
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
inna summer peak source	ווואס

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RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1776/audit with multiple installed measures

TRL Reference Number	RI 0023
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	EnergyWise
Measure Name	SF Other Insulation
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional
Baseline Description	insulation.
	The high efficiency case is the existing facility or equipment after the implementation of additional
Savings Principle	insulation.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
Savings unit	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross Minible_Gas – Qly × deltaminible_Gas
	Where:
Savings Equation	Where.
	Qty = Total number of units.
	deltaMMBtu Gas = Average annual natural gas reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A 0
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Gas Heat MMBtu/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
	Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.99
	The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for
RRe source	National Grid
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
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RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1776/audit with multiple installed measures

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TRL Reference Number	RI_0037
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Shell
Program Name	EnergyWise
Measure Name	SF Shell Insulation
	Shell insulation upgrades applied in existing facilities including improved insulation in attics, basements
Measure Description	and sidewalls.
Baseline Description	The baseline efficiency case is any existing home shell measures.
Savings Principle	The high efficiency case includes increased weatherization insulation levels.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed insulation project.
Savings unit	
Savings Equation	Gross MMBtu Gas = SQFT × [ 1/R_pre - 1/(R_pre + R_add) ] × HDD × (Hours per Day) × CorrectionFactor × SeasonalEff / (Btu per MMBtu) Where:
	SQFT = Square feet of insulation installed R_pre = Total R-value of the existing attic, basement or sidewall (ft2-hr-°F/Btu) R_add = R-value of the added insulation (ft2-hr-°F/Btu) 4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data. http://www.ncdc.noaa.gov 24 Hours per Day = Conversion factor 60 Minutes per Hour = Conversion factor 0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F 1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default 0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with natural gas: Default 1,000,000 Btu per MMBtu = Conversion factor
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
	25
measure life	
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00

In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.99
RRe source	The Cadmus Group (2012). Rhode Island EnergyWise Single Family Impact Evaluation. Prepared for National Grid
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1776/audit with multiple installed measures

TRL Reference Number	RI 0042
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category Type	Building Shell Insulation & Air sealing
Sub-type	Weatherization
Program Name Measure Name	Single Family Appliance Management Weatherization
	Installation of weatherization measures such as air sealing and insulation in gas heated homes. Electric
Measure Description	savings are achieved from reduced run time of the HVAC system fan(s).
Baseline Description	The baseline efficiency case is the existing home shell.
	The high efficiency case can be a combination of increased insulation, air sealing, duct sealing, and other
Savings Principle	improvements to the home shell.
Energy Savings calculation method	Deemed
Savings unit	Household with weatherization measures installed
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross KW – Qty × deltaKW Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	GIOSS MIVIDIU_Gas = QIV × UEITAIVIVIDIU_Gas
	Where
Savings Equation	Where:
	Obs. Tatal sumbar of units
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
11	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low
	Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.009
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	18.8
Gas Heat MMBtu/yr savings source	Synapse (2012). A Preliminary Analysis of Energy Impacts from Partial Deep Energy Retrofit Projects in
	National Grid's Jurisdiction. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Boiler.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A

Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
1.00
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
0.03
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.03
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
0.00
#N/A
#N/A
128.80
#N/A
#N/A
368.56
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 4500 per job
#N/A
#N/A
1 # F 1 # F 0 E F # 0 E F # 0 0 # # 1 # # 2 # 4 0 0 0 1 # T \$ #

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TBL Deference Number	DI 0070
TRL Reference Number	RI_0070
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Type	Controls
Sub-type	Boiler Control
Program Name	EnergyStar HVAC
Measure Name	Boiler Load Controls
Measure Description	Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.
Baseline Description	The baseline efficiency case is a boiler without reset or load controls.
	The efficient case is a boiler with reset or load controls, which reset the supply water temperature based
Savings Principle	on outdoor temperatures and/or building load.
Energy Savings calculation method	Deemed
Savings unit	Installation of boiler reset control on existing boiler
	Gross MMBtu Gas = Qty × deltaMMBtu Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	2.7
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	The Cadmus Group (2012). Impact Evaluation of the 2012-2013 Boiler Reset Control Pilot Program. Prepared for the Electric and Gas Energy Efficiency Program Administrators of Massachusetts.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A

P.D.d. summer peak pete	Papilization rate is 100% cince gross savings values are based on evaluation results
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.92
CF summer peak source	The Cadmus Group (2012). Impact Evaluation of the 2012-2013 Boiler Reset Control Pilot Program. Prepared for the Electric and Gas Energy Efficiency Program Administrators of Massachusetts.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	The Cadmus Group (2012). Impact Evaluation of the 2012-2013 Boiler Reset Control Pilot Program. Prepared for the Electric and Gas Energy Efficiency Program Administrators of Massachusetts.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 300
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 100

TRL Reference Number	RI 0072
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Boiler Control
Program Name	EnergyStar HVAC
Measure Name	Boiler Reset Controls
Measure Description	Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.
Baseline Description	The baseline efficiency case is a boiler without reset or load controls.
· · · · · ·	The efficient case is a boiler with reset or load controls, which reset the supply water temperature based
Savings Principle	on outdoor temperatures and/or building load.
Energy Savings calculation method	Deemed
Savings unit	Installation of boiler reset control on existing boiler
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	4.5
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	#N/A #N/A
RR demand (RRd) winter peak	0.00
	leree .

RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 300 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 100 per measure

TRL Reference Number	RI 0073
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Boiler Control
Program Name	EnergyStar HVAC
Measure Name	Hard-To-Reach Boiler Reset Controls
Measure Description	Boiler reset controls are devices that improve the efficiency of an existing boiler system by modulating the hot water temperature set point. Reset controls automatically control boiler water temperature based on outdoor temperature using a software program; load controls sense the thermal demand of the heating system and resets the water temperature based on the demand.
Baseline Description	The baseline efficiency case is a boiler without reset or load controls.
Savings Principle	The efficient case is a boiler with reset or load controls, which reset the supply water temperature based on outdoor temperatures and/or building load.
Energy Savings calculation method	Deemed
Savings unit	Installation of boiler reset control on existing boiler
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	4.5
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
	Realization rate is 100% since gross savings values are based on evaluation results.
RRe note	inealization rate is 100% since gross savings values are based on evaluation results.
RRe note RR demand (RRd) summer peak	
RR demand (RRd) summer peak	0.00

RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 300 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 100 per measure

	DL 0470
TRL Reference Number	RI_0179
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Ventilation
Sub-type	Heat Recovery Ventilator
Program Name	EnergyStar HVAC
Measure Name	Heat Recovery Ventilator
	Heat Recovery Ventilators (HRV) can help make mechanical ventilation more cost effective by reclaiming
Measure Description	energy from exhaust airflows. An electric penalty results due to the increased electricity consumed by the
	system fans.
Baseline Description	The baseline efficiency case is an ASHRAE 62.2-compliant exhaust fan system with no heat recovery.
Savings Principle	The high efficiency case is an exhaust fan system with heat recovery.
Energy Savings calculation method	Deemed
Savings unit	Installation of heat recovery ventilation system
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A
Hours Source	#N/A
	#N/A
Hours source note kWh/yr Savings	-133
Kwiiyyi Saviligs	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
kWh/yr savings source	Massachusetts. Prepared for GasNetworks.
White human in go noto	#N/A
kWh/yr savings note kW reduction	-0.07
kw reduction	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
kW reduction source	
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.7
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
	Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
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RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.00
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	1.00
CF winter peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 960 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

TRL Reference Number	RI 0151
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Heating
Sub-type	Efficient Heating
Program Name	Single Family Appliance Management
Measure Name	Heating system replacement (gas)
	Replacement of an existing gas heating system with a new high efficiency system. Electric savings are
Measure Description	achieved from reduced run time of the heating system fan(s).
Baseline Description	The baseline efficiency case is the existing inefficient heating equipment.
Savings Principle	The high efficiency case is the new efficient heating equipment.
Energy Savings calculation method	Deemed
Savings unit	Installation of new high-efficiency gas heating system
Savings unit	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	N/hara
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low Income Weatherization Program. Prepared for National Grid.
kWh/yr savings note	#N/A
kW reduction	0.024
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012). Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	18.4
Gas Heat MMBtu/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
measure life source	Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Source Dorristoneo Fostor (SDE)	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.

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RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak	0.03
CF summer peak source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF summer peak source	Prepared for the Massachusetts Program Administrators.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.03
	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source	Prepared for the Massachusetts Program Administrators.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	134.82
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	249.20
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 4500 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 4500 per measure

TRL Reference Number	RI 0088
Fuel	Gas
Sector	Residential
	Retrofit
Project Type Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	Income Eligible MultiFamily
Measure Name	Programmable thermostat
	Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning
Measure Description	operating times according to a pre-set schedule.
	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using
	natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi
Baseline Description	programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide
	space heating with a programmable thermostat.
	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable
Savings Principle	thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installation of programmable thermostat
Savings and	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	where.
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
	RLW Analytics (2007). Validating the Impacts of Programmable Thermostats. Prepared for GasNetworks;
Gas Heat MMBtu/yr savings source	Page 2. Conversion factor for CCF to therms is 1.024.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
measure life source	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor (SPF)	#N/A
Savings Persistence Factor source	#N/A Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
innu summer peak source	

RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 390/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 390/audit with multiple installed measures

TRL Reference Number	RI_0087
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise MultiFamily
Measure Name	Programmable thermostat
Measure Description	Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning
	operating times according to a pre-set schedule.
	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using
Baseline Description	natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi
	programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide
	space heating with a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable
	thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installation of programmable thermostat
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
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	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	The Cadmus Group (2012). Home Energy Services Impact Evaluation. Prepared for Massachusetts
	Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
	Deslighting wets is 1000% since success in a success to a success the
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RRe note RR demand (RRd) summer peak	0.00

RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         CG summer peak note       #N/A         CF summer peak note       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         Pre-Ridership       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00		
RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Manual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)       0.00         Spill-Ov	RRd summer peak note	#N/A
RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Manual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Gross	RR demand (RRd) winter peak	0.00
Coincidence factor (CF) summer peak0.00CF summer peak source#N/ACF summer peak note#N/ACoincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/ACF winter peak note#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Water / Sewer savings: gallons/yr0.00Water / Sewer savings source#N/AMultar / Sewer savings source#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross noteThe Ne	RRd winter peak source	#N/A
CF summer peak source#N/ACF summer peak note#N/ACoincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings Source#N/AAnnual \$ savings0.00Annual \$ savings0.00Annual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpail-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC ourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	RRd winter peak note	#N/A
CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (pon-participant)       0.00         Spill-Over (pon-participant)       0.00         Spill-Over (pon-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Ressure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC cource       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June	Coincidence factor (CF) summer peak	0.00
Coincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings source#N/AWater / Sewer savings source#N/AManual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC ourceGol/audit with multiple installed measuresGross Measure TRC note#N/A	CF summer peak source	#N/A
CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings ource/description       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross note       #N/A         Net-to-Gross note       #N/A         Ret-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC note       #N/A	CF summer peak note	#N/A
CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Met-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC note       #N/A	Coincidence factor (CF) winter peak	0.00
Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Met-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC note       #N/A	CF winter peak source	#N/A
Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings note       #N/A         Splil-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Splil-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	CF winter peak note	#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross note#N/AGross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC note#N/A	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC note#N/A	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC note#N/A	Water / Sewer savings Source	#N/A
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Set-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceWN/A	Annual \$ savings	0.00
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.00Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	One time \$ savings	0.00
Free-Ridership       0.00         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)0.00Spill-Over (non-participant)0.00Net-to-Gross1.00Net-to-Gross source#N/ANet-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.00         Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Free-Ridership	0.00
Net-to-Gross       1.00         Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.00
Net-to-Gross source       #N/A         Net-to-Gross note       The Net-to-Gross ratio is Assumed to be 100%.         Gross Measure TRC unit       \$ 601/audit with multiple installed measures         Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross noteThe Net-to-Gross ratio is Assumed to be 100%.Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross	1.00
Gross Measure TRC unit\$ 601/audit with multiple installed measuresGross Measure TRC sourceCadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, JuneGross Measure TRC note#N/A	Net-to-Gross source	#N/A
Gross Measure TRC source       Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June         Gross Measure TRC note       #N/A	Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC note #N/A	Gross Measure TRC unit	\$ 601/audit with multiple installed measures
	Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Incentive Unit \$ 553/audit with multiple installed measures	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 553/audit with multiple installed measures

TRL Reference Number	RI 0086
Fuel	Gas
	Residential
Sector	
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise
Measure Name	Programmable thermostat
Measure Description	Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning
	operating times according to a pre-set schedule.
	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using
Baseline Description	natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi
	programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide
	space heating with a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable
	thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installation of programmable thermostat
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
measure life source	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.99
RRe source	#N/A
RRe source RRe note	
	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak RRd summer peak source	0.00 #N/A
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RRd summer peak note	#N/A

RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1776/audit with multiple installed measures

TRL Reference Number	RI_0091
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyStar HVAC
Measure Name	WiFi Enabled Thermostat
Measure Description	Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning
	operating times according to a pre-set schedule.
	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using
Baseline Description	natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi
	programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide
	space heating with a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable
	thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installation of programmable thermostat
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	6.6
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Gas Heat MMBtu/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
	Accessed on 10/12/2011.
money into noto	
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISR)	1.00
In-service rate (ISR) In-service rate source	1.00 #N/A
In-service rate (ISR) In-service rate source In-service rate note	1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations.
In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF)	1.00         #N/A         All installations have 100% in-service rate since programs include verification of equipment installations.         1.00
In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source	1.00         #N/A         All installations have 100% in-service rate since programs include verification of equipment installations.         1.00         #N/A
In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note	1.00         #N/A         All installations have 100% in-service rate since programs include verification of equipment installations.         1.00         #N/A         Savings persistence is assumed to be 100%.
In-service rate (ISR) In-service rate source In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe)	1.00         #N/A         All installations have 100% in-service rate since programs include verification of equipment installations.         1.00         #N/A         Savings persistence is assumed to be 100%.         1.00

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RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 50 per measure

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TRL Reference Number         Fuel         Sector         Project Type         Category         Type         Sub-type         Program Name         Measure Name         Measure Description         Baseline Description         Savings Principle         Energy Savings calculation method         Savings unit         Savings Equation	RI_0092         Gas         Residential         Retrofit         HVAC         Controls         Thermostat         EnergyStar HVAC         WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Where:
Sector Project Type Category Type Sub-type Program Name Measure Name Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	Residential         Retrofit         HVAC         Controls         Thermostat         EnergyStar HVAC         WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Project Type Category Type Sub-type Program Name Measure Name Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	Retrofit         HVAC         Controls         Thermostat         EnergyStar HVAC         WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Category Type Sub-type Program Name Measure Name Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	HVAC         Controls         Thermostat         EnergyStar HVAC         WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Type Sub-type Program Name Measure Name Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	Controls         Thermostat         EnergyStar HVAC         WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Sub-type Program Name Measure Name Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	Thermostat         EnergyStar HVAC         WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Program Name Measure Name Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	EnergyStar HVAC         WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Measure Name Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Measure Description Baseline Description Savings Principle Energy Savings calculation method Savings unit	WiFi Enabled Thermostat with Cooling         Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Baseline Description Savings Principle Energy Savings calculation method Savings unit	operating times according to a pre-set schedule.         For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Baseline Description Savings Principle Energy Savings calculation method Savings unit	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat. The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed. Deemed Installation of programmable thermostat Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Principle Energy Savings calculation method Savings unit	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat. The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed. Deemed Installation of programmable thermostat Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Principle Energy Savings calculation method Savings unit	natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat. The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed. Deemed Installation of programmable thermostat Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Principle Energy Savings calculation method Savings unit	programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Energy Savings calculation method Savings unit	space heating with a programmable thermostat.         The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed.         Deemed         Installation of programmable thermostat         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Energy Savings calculation method Savings unit	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable thermostat installed. Deemed Installation of programmable thermostat Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Energy Savings calculation method Savings unit	thermostat installed. Deemed Installation of programmable thermostat Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings unit	Deemed Installation of programmable thermostat Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings unit	Installation of programmable thermostat Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	
Savings Equation	Where:
Savings Equation	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	104
<del>_</del>	The Cadmus Group (2011). Memo: Wi-fi Programmable Thermostat Billing Analysis. Prepared for Keith
kWh/yr savings source	Miller and Whitney Domigan, National Grid.
kWh/yr savings note	#N/A
kW reduction	0.231
KW reduction	The Cadmus Group (2011). Memo: Wi-fi Programmable Thermostat Billing Analysis. Prepared for Keith
kW reduction source	
	Miller and Whitney Domigan, National Grid.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	6.6
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Gas Heat MMBtu/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
measure life source	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A

RR demand (RRd) summer peak1.00RRd summer peak source#N/A	rate is 100% since gross savings values are based on evaluation results.
RRd summer peak source#N/ARRd summer peak noteRealization	
RRd summer peak note Realization	
BB demand (BBd) winter neak 1 00	rate is 100% since gross savings values are based on evaluation results.
RRd winter peak source #N/A	
RRd winter peak note Realization	rate is 100% since gross savings values are based on evaluation results.
Coincidence factor (CF) summer peak 1.00	
CF summer peak source	sing the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared fc	r the Massachusetts Program Administrators.
CF summer peak note #N/A	
Coincidence factor (CF) winter peak 1.00	
Estimated u	sing the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
CF winter peak source Prepared for	r the Massachusetts Program Administrators.
CF winter peak note #N/A	
Water savings: gallons/yr 0.00	
Sewer savings: gallons/yr 0.00	
Water / Sewer savings Source #N/A	
Water / Sewer savings note #N/A	
Annual \$ savings 0.00	
Annual \$ savings source / description #N/A	
Annual \$ savings note #N/A	
One time \$ savings 0.00	
One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.00	
Spill-Over (participant) 0.00	
Spill-Over (non-participant) 0.00	
Net-to-Gross 1.00	
Net-to-Gross source #N/A	
Net-to-Gross note The Net-to-	Gross ratio is Assumed to be 100%.
Gross Measure TRC unit \$ 270 per m	easure
Gross Measure TRC source #N/A	
Gross Measure TRC note #N/A	
Incentive Unit \$50 per me	asure

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TRL Reference Number	RI_0094
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise MultiFamily
Measure Name	WiFi programmable thermostat
Measure Description	Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning
•	operating times according to a pre-set schedule.
	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using
Baseline Description	natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi
	programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide
	space heating with a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable
	thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installation of programmable thermostat
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
<b>C</b> .	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	#N/A
., 0	
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A #N/A
Propane MMBtu/yr savings	#N/A 0
Propane MMBtu/yr savings source	
Propane MMBtu/yr savings source Propane MMBtu/yr savings note	#N/A #N/A
Energy Reference(s) & table(s) notes	#N/A 0
measure life	15
	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
measure life source	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A #N/A
nna summer peak note	וויאס

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RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 601/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 553/audit with multiple installed measures

TRL Reference Number	RI_0093 Gas
Fuel	
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	EnergyWise
Measure Name	WiFi programmable thermostat
Measure Description	Installation of a programmable thermostat which gives the ability to adjust heating or air-conditioning
•	operating times according to a pre-set schedule.
	For the intallation of a programmable thermostat, the baseline efficiency case is an HVAC system using
Baseline Description	natural gas to provide space heating without a programmable thermostat. For the intallation of a wi-fi
	programmable thermostat, the baseline efficiency case is an HVAC system using natural gas to provide
	space heating with a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system that has a programmable thermostat or wi-fi programmable
	thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installation of programmable thermostat
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Caulia an Easta than	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	
	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Gas Heat MMBtu/yr savings source	Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
	Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
mossure life course	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats.
measure life source	Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Sovings Dorsistones Foster (CDF)	1.00
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.99
	#N/A
RRe source	
RRe source RRe note RR demand (RRd) summer peak	Realization rate is 100% since gross savings values are based on evaluation results.

RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1776/audit with multiple installed measures

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TRL Reference Number	RI_0178
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	HVAC
Туре	Ventilation
Sub-type	Heat Recovery Ventilator
Program Name	EnergyStar HVAC
Measure Name	Hard-to-Reach Heat Recovery Ventilator
	Heat Recovery Ventilators (HRV) can help make mechanical ventilation more cost effective by reclaiming
Manaura Description	
Measure Description	energy from exhaust airflows. An electric penalty results due to the increased electricity consumed by the
	system fans.
Baseline Description	The baseline efficiency case is an ASHRAE 62.2-compliant exhaust fan system with no heat recovery.
Savings Principle	The high efficiency case is an exhaust fan system with heat recovery.
Energy Savings calculation method	Deemed
Savings unit	Installation of heat recovery ventilation system
5	Gross kWh = Qty × deltakWh
	$Gross kW = Qty \times deltakW$
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	NA (h. a. a. a.
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	-133
	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
kWh/yr savings source	Massachusetts. Prepared for GasNetworks.
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
	Prepared for the Massachusetts Program Administrators.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	7.7
	The Cadmus Group (2012). Massachusetts Residential Retrofit and Low Income Program Area: Brushless
Gas Heat MMBtu/yr savings source	Fan Motors Impact Evaluation. Prepared for The Electric and Gas Program Administrators of
	Massachusetts.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
	#N/A
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
measure life source	Massachusetts. Prepared for GasNetworks.
	Iviassachusetts. Frepareu ibi Gasivetworks.
measure life note	
measure life note	#N/A
In-service rate (ISR)	#N/A 1.00
	#N/A
In-service rate (ISR) In-service rate source In-service rate note	<pre>#N/A 1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations.</pre>
In-service rate (ISR) In-service rate source	#N/A 1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations. 1.00
In-service rate (ISR) In-service rate source In-service rate note	<pre>#N/A 1.00 #N/A All installations have 100% in-service rate since programs include verification of equipment installations.</pre>

1.00
#N/A
Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
#N/A
Realization rate is 100% since gross savings values are based on evaluation results.
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
1.00
Estimated using the demand allocation methodology described in: Cadmus Demand Impact Model (2012).
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
0.00
#N/A
-
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 960 per measure
#N/A
#N/A
\$ 250 per measure

TRL Reference Number	RI_0294
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	Income Eligible MultiFamily
Measure Name	Faucet aerator
Measure Description	Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow.
Baseline Description	The baseline efficiency case is an existing faucet with a high flow.
Savings Principle	The high efficiency is a low-flow faucet aerator.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
Heure	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A #N/A

0.00
#N/A
#N/A
0.00
#N/A
#N/A
332.00
0.00
The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 390/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A
\$ 390/audit with multiple installed measures

TRL Reference Number	RI_0333
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Water Heater
Sub-type	Efficient Water Heater
Program Name	Income Eligible MultiFamily
Measure Name	LI MF Water heating system replacement
	Replacement of an existing natural gas water heating system with a new high-efficiency natural gas
Measure Description	system.
Baseline Description	The baseline efficiency case is the existing natural gas water heating system.
Savings Principle	The high efficiency case is a high-efficiency natural gas water heating system.
Energy Savings calculation method	Deemed
Savings unit	
	Installed high-efficiency natural gas water heating system.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
<b>.</b> .	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
•	
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
	#N/A
RRd winter peak source	
RRd winter peak source RRd winter peak note Coincidence factor (CF) summer peak	#N/A 0.00

CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 390/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 390/audit with multiple installed measures

Fuel         Gas           Sector         Residential           ProjectType         Retrofit           Category         Water Heating           Type         Low Flow Showerhead           Sub Type         Low Flow Showerhead thermic Control (ladybug gas DHW)           Measure Description         A showerhead with a control that limits flow once water is heated.           Baseline Description         The baseline case is a showerhead with a fort of 25 gains per minute, or for the case of the adaper low flow Showerhead with a fort of 12 sg more res.           Savings Principle         The high efficiency is a low-flow showerhead with a to ontrol that limits flow once the water is heated.           Carery Savings calculation method         Deemed           Savings unit         Installed low-flow showerhead           Savings unit         Gross MMBtu_Gas = Quy & deltaMMBtu_Gas           Savings unit         Gross MMBtu_Gas = Quy & deltaMMBtu_Gas           Savings cource         BH/A           Hours N/A         Measure description           Wret extrama         N/A           More result         Meas = Average annual natural gas reduction per unit.           Hours Source         BH/A           Wret result         Bh/A           Wret result         Savings a contex           Wreduction source         B		
Sector         Residential           Project Type         Retrofit           Category         Water Heating           Type         Flow Control           Sub-type         Low Flow Showerhead           Program Name         Income Bigble Multi-annity           Messure Name         Low Flow Showerhead thermo Control (ladybug gas DHW)           Messure Description         A showerhead with a control that limits flow once water is heated.           Baseline Description         A showerhead with flow of 1.5 galons per minute, or for the case of the adaper low showerhead with flow of 2.5 galons per minute, or for the case of the adaper low flow showerhead with flow of 2.5 galons per minute, or for the case of the adaper low showerhead with flow of 2.5 galons per minute, or for the case of the adaper low showerhead with flow of 2.5 galons per minute, or for the case of the adaper low flow showerhead is flow flow showerhead           Savings Equation         City = Tat number of units.           detaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours Source           N/A         MA           Hours Source mote         RN/A           Wirfly's swings note         RN/A           Wirfly's sw	TRL Reference Number	RI_0318
Project Type         Retroft           Cottspory         Water Heating           Type         How Control           Sub type         Low Flow Showerhead           Program Name         Income tligble Multifamily           Measure Description         As howerhead with a control that limits flow once water is heated.           Baseline Description         The baseline case is a showerhead with a low of 1.5 gpm of ess.           Savings Principle         The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.           Baseline Description         Installed low-flow showerhead           Savings Principle         The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.           Breage Savings calculation method         Deemed           Savings unit         Gress MM8tu_Gas = Qtry × dettaMM8tu_Gas           Savings figuation         Where:           Qtry = Total number of units, detaMM8tu_Gas         Multi Gas = Qtry × dettaMM8tu_Gas           Hours Source         M/A           Hours Source         M/A           MVMyr savings note         M/A           WM/Myr Savings Doute         M/A           WM/Myr Savings Doute         M/A           WM/Myr Savings note         M/A           WM/Myr Savings note         M/		
Category         Water Heating           Type         Elow Control           Sub type         Low Flow Showehead           Program Name         Income Eligible MultiFamily           Measure Name         Low Flow Showehead thermo Control [daybug gas DHW]           Measure Description         A showehead with a control that limits flow one water is heated.           Baseline Description         The baseline case is a showehead with a control that limits flow once where is heated.           Savings Principle         The high efficiency is a low-flow showehead with a control that limits flow once the water is heated.           Baseline Description         Gross MMRtu_Gas = Quy × detraMMRtu_Gas           Savings unit         Installed low-flow showehead           Savings Equation         Where: dross and MRtu_Gas = Average annual natural gas reduction per unit. detraMMRtu_Gas = Average annual natural gas reduction per unit.           Mours         N/A           Hours Source note         MNA           Whyfy sings onte         MNA           Whyfy sings note         MNA           Whyfy sings note         MNA           Whyfyr swings note         MNA           Whyfyr swings note         MNA           MWhyfyr swings note         MNA           MWhyfyr swings note         MNA           MMA         MA	Sector	Residential
Type         Flow Control           Sub-type         Low Flow Showerhead           Program Name         Income Eligible MultiFamily           Measure Description         As showerhead with a control that limits flow one water is heated.           Baseline Description         The baseline case is a showerhead with a low of 1.5 gpm or less.           Savings Principle         The high efficiency is a low flow showerhead with a control that limits flow once the water is heated.           Energy Savings calculation method         Deemed           Savings principle         The high efficiency is a low flow showerhead           Savings unit         Installed low-flow showerhead           Savings unit         Installed low-flow showerhead           Gross MMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         MVA           Hours Source         MVA           Whyry savings note         MVA           Whyry savings source         MVA           Wir eduction on         0           Wir eduction source         MVA           Wir eduction source         MVA           Wir eduction source         MVA           Wirdyr savings source         MVA           Wirdyr savings source         MVA           Wir eduction note         MVA	Project Type	Retrofit
Sub-type         Low Flow Showerhead           Program Name         Income Eligible MultiFamily           Measure Name         Low Flow Showerhead memo Control (ladybug gas DHW)           Measure Description         A showerhead with a control that limits flow once water is heated.           Baseline Description         The baseline case is a showerhead with a control that limits flow once the case of the adaper low flow showerhead with a control that limits flow once the water is heated.           Baseline Description         The high efficiency is a low flow showerhead with a control that limits flow once the water is heated.           Barygings calculation method         Deemed           Savings Equation         Where:           City = Total number of units.         City = Total number of units.           GetaMMBtu_Gas = Qty x deltaMMBtu_Gas         Where:           N/A         Hours N/A           Hours N/A         Hours A           Hours Surce N/A         M/A           Hours Surce N/A         M/A           Wh/yr savings source         RN/A           Wh/yr savings source         RN/A           Wh/yr rawings note         N/A           Wh/yr savings note         N/A           Wh/yr Savings note         N/A           MWh/yr savings note         N/A           Gas Heat MMBtu/yr savings note	Category	
Program Name         Income Flighle MultiFamily.           Messure Name         Low Flox Showethead thermo Control (Jadybug gas DHW)           Messure Description         A browethead with a control that limits flow once water is heated.           Baseline Description         The baseline case is a showethead with a flow of 2.5 gailons per minute, or for the case of the adaper low flow showethead with infow of 1.5 gam or less.           Savings Principle         The high efficiency is a low-flow showethead with a control that limits flow once the water is heated.           Chargy Savings calculation method         Deemed           Savings unit         Installed low-flow showethead           Installed low-flow showethead         Gross MMBtu_Gas = Qty x dettaMMBtu_Gas           Savings Equation         Where:           Ours         MyA           Hours Source         MyA           Hours Source         MyA           Hours Source         MyA           Wr eduction once         N/A           WW reduction source         MYA           Wr eduction source         MYA           Savings Source         MYA           Gas Heat MMBtu/ry sa		Flow Control
Messure Name         Low Flow Showerhead thermo Control (lidybug gas DHW)           Messure Description         A showerhead with a control that limits flow or 2.5 gallons per minute, or for the case of the adaper low flow showerhead with low of 1.5 gan or less.           Savings Principle         The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.           Energy Savings calculation method         Deemed           Savings Linut         Installed low-flow showerhead           Savings Equation         Where: Other Total and the control that limits flow once the water is heated.           Savings Equation         Uhr = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source         HV/A           Hours Source         HV/A           Whyry savings note         HV/A           Whyry savings note         HV/A           WWhyr savings once         HV/A           WW reduction source         HV/A           WW reduction source         HV/A           WW reduction source         HV/A           Gas Heat MMBLU/r savings once         HV/A           Ol IMMBLU/r savings once         HV/A           Ol IMMBLU/r savings once         HV/A           Ol IMMBLU/r savings source         HV/A	Sub-type	Low Flow Showerhead
Measure Description         A showerhead with a control that limits flow once water is heated.           Baseline Description         The baseline case is a showerhead with allow of 2.5 gallons per minute, or for the case of the daper low flow showerhead with flow of 1.5 gpm or less.           Savings Principle         The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.           Energy Savings calculation method         Deemed           Savings init         Installed low-flow showerhead           Savings init         Installed low-flow showerhead           Gross MMBtu_Gas = Qty × dettaMMBtu_Gas         Control that limits flow once the water is heated.           Savings init         Installed low-flow showerhead           Hours Source         Where:         Oty = Total number of units.           Hours Source         IN/A         Hours Source           WhA         N/A         KWh/ry savings note           WN/A         KWh/ry savings note         HV/A           KW reduction source         HV/A         KWh/ry savings           Gas Heat MMBtu/r savings         O.2         Control           Gas Heat MMBtu/r savings note         HV/A         KWrA           KW reduction note         HV/A         Gas Hout MMBtu/r savings note         HV/A           Gas Heat MMBtu/r savings note         HV/A	Program Name	Income Eligible MultiFamily
Baseline Description         The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper low flow showerhead with flow of 1.5 gpm or less.           Savings Principle         The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.           Energy Savings calculation method         Deemed           Savings unit         Installed low-flow showerhead           Savings Equation         Where:           Qty = Total number of units.         detlaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours source         MIV/A           Why restings source         MIV/A           Wurdy source note         MIV/A           Why restings source         MIV/A           Wurdy savings source         MIV/A           Why reduction on         0           KW reduction         0           Savings source         MIV/A           Wr eduction note         MIV/A           MW reduction note         MIV/A           MIVA         Savings source           MIVA         MIVA           Wr eduction note         MIV/A           OI MMBtu/yr savings source         MIVA           MIVA         MIVA           MiVA         MIVA	Measure Name	Low Flow Showerhead thermo Control (ladybug gas DHW)
Baseline Description low flow showerhead with flow of 1.5 gpm or less. Savings Principle The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated. Energy Savings calculation method Deemed Savings unit Installed low-flow showerhead City = Total number of units. City = Total number o	Measure Description	
Savings Principle         The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.           Energy Savings calculation method         Deemed           Savings unit         Installed low-flow showerhead           Savings Equation         Gross MMBu_Gas = Qty × deftaMMBtu_Gas           Where:         Qty = Total number of units.           dettaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source NM/A         MV/A           Hours Source note         MV/A           KWh/yr savings source         M/A           KWh/yr savings source         M/A           KW reduction         0           KW reduction note         M/A           Gas Heat MMBtu/yr savings         0.21           Gas Heat MMBtu/yr savings source         M/A           Gas Heat MMBtu/yr savings source         M/A           Gil MMBtu/yr savings source         M/A           Gil MMBtu/yr savings source         M/A           Gil MMBtu/yr savings source         M/A           Gas Heat MMBtu/yr savings source         M/A           Gas Heat MMBtu/yr savings source         M/A           Gil MMBtu/yr savings source         M/A           Gas Heat MMBtu/yr savings source         M/A	Baseline Description	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a low flow showerhead with flow of 1.5 gpm or less.
Savings unit       Installed low-flow showerhead         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation       Where:         Outy = Total number of units.         detaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours Source       N/A         Hour Source note       M/A         KWh/ry savings note       M/A         KWh/ry savings note       M/A         KW reduction source       M/A         Gas heat MMBtu/yr savings source       M/A         Gas heat MMBtu/yr savings note       M/A         MU/A       MA         Gas heat MMBtu/yr savings note       M/A         Gas heat MMBtu/yr savings note       M/A         Gas heat MMBtu/yr savings note       M/A         Gas heat MMBtu/yr savings note       M/A      <	Savings Principle	
Savings unit       Installed low-flow showerhead         Gross MVBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation       Qty = Total number of units. detaMMBtu_Gas = Average annual natural gas reduction per unit. Hours Source         Hours Source       N/A         Hours Source onte       N/A         KWh/yr savings note       N/A         KWh/yr savings note       N/A         KW reduction source       N/A         Gas heat MMBtu/yr savings source       N/A         Gas heat MMBtu/yr savings note       N/A         MU/A       MMBtu/yr savings note       N/A         Gas heat MMBtu/yr savings note       N/A         Gas heat MMBtu/yr savings note       N/A       M         Gas heat MMBtu/yr savings note       N/A       M <t< td=""><td>Energy Savings calculation method</td><td>Deemed</td></t<>	Energy Savings calculation method	Deemed
Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Savings Equation         Where:           Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         #N/A           Hours Source note         #N/A           KWh/yr savings ource         #N/A           KWh/yr savings source         #N/A           KWh/yr savings note         #N/A           KWr eduction         0           KW reduction source         #N/A           Sa sheat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Qi I MMBtu/yr savings         0.21           Gas Heat MMBtu/yr savings source         #N/A           Qi I MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings note         #N/A </td <td></td> <td></td>		
Savings Equation       Where:         Oty = Total number of units.         Hours       N/A         Hours Source       #N/A         Hours source note       #N/A         KWh/yr Savings       0         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KW reduction       0         KW reduction note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A      <	Savings and	
Qty = Total number of units.           deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         HV/A           Hours Source note         HV/A           KWh/yr savings source         HV/A           KWh/yr savings note         HV/A           KWh/yr savings note         HV/A           KWh/yr savings note         HV/A           KW reduction source         HV/A           KW reduction note         HV/A           Gas Heat MMBtu/yr savings         0.21           Gas Heat MMBtu/yr savings         0           Gas Heat MMBtu/yr savings         0           Oil MMBtu/yr savings note         HV/A           Gil MMBtu/yr savings note         HV/A           Gil MMBtu/yr savings note         HV/A           Gas Heat MMBtu/yr savings note         HV/A           Gas Heat MMBtu/yr savings note         HV/A           Gil MMBtu/yr savings note         HV/A           Propane MMBtu/yr savings note         HV/A           Propane MMBtu/yr savings note         HV/A           Dergane MMBtu/yr savings note         HV/A           Metu/r savings note         HV/A           Propane MMBtu/yr savings note         HV/A           Inergy Reference(s) & table(s) notes <td< td=""><td>Savings Equation</td><td></td></td<>	Savings Equation	
Identify         Identify           Hours         N/A           Hours Source         #N/A           Hours Source note         #N/A           KWh/yr savings source         #N/A           KWh/yr savings source         #N/A           KWh/yr savings source         #N/A           KWh/yr savings note         #N/A           KWh/yr savings note         #N/A           KW reduction source         #N/A           KW reduction note         #N/A           Gas Heat MMBtu/yr savings         0.21           Gas Heat MMBtu/yr savings note         #N/A           Gas Heat MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Oil MMBtu/yr savings note         #N/A           Propane Iffe note         Massachusetts Common Assumption           In-service rate (SR)         1.00		
Hours     N/A       Hours Source note     #N/A       Hours Source note     #N/A       KWh/yr savings source     #N/A       KWh/yr savings note     #N/A       KWh/yr savings note     #N/A       KW reduction     0       KW reduction note     #N/A       KW reduction note     #N/A       Gas Heat MMBtu/yr savings ource     #N/A       Gas Heat MMBtu/yr savings ource     #N/A       Gas Heat MMBtu/yr savings note     #N/A       Gil MMBtu/yr savings note     #N/A       Energy Reference(s) & table(s) notes     0       Propane MMBtu/yr savings note     #N/A       measure life note     Massachusetts Common Assumption       In-service rate note     All installations have 100% in-service rate since programs include verification of equipment installatio       Savings Persistence Factor Source     #N/A       Savings Persistence Factor note     Savings persistence Factor sour		
Hours Source     #N/A       Hours source note     #N/A       Hours source note     #N/A       KWh/yr savings ource     #N/A       KWh/yr savings note     #N/A       KW reduction     0       KW reduction note     #N/A       Gas Heat MMBtu/yr savings source     #N/A       Gas Heat MMBtu/yr savings note     #N/A       Gas Heat MMBtu/yr savings note     #N/A       Oil MMBtu/yr savings note     #N/A       Propane MMBtu/yr savings note     #N/A       Propane MMBtu/yr savings note     #N/A       Propane MMBtu/yr savings note     #N/A       Energy Reference(s) & table(s) notes     0       measure life     7       measure life note     Masachusetts Common Assumption       In-service rate note     All installations have 100% in-service rate since programs include verification of equipment installation       Savings Persistence Factor source     #N/A       Readings Persistence Factor source     #N/A       Re note     Nalisinal Grid assumption based on regional PA working groups.       Re note     Nalisinal Grid assumption based on regional PA worki		
Hours source note       #N/A         kWh/yr savings source       #N/A         kWh/yr savings note       #N/A         kWr reduction       0         kW reduction source       #N/A         kW reduction source       #N/A         kW reduction source       #N/A         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(5) & table(s) notes       0         measure life       7         measure life       7         measure life note       Massachusetts Common Assumption         In-service rate note       All installations have 100% in-service rate since programs include verification o	Hours	
kWh/yr savings       0         kWh/yr savings source       #N/A         kWh/yr savings note       #N/A         kW reduction       0         kW reduction note       #N/A         kW reduction note       #N/A         gas Heat MMBtu/yr savings       0.21         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         In-service rate ife       7         measure life note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-serv	Hours Source	
kWh/yr savings source       #N/A         kWh/yr savings note       #N/A         kWr eduction       0         kW reduction source       #N/A         kW reduction note       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life note       Massachusetts Common Assumption         In-service rate (SR)       1.00         In-service rate source       #N/A         In-service rate source       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Re note       All installations have 100% in-service rate since programs include verification of equipment installation         Savings Persistence Factor source       #N/A	Hours source note	#N/A
kWh/yr savings note       #N/A         kW reduction       0         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0.21         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         Propane Iffe note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installation         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence Factor source         Savings Persistence Factor Surce       #N/A         Re andte       National Grid assumption based on regional PA working groups.		
kW reduction       0         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0.21         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installation         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Rea burde       N/A         Rea source       #N/A         Rea note       National Grid assumption based on regional PA working groups.         RR demand (RRd) summer peak       0.00		#N/A
kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0.21         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life source       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RR emand (RRd) summer peak       0.00         RR demand (RRd) summer peak note       M/A         RRd summer peak source	kWh/yr savings note	#N/A
kW reduction note       #N/A         Gas Heat MMBtu/yr savings       0.21         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #W/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-service rate source       #N/A         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence Factor source         Re note       National Grid assumption based on regional PA working groups.         Re note       National Grid assumption based on regional PA working groups.         RR demand (RRd) summer peak       0.00         RR demand (RRd) winte	kW reduction	0
Gas Heat MMBtu/yr savings       0.21         Gas Heat MMBtu/yr savings source       #W/A         Gas Heat MMBtu/yr savings note       #W/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #W/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installation         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor source       #N/A         Realization rate energy (RRe)       1.00         Re note       National Grid assumption based on regional PA working groups.         Re note       National Grid assumption based on regional PA working groups.         Re demand (RRd) summer peak       0.00         RR demand (RRd) winter peak       0.00	kW reduction source	
Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings ource       #N/A         Oil MMBtu/yr savings ource       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       Verifying Thermostatic Valve Showerhead Savings.xls         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life source       #N/A         In-service rate (ISR)       1.00         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installatio         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         Re note       National Grid assumption based on regional PA working groups.         RR demand (RRd) summer peak       0.00         RR demand (RRd) winter peak       0.00	kW reduction note	#N/A
Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings ource       Verifying Thermostatic Valve Showerhead Savings.xls         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life source       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Realization rate energy (RRe)       1.00         Realization rate energy (RRe)       1.00         Realization rate energy (RRe)       1.00         RRe note       National Grid assumption based on regional PA working groups.         RR demand (RRd) summer peak note       #N/A         RR demand (RRd) winter peak       0.00	Gas Heat MMBtu/yr savings	0.21
Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       Verifying Thermostatic Valve Showerhead Savings.xls         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life source       #N/A         In-service rate (ISR)       1.00         In-service rate ote       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installatio         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence Factor note         Savings Persistence Factor note       Savings persistence factor note         Realization rate energy (RRe)       1.00         Re source       #N/A         RRe note       National Grid assumption based on regional PA working groups.         RR demand (RRd) summer peak       0.00         RR demand (RRd) winter peak       0.00	Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings ource       Verifying Thermostatic Valve Showerhead Savings.xls         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life source       #N/A         measure life note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installatio         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Realization rate energy (RRe)       1.00         RR enote       National Grid assumption based on regional PA working groups.         RR demand (RRd) summer peak       0.00         RR demand (RRd) winter peak       0.00	Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       Verifying Thermostatic Valve Showerhead Savings.xls         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installation         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         RR demand (RRd) summer peak       0.00         RR demand (RRd) winter peak       0.00	Oil MMBtu/yr savings	0
Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       Verifying Thermostatic Valve Showerhead Savings.xls         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       7         measure life source       #N/A         measure life note       Massachusetts Common Assumption         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installation         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00         RRe source       #N/A         RRe note       National Grid assumption based on regional PA working groups.         RR demand (RRd) summer peak       0.00         RR demand (RRd) winter peak       0.00	Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings sourceVerifying Thermostatic Valve Showerhead Savings.xlsPropane MMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life7measure life source#N/Ameasure life noteMassachusetts Common AssumptionIn-service rate (ISR)1.00In-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installationSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00Renote#N/ARe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak note#N/ARR demand (RRd) winter peak0.00	Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings note#N/AEnergy Reference(s) & table(s) notes0measure life7measure life source#N/Ameasure life noteMassachusetts Common AssumptionIn-service rate (ISR)1.00In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installatioSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARR demand (RRd) summer peak0.00RR demand (RRd) winter peak0.00RR demand (RRd) winter peak0.00	Propane MMBtu/yr savings	0
Energy Reference(s) & table(s) notes0measure life7measure life source#N/Ameasure life noteMassachusetts Common AssumptionIn-service rate (ISR)1.00In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installationSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RR conce#N/ARR demand (RRd) summer peak0.00RR demand (RRd) winter peak0.00	Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
measure life7measure life source#N/Ameasure life noteMassachusetts Common AssumptionIn-service rate (ISR)1.00In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installatioSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARR demand (RRd) summer peak0.00RR demand (RRd) winter peak0.00RR demand (RRd) winter peak0.00	Propane MMBtu/yr savings note	#N/A
measure life7measure life source#N/Ameasure life noteMassachusetts Common AssumptionIn-service rate (ISR)1.00In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installatioSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARR demand (RRd) summer peak0.00RR demand (RRd) winter peak0.00RR demand (RRd) winter peak0.00		0
measure life noteMassachusetts Common AssumptionIn-service rate (ISR)1.00In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installatioSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak note#N/ARR demand (RRd) winter peak0.00		7
In-service rate (ISR)1.00In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installationSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak note#N/ARR demand (RRd) winter peak0.00	measure life source	#N/A
In-service rate (ISR)1.00In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installationSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak note#N/ARR demand (RRd) winter peak0.00	measure life note	Massachusetts Common Assumption
In-service rate source#N/AIn-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installationSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak note#N/ARR demand (RRd) winter peak0.00	In-service rate (ISR)	
In-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installationSavings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak note#N/ARR demand (RRd) winter peak0.00	In-service rate source	#N/A
Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00	In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00	Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00	Savings Persistence Factor source	#N/A
Realization rate energy (RRe)1.00RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00		Savings persistence is assumed to be 100%.
RRe source#N/ARRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00		1.00
RRe noteNational Grid assumption based on regional PA working groups.RR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00		#N/A
RR demand (RRd) summer peak       0.00         RRd summer peak source       #N/A         RRd summer peak note       #N/A         RR demand (RRd) winter peak       0.00		
RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00		
RRd summer peak note#N/ARR demand (RRd) winter peak0.00		
RR demand (RRd) winter peak 0.00	•	
RRd winter peak source I#N/A	RRd winter peak source	#N/A
RRd winter peak note #N/A		
Coincidence factor (CF) summer peak 0.00		

CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	296.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 390/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 390/audit with multiple installed measures

TRL Reference Number	RI 0317
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyWise MultiFamily
Measure Name	Low Flow Showerhead thermo Control (ladybug gas DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
Baseline Description	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
-	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.21
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	/ #N/A
measure life note	
	Massachusetts Common Assumption
In-service rate (ISR)	1.00 #N/A
In-service rate source In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A #N/A
	0.00
Coincidence factor (CF) summer peak	0.00

CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	435.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 601/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 553/audit with multiple installed measures

TRL Reference Number Fuel Sector Project Type Category	RI_0316 Gas Residential Retrofit
Sector Project Type	Residential
Project Type	
, ,,	Betrofit
Category	Retolit
	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyWise
Measure Name	Low Flow Showerhead thermo Control (ladybug gas DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
Baseline Description	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.14
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source measure life note	#N/A
	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
	#N/A
RRd summer peak note	
	0.00
RRd summer peak note	
RRd summer peak note RR demand (RRd) winter peak	0.00

#N/A
#N/A
0.00
#N/A
#N/A
296.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 2537/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A
\$ 1776/audit with multiple installed measures

TPL Poforonco Numbor	RI 0310
TRL Reference Number Fuel	RI_0310 Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Type	Flow Control
Sub-type	Low Flow Showerhead
Program Name	Income Eligible MultiFamily
Measure Name	Low Flow Showerhead w/thermo Control (roadrunner gas DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
Baseline Description	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
	#N/A
Hours source note	0
kWh/yr Savings	0 #N/A
kWh/yr savings source	
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	1.4 The Cadmus Group (2009). Impact Evaluation of the 2007 Appliance Management Program and Low Income Weatherization Program. Prepared for National Grid.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor source	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A

0.00
#N/A
#N/A
0.00
#N/A
#N/A
1768.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 390/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A
\$ 390/audit with multiple installed measures

TRL Reference Number	RI 0309
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyWise MultiFamily
Measure Name	Low Flow Showerhead w/thermo Control (roadrunner gas DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a
Baseline Description	low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
11	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	1.4
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	#N/A
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
	1

#N/A
#N/A
0.00
#N/A
#N/A
2888.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 601/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A
\$ 553/audit with multiple installed measures

TRL Reference Number	RI 0308
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating Flow Control
Type	
Sub-type	Low Flow Showerhead
Program Name	EnergyWise
Measure Name	Low Flow Showerhead w/thermo Control (roadrunner gas DHW)
Measure Description	A showerhead with a control that limits flow once water is heated.
Baseline Description	The baseline case is a showerhead with a flow of 2.5 gallons per minute, or for the case of the adaper, a low flow showerhead with flow of 1.5 gpm or less.
Savings Principle	The high efficiency is a low-flow showerhead with a control that limits flow once the water is heated.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.86
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	//////////////////////////////////////
measure life note	Massachusetts Common Assumption
In-service rate (ISR)	
In-service rate (ISR)	#N/A
In-service rate source	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	National Grid assumption based on regional PA working groups.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A

RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	1768.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1776/audit with multiple installed measures

TRL Reference Number	RI_0293
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	EnergyWise MultiFamily
Measure Name	Faucet aerator
Massura Description	Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a
Measure Description	commercial setting with service water heated by natural gas.
Baseline Description	The baseline efficiency case is 2.2 GPM or greater faucet.
Savings Principle	The high efficiency case is a faucet with 1.5 GPM or less aerator installed.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
	#N/A
Gas Heat MMBtu/yr savings source	
Gas Heat MMBtu/yr savings note	#N/A 0
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
	Prepared for the Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
	Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A

0.00
#N/A
#N/A
0.00
#N/A
#N/A
332.00
0.00
The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Prepared for the Massachusetts Program Administrators.
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
#N/A
The Net-to-Gross ratio is Assumed to be 100%.
\$ 601/audit with multiple installed measures
Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
#N/A
\$ 553/audit with multiple installed measures

TRL Reference Number	RI_0323
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	Income Eligible MultiFamily
Measure Name	Low-flow showerhead
Measure Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.
	The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the
Baseline Description	baseline is the existing showerhead.
Savings Principle	The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
Savings unit	
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	140
Savings Equation	Where:
-	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	Verifying Thermostatic Valve Showerhead Savings.xls
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
., 0	#N/A
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
measure life source	Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Covings Development Factor (CDE)	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RPd) cummor pook	0.00
RR demand (RRd) summer peak	#N/A
RRd summer peak source	#N/A
	#N/A #N/A
RRd summer peak source	
RRd summer peak source RRd summer peak note	#N/A

Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	3696.00
Sewer savings: gallons/yr	0.00
Mater / Source courses	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Water / Sewer savings Source	Prepared for the Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 390/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 390/audit with multiple installed measures

TRL Reference Number	RI_0322
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyWise MultiFamily
Measure Name	Low-flow showerhead
Measure Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.
• • •	The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the
Baseline Description	baseline is the existing showerhead.
Savings Principle	The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Gross Minible_Gas – Qty × deitainindte_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
measure life source	Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A

Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	3696.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Water / Sewer savings Source	Prepared for the Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 601/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 553/audit with multiple installed measures

TRL Reference Number	RI_0321
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	EnergyWise
Measure Name	Low-flow showerhead
Measure Description	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less.
	The baseline efficiency case is a showerhead with a flow of 2.5 gpm. For home audit applications, the
Baseline Description	baseline is the existing showerhead.
Savings Principle	The high efficiency is a low-flow showerhead with a flow of 1.5 gpm or less.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A #N/A
	#N/A 0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
	Prepared for the Massachusetts Program Administrators.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
	Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.99
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A

Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	3696.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis.
Water / Sewer savings Source	Prepared for the Massachusetts Program Administrators.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	\$ 2537/audit with multiple installed measures
Gross Measure TRC source	Cadmus, Inc., LED Incremental Cost Study - Modeling Light Tracker LED and Halogen Pricing Data, June
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1776/audit with multiple installed measures

TRL Reference Number	RI_0356
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Whole Home
Туре	Behavior
Sub-type	Home Energy Reports
Program Name	Home Energy Reports
Measure Name	New Movers
Measure Description	A Home Energy report sent to gas customers that displays home energy consumption in comparison with
	peers and prompts energy conserving behavior.
Baseline Description	A control group of homes that does not receive Home Energy Reports.
Savings Principle	A home that receives Home Energy Reports.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Customer receiving energy reports
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	1
measure life source	Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts Energy Efficiency Advisory Council & Behavioral Research Team
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is 100% since measure life is 1 year.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate will be determined by an independent evaluation.
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A #N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak source	#N/A #N/A
	#1V/A

Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	Free-ridership and spillover are not applicable as customers cannot participate without the utility
Net-to-Gross note	program.
Gross Measure TRC unit	\$ 3.71 per participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 3.71 per participant

TRL Reference Number	RI_0411
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Whole Home
Туре	Behavior
Sub-type	Home Energy Reports
Program Name	Home Energy Reports
Measure Name	Opt-out dual fuel
Measure Description	A Home Energy report sent to gas customers that displays home energy consumption in comparison with peers and prompts energy conserving behavior.
Baseline Description	No Home Energy Report.
Savings Principle	A home that receives Home Energy Reports.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Per participant
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	9 #N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
	1
measure life	
measure life source	Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts Energy Efficiency Advisory Council & Behavioral Research Team
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is 100% since measure life is 1 year.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate will be determined by an independent evaluation.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A

Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	Free-ridership and spillover are not applicable as customers cannot participate without the utility
Net-to-Gross note	program.
Gross Measure TRC unit	\$ 3.71 per participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 3.71 per participant

TDL Deference Number	01.0440
TRL Reference Number	RI_0412
Fuel	Gas
Sector	Residential
Project Type	Retrofit
Category	Whole Home
Туре	Behavior
Sub-type	Home Energy Reports
Program Name	Home Energy Reports
Measure Name	Opt-out gas
Measure Description	A Home Energy report sent to gas customers that displays home energy consumption in comparison with
	peers and prompts energy conserving behavior.
Baseline Description	No Home Energy Report.
Savings Principle	A home that receives Home Energy Reports.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Per participant
	Gross kWh = deltakWh_custom
Savings Equation	Gross Summer kW = deltakW_sp_custom
	Gross Winter kW = deltakW_wp_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	1
measure life source	Opinion Dynamics with Navigant Consulting (2012). Massachusetts Three Year Cross-Cutting Behavioral Program Evaluation Integrated Report July 2012. Prepared for Massachusetts Energy Efficiency Advisory Council & Behavioral Research Team
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is 100% since measure life is 1 year.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate will be determined by an independent evaluation.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
e. sammer peak note	l

	1
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	Free-ridership and spillover are not applicable as customers cannot participate without the utility
Net-to-Gross note	program.
Gross Measure TRC unit	\$ 3.71 per participant
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 3.71 per participant

Fuel       0         Sector       0         Project Type       0         Category       1         Type       0         Sub-type       1         Program Name       1         Measure Name       1         Measure Description       1         Baseline Description       1         Savings Principle       1         Energy Savings calculation method       1         Savings unit       1	RI_0372 Gas C&I Direct Install HVAC Controls Boiler Control Direct Install Boiler Reset Control Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature. The high efficiency case is a boiler with reset controls.
Sector       ()         Project Type       [)         Category       [)         Type       ()         Sub-type       []         Program Name       []         Measure Name       []         Measure Description       []         Baseline Description       []         Savings Principle       []         Energy Savings calculation method       []         Savings unit       []	C&I Direct Install HVAC Controls Boiler Control Direct Install Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Project Type       [         Category       [         Type       [         Sub-type       [         Program Name       [         Measure Name       [         Measure Description       [         Baseline Description       [         Savings Principle       1         Energy Savings calculation method       [         Savings unit       [	Direct Install HVAC Controls Boiler Control Direct Install Direct Install Direct Install Boiler Reset Control Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Category       I         Type       C         Sub-type       F         Program Name       F         Measure Name       F         Measure Description       F         Baseline Description       F         Savings Principle       T         Energy Savings calculation method       F         Savings unit       I	HVAC Controls Boiler Control Direct Install Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Type       0         Sub-type       1         Program Name       1         Measure Name       1         Measure Description       1         Baseline Description       1         Savings Principle       1         Energy Savings calculation method       1         Savings unit       1	Controls Boiler Control Direct Install Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Sub-type       F         Sub-type       F         Program Name       F         Measure Name       F         Measure Description       F         Baseline Description       F         Savings Principle       T         Energy Savings calculation method       F         Savings unit       F	Boiler Control Direct Install Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Program Name         Measure Name         Measure Description         Baseline Description         Savings Principle         Energy Savings calculation method         Savings unit	Direct Install Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Measure Name       I         Measure Description       I         Baseline Description       I         Savings Principle       1         Energy Savings calculation method       I         Savings unit       I	Boiler Reset Control Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Measure Description       I         Baseline Description       f         Savings Principle       1         Energy Savings calculation method       I         Savings unit       I	Boiler reset controls are devices that automatically control boiler water temperature based on outdoor temperature using a software program. Fixed boiler water temperature.
Measure Description       t         Baseline Description       f         Savings Principle       1         Energy Savings calculation method       I         Savings unit       I	temperature using a software program. Fixed boiler water temperature.
Baseline Description     F       Savings Principle     T       Energy Savings calculation method     I       Savings unit     I	Fixed boiler water temperature.
Savings Principle Tenergy Savings calculation method I Savings unit I	
Energy Savings calculation method [ Savings unit ]	The high efficiency case is a boiler with reset controls.
Savings unit I	
	Deemed
	Installed boiler reset control
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
1	
	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	N/A
	#N/A
	#N/A
	0
11 - 0-	#N/A
	#N/A
	0
	#N/A
	#N/A
	35.5
., .	#N/A
	#N/A
	0
	#N/A
	#N/A #N/A
	0
	#N/A
., .	#N/A
6, (, (,	0
measure life 2	20
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
	#N/A
· · · ·	1.00
In-service rate source #	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
	1.00
	#N/A
	Savings persistence is assumed to be 100%.
	1.00
	#N/A
	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
	1.00
	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
	#N/A
· · · · · · · · · · · · · · · · · · ·	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RRd winter peak note	

CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 600 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 420 per measure

	DL 0004
TRL Reference Number	RI_0084
Fuel	Gas C&I
Sector	
Project Type	Direct Install
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	Direct Install
Measure Name	Programmable thermostat
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system using natural gas to provide space heating with a
	programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where:
	Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	= #N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	3.2
Gas Heat MMBtu/yr savings source	E-mail correspondence among MA PAs and Ralph Prahl
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	= #N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A
	#N/A Savings persistence is assumed to be 100%.
Savings Persistence Factor source	
Savings Persistence Factor source Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe)	Savings persistence is assumed to be 100%. 1.00
Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe) RRe source	Savings persistence is assumed to be 100%. 1.00 #N/A
Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe) RRe source RRe note	Savings persistence is assumed to be 100%. 1.00 #N/A Realization rate is 100% since gross savings values are based on evaluation results.
Savings Persistence Factor source Savings Persistence Factor note Realization rate energy (RRe) RRe source RRe note RR demand (RRd) summer peak	Savings persistence is assumed to be 100%. 1.00 #N/A Realization rate is 100% since gross savings values are based on evaluation results. 0.00

DDd winter neek source	451/A
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.03
Spill-Over (participant)	0.02
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 180 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 126 per measure

TRL Reference Number	RI_0176
Fuel	Gas
Sector	
Project Type	Direct Install
Category	HVAC
Туре	Steam Traps
Sub-type	Steam Trap
Program Name	Direct Install
Measure Name	Steam trap HVAC
Measure Description	The repair or replacement of malfunctioning steam traps.
Baseline Description	The baseline efficiency case is a failed steam trap.
Savings Principle	The high efficiency case is a repaired or replaced steam trap.
Energy Savings calculation method	Deemed
Savings unit	Repaired or replaced steam trap.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	25.7
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	6
measure life source	DNV GL MA 2013 Prescriptive Gas Impact Evaluation: Steam Trap Evaulation Phase 1
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak source	#N/A #N/A
Coincidence factor (CF) summer peak	#N/A 0.00
	#N/A
CF summer peak source	
CF summer peak note	#N/A

0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.03
0.02
0.00
1.00
TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015
#N/A
\$ per measure
#N/A
#N/A
\$ per measure

TRL Reference Number	
	RI_0377
Fuel	Gas
Sector	C&I
Project Type	Direct Install
Category	Lighting
Туре	Custom
Sub-type	Lighting
Program Name	Direct Install
Measure Name	SBS Custom Measures
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	0
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Completed custom project
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings	#N/A
Gas Heat MMBtu/yr savings source	#N/A #N/A
	Calc
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A

Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
1.00
#N/A
Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
0.00
#N/A
Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
0.00
#N/A
Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.03
0.02
0.00
1.00
TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015
#N/A
\$ 0.76 /kWh
#N/A
#N/A
\$ 0.53 /kWh

TRL Reference Number	RI_0291
Fuel	Gas
Sector	C&I
Project Type	Direct Install
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	Direct Install
Measure Name	Faucet aerator
Maggura Decoription	Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a
Measure Description	commercial setting with service water heated by natural gas.
Baseline Description	The baseline efficiency case is a 2.2 GPM faucet.
Savings Principle	The high efficiency case is a faucet with 1.5 GPM or less aerator installed.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu Gas = Average annual natural gas reduction per unit.
Hours	The calculator used to determine the deemed savings uses a default operation of 30 minuts/day, 260
nours	days/year. Not applicable for Multifamily applications.
	Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.
Hours Source	Accessed on 10/12/2011.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	1.7
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	5
measure life source	Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
and whiter peak source	,,

RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	5460.00
Sewer savings: gallons/yr	5460.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 11 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 11 per measure

TRL Reference Number	RI 0373
Fuel	Gas
Sector Project Type	Direct Install
Category	Water Heating Water Heater Insulation
Type	
Sub-type	Insulation
Program Name	Direct Install
Measure Name	Insulation Pipe Diameter 1.5in H2O
Measure Description	Install insulation on hot water or steam piping located in non-conditioned spaces.
Baseline Description Savings Principle	Existing uninsulated pipe. The high efficiency condition is steam or hot water piping in unconditional space with insulation installed.
Energy Savings calculation method	Deemed
Savings unit	Installed LF of pipe insulation
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.21
Gas Heat MMBtu/yr savings source	RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
ind winter peak note	בורכמוזצמנוטון דמנכ וא מאשרוובת נט אב דסטיס אוורב באמוממנוטון מתומאנא תבנוובת אמאווצא אמותב

Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 8 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 5.6 per measure

TRL Reference Number	RI_0374
Fuel	Gas
Sector	C&I
Project Type	Direct Install
Category	Water Heating
Туре	Water Heater Insulation
Sub-type	Insulation
Program Name	Direct Install
Measure Name	Insulation Pipe Diameter 1.5in Steam
Measure Description	Install insulation on hot water or steam piping located in non-conditioned spaces.
Baseline Description	Existing uninsulated pipe.
Savings Principle	The high efficiency condition is steam or hot water piping in unconditional space with insulation installed.
Energy Savings calculation method	Deemed
Savings unit	Installed LF of pipe insulation
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where:
Savings Equation	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.21
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00

CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 8 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 5.6 per measure

TRL Reference Number	RI_0375
Fuel	Gas
Sector	C&I
Project Type	Direct Install
Category	Water Heating
Туре	Water Heater Insulation
Sub-type	Insulation
Program Name	Direct Install
Measure Name	Insulation Pipe Diameter 2in H2O
Measure Description	Install insulation on hot water or steam piping located in non-conditioned spaces.
Baseline Description	Existing uninsulated pipe.
Savings Principle	The high efficiency condition is steam or hot water piping in unconditional space with insulation installed.
Energy Savings calculation method	Deemed
Savings unit	Installed LF of pipe insulation
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where:
	Qty = Total number of units. deltaMMBtu Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Hours Source	IN/A #N/A
Hours source note	#N/A #N/A
	0
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.36
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
sementer ractor (er / summer peak	

CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 11 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 7.7 per measure

TRL Reference Number	RI_0376
Fuel	Gas
Sector	C&I
Project Type	Direct Install
Category	Water Heating
Туре	Water Heater Insulation
Sub-type	Insulation
Program Name	Direct Install
Measure Name	Insulation Pipe Diameter 2in Steam
Measure Description	Install insulation on hot water or steam piping located in non-conditioned spaces.
Baseline Description	Existing uninsulated pipe.
Savings Principle	The high efficiency condition is steam or hot water piping in unconditional space with insulation installed.
Energy Savings calculation method	Deemed
Savings unit	Installed LF of pipe insulation
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where:
	Qty = Total number of units.
Hours	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.37
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
sementer ractor (er / summer peak	7

CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 11 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 7.7 per measure

TDI Deference Number	01.0270
TRL Reference Number	RI_0378
Fuel	Gas C&I
Sector	
Project Type	Direct Install
Category	Water Heating
Type	Flow Control
Sub-type	Low Flow Spray Valve
Program Name	Direct Install
Measure Name	Salon Nozzle
Measure Description	The installation of a high efficiency salon nozzle.
Baseline Description	Standard salon nozzle.
Savings Principle	An efficient salon nozzle.
Energy Savings calculation method	Deemed
Savings unit	Installed salon nozzle
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	20.4
Gas Heat MMBtu/yr savings	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	9 #N/A
	#N/A #N/A
Oil MMBtu/yr savings note Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life measure life source	5 Energy & Resource Solutions (2005). Measure Life Study. Prepared for The Massachusetts Joint Utilities.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	
CF summer peak source	#N/A

CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	28639.00
Sewer savings: gallons/yr	28639.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 100 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 100 per measure

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uel     6as       ector     C&I       ordert Type     Direct Install       Direct Install     Elsov Control       ub type     Elsov Control       ub type     Low Flow Showerhead       Yogram Name     Direct Install       deasure Variant     Low Flow Showerhead       installation of a low flow showerhead     Installation of a low flow showerhead.       awings Principle     The high efficiency case is a 2.5 GPM showerhead.       awings Principle     The high efficiency case is a 2.5 GPM showerhead.       awings Principle     The high efficiency case is a 2.5 GPM showerhead.       awings Principle     The high efficiency case is a 1.5 GPM showerhead.       awings Statustion method     Deemed       awings sequation     Uhere:       Qty = Total number of units.     detaMMBtu_Gas = Qty × detaMMBtu_Gas       divers Source     Federal Incrept Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.       fours Source note     #N/A       MV/Y Savings source     #N/A       MV/Y Savings source     #N/A       MV/Y Savings source     #N/A       MV/Y Savings note     #N/A       MV/A     MV/A       MV/Y Savings note     #N/A       MV/Y Savings note     #N/A       Sa Heat MMBtu/yr savings note     #N/A <t< th=""><th></th><th></th></t<>		
cstor         Cst           criget Type         Direct Install           category         Water Heating           ype         How Control           ubtype         Dow Showerhead           rogram Name         Direct Install           desure Name         Low Tow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with traditation of a low flow thowerhead.           desure Name         Low Goor showerhead heated by natural gas.           asseline Description         The Installed for yos is a 1.5 GPM showerhead.           awings principal         The Installed for flow showerhead.           awings figuration         Desmed           awings figuration         The Installed for flow showerhead.           awings figuration         Where:           City = Total number of units.         durits.           durits         Grass Minktur_Gas = Average annual natural gas reduction per unit.           flows Source         Federal Inergy Management Program [2010]. Energy Cost Calculator for Faucets and Showerheads.           flows Source         Federal Inergy Management Program [2010]. Energy Cost Calculator for faucets and Showerheads.           flows Source         MAA           Whyfy swings source         MAA           Whyfy Swings         0           MiNfy Swings sonte         MNA	TRL Reference Number	RI_0320
rigetType Direct Install argery Water Heating argery Direct Install arger Dev Flow Showerhead besure Rescription besure Rescription besure Rescription besure Rescription besure Rescription beened be	Fuel	
image yr         Water Heating           ype         Flow Control           yby pot         Low Flow Showerhead           yng yr         Installation of low flow showerhead           desure Description         Installation of low flow showerhead           desure Description         Installation of low flow showerhead           average Sensition         Installation of low flow showerhead.           average Sensition         The baseline exciption           The baseline exciption         The baseline exciption           Installed Construction         Deemed           average Sensition         The low flow showerhead           average Sensition         The low flow showerhead           average Sensition         The calculator sensition sensition           average Sensition         The calculator used to determine the determed savings uses a detault operation of 20 minutes/day, 365           day/yeer.         The calculator used to determine the determed savings uses a detault operation of 20 minutes/day, 365           fours Source         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           fours source note         MVA           MV/ry savings source         MVA           MV/ry savings note         MVA           MV/ry savings note         MVA           W	Sector	C&I
ypc         Flow Control           bit-type         Low Flow Showerhead           tragram Name         Direct Install           deasure Name         Low Flow Showerhead           deasure Description         savite Name           awing Principle         The baseline efficiency case is a 2.5 GPM showerhead.           awings Principle         The baseline efficiency case is a 2.5 GPM showerhead.           awings runt         Installed low flow showerhead           awings unit         Gross MMBU_Gas = 0.5 GPM showerhead.           awings unit         Gross MMBU_Gas = 0.5 GPM showerhead.           awings Equation         Where:           dury = Total number of units.         eletaMMBU_Gas = deverage annual natural gas reduction per unit.           flow source         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           flow source         MN/A           MV/ry savings source         MN/A	Project Type	Direct Install
Dep end         Low Flow Showerhead           rogram Name         Direct Install           rogram Name         Low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with           dessure Description         Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with           dessure Description         The baseline efficiency case is a 2.5 GPM showerhead.           avings principle         The high efficiency case is a 2.5 GPM showerhead.           avings principle         The high efficiency case is a 1.2 GPM showerhead.           avings fauation         Deemed           avings fauation         Cry = Total number of units.           detraMMBtu_Gas = Average annual natural gas reduction per unit.         The calculator used to determine the deemed savings uses a default operation of 20 minutes/day.365           dars/year. Not applicable for Multifamily applications.         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           fours Source         MVA         Wreduction output         O           Wrlyr savings output         MVA         Wreduction source         MVA           Wrlyr savings note         MVA         MVA         MV/Y           Wreduction source         MVA         MVA         MV/Y           Wreduction source         MVA         MVA         MVA<	Category	Water Heating
Ub-type         Low Flow Showerhead           deasure Mame         Low-flow showerhead           installation of low flow showerhead         installation of low flow showerhead           assiline Description         Installation of low flow showerhead.           assiline Description         The bascline efficiency case is a 1.5 GPM showerhead.           awings principle         The high efficiency case is a 1.5 GPM showerhead.           awings unit         Description           installed one-flow showerhead         Gross MMBtu_Gas = Qty × dettaMMBtu_Gas           awings trut         Gross MMBtu_Gas = Qty × dettaMMBtu_Gas           awings trut         Gross MMBtu_Gas = Qty × dettaMMBtu_Gas           awings trut         Gross MMBtu_Gas = Average annual natural gas reduction per unit.           trut         Gross MMBtu_Gas = Average annual natural gas reduction per unit.           truts source         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           fours Source         Protein Installed Cost and Showerhead           tours source note         MVA           Wiry Swings note         MVA           Wiry Swings note         MVA           Wiry swings note         MVA           Wiry swings note         MVA           Wireduction source         MVA           W	Туре	Flow Control
Togram Name         Direct Install           Installation of a low flow showehead         Installation of a low flow showehead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           takesure Description         The baseline efficiency case is a 2.5 GPM showerhead.           takings Principle         The baseline efficiency case is a 2.5 GPM showerhead.           takings principle         The high efficiency case is a 2.5 GPM showerhead.           takings calculation method         Beemed           avings calculation method         Beemed           takings calculation method         Gross MMBtu_Gas = Average annual natural gas reduction per unit.           deltaMMBtu_Gas = Average annual natural gas reduction per unit.         default operation of 20 minutes/day, 365 day/vers. Not applicable for Nubitismity applications.           tours         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 0.2011.           Whyfyr savings source         MN/A	Sub-type	Low Flow Showerhead
dessure         Low-flow showerhead           installation of low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           assine Description         The baseline efficiency case is a 1.5 GPM showerhead.           awings principle         The baseline efficiency case is a 1.5 GPM showerhead.           nergy Sangs calculation method         Deemed           awings unit         Gross MMBtu_Gas = Qty x deltaMMBtu_Gas           awings figuation         Where:           Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           norrs         days/year. Norgo Jobicable for Multismly applications.           forts Source         Federal lengy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           MV/ry swings orce         MVA           MV/ry swings orde         MVA           MV		Direct Install
Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           iaseline Description         The baseline efficiency case is a 2.5 GPM showerhead.           avings Principle         The high efficiency case is a 2.5 GPM showerhead.           avings principle         The high efficiency case is a 2.5 GPM showerhead.           avings sunt         Installed low flow showerhead           avings function         Gross MMBtu_Gas = Clay x deltaMMBtu_Gas           avings function         Gross MMBtu_Gas = Average annual natural gas reduction per unit.           deltaMMBtu_Gas = Average annual natural gas reduction per unit.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           fours         More Source         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           fours source note         #N/A         W/A           Why/rs savings note         #N/A           Why/rs savings note         #N/A           Why/rs savings note         #N/A           Why/rs savings note         #N/A           WHA         MA           Wreduction note         #N/A           Wreduction note         #N/A           MWA         MA           MMBtu/ry savings note         #N/A           MMBtu/ry savings note		
desurption     envice water heated by natural gas.     -       isseline Description     The baseline efficiency case is a 2.5 GPM showerhead.       awings Principle     The high efficiency case is a 1.5 GPM showerhead.       nergy Swings calculation method     Deemed       awings unit     Installed low-flow showerhead       awings unit     Gross MMBtu_Gas = Qty x dettaMMBtu_Gas       awings unit     Gross MMBtu_Gas = Qty x dettaMMBtu_Gas       awings unit     The taken down of the deemed savings uses a default operation of 20 minutes/day. 365       days/year. Not applicable for Multifamily applications.       federal fibrery Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.       days source note     #N/A       Miry Savings note     #N/A       Wreduction oc     0       Wreduction noto:     #N/A       Wreduction noto:     #N/A       Wreduction noto:     #N/A       Miry savings source     #N/A       Sa Heat MMBtu/yr savings source     #N/A       Miry asses source     #N/A       Miry asses source     #N/A       Miry savings note     #N/A       Miry assings source     #N/A       Miry assings note     #N/A       Miry assings note     #N/A       Miry assings note     #N/A       Miry assings note     #N/A		
Saceline Description         The baseline efficiency case is 2.5 GPM showerhead.           awings Principle         The high efficiency case is a 1.5 GPM showerhead.           mergy Savings calculation method         Deemed           awings unit         Installed low flow showerhead           awings calculation method         Gross MMBtu_Gas = Qty x detaMMBtu_Gas           Gross MMBtu_Gas = Average annual natural gas reduction per unit.         detaMMBtu_Gas = Average annual natural gas reduction per unit.           fours         The calculator used to determine the deemed savings uses a default operation of 20 minutes/day.365           days/vers. Not applicable for Multifsmity applications.         Accessed on 10/12/2011.           fours Source         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           Accessed on 10/12/2011.         Wreduction source           Wreduction source         #N/A           Wreduction source         #N/A <t< td=""><td>Measure Description</td><td></td></t<>	Measure Description	
awings Principle         The high efficiency case is a 1.5 GPM showerhead.           inergy Savings calculation         Deemed           awings unit         Installed low-flow showerhead           awings function         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           awings function         Where:           City = Total number of units.         deltaMMBtu_Gas - Average annual natural gas reduction per unit.           fours         The calculator uset to determine the deemed savings uses a default operation of 20 minutes/day, 365           days/year. Not applicable for Multifamily applications.         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           fours Source         #celoautator uset to determine the deemed savings uses a default operation of 20 minutes/day, 365           days/year. Not applicable for Multifamily applications.         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           fours source         #N/A         Accessed on 10/12/2011.           Why/r savings note         #N/A         Why/r savings note           Why/r savings note         #N/A         Accessed on 10/12/2011.           Wreduction note         #N/A         Accessed on 10/12/2011.           Wreduction source         #N/A         Accessed on 10/12/2011.           Wreduction source         #N/A         Accessed on 10/12/2011.	Rasolina Description	
Inergy Savings calculation method         Deemed           avings unit         Installed low-flow showshead           avings Equation         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Qty = Total number of units.         dettaMMBtu_Gas = Average annual natural gas reduction per unit.           idurts         The calculators used to determine the deemed savings uses a default operation of 20 minutes/day, 365 day./year. Not applicable for Multifamily applications.           iours Source         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.           iours source note         #N/A           Why/rs savings source         #N/A           Why/rs savings note         #N/A           Wh/rs savings note         #N/A           Wi/A         Mi/A           Sas Heat MMBtu/rs savings note         #N/A           Wi/Must savings source         #N/A           Wi/Must savings note         #N/A           Wi/Must savings source         #N/A           Wi/Must savings note         #N/A           Wi/Must savings note         #N/A           Wi/Must savings note         #N/A           Wi/Must savings note         #N/A           Wi/Must savings source         #N/A           Wi/Must savings note         #N/A	•	
avings unit         Installed low-flow showerhead           avings Equation         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           fours         Delta number of units.           detramMMBtu_Gas = Average annual natural gas reduction per unit.         The calculator used to determine the deemed savings uses a default operation of 20 minutes/day, 365 days/year. Not applicable for Multifamily applications.           dours Source         Rederal Encerpt Wanagement Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.           dours source note         #N/A           Why'r savings source         #N/A           Wreduction source         #N/A           W reduction source         #N/A           W reduction source         #N/A           Bas Heat MMBtu/rs savings source         #N/A           Mi/Massings note         #N/A           Mi/Mastourgs note         #N/A		
Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           where:         Qty = Total number of units.           deltaMMBtu_Gas = Average annual natural gas reduction per unit.           tours         The calculator used to determine the deemed savings uses a default operation of 20 minutes/day, 365           days/year. Not applicable for Multifamily applications.         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           Accessed on 10/12/2011.         MA/A           Why/r savings note         #N/A           Why/r savings note         #N/A           Wh/ry savings note         #N/A           Wrduction note         #N/A           as Heat MMBtu/r savings note         #N/A           W/A         Wereduction note           as Heat MMBtu/r savings note         #N/A           W/A         #MA           W/A         #MA           MMMUry savings         5.2           as Heat MMBtu/r savings         0           DI MMBtu/r savings note         #N/A           M/A         #M/A           MI/A         #M/A           MIMA         #M/A           MMBtu/r savings source         #N/A           MIMA         #M/A           MMBtu/r savings source         #N/A		
avings Equation         Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit. The calculator used to determine the deemed savings uses a default operation of 20 minutes/day, 365 darsySear. Not applicable for Multifamily applications. Rederal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011. MN/A                dours source note             mN/A               divers source             mN/A               divers durits on source             mN/A               divered	Savings unit	
Jours         The calculator used to determine the deemed savings uses a default operation of 20 minutes/day, 365 days/year. Not applicable for Multifamily applications.           Accessed on 10/12/2011.         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.           Mours Source note         HN/A           Wh/yr savings source         HN/A           Wh/yr savings note         HN/A           W reduction note         HN/A           W reduction note         HN/A           W reduction note         HN/A           Sas Heat MMBtu/yr savings source         HN/A           Mix Praduction source         HN/A           Sas Heat MMBtu/yr savings         S.2           Sas Heat MMBtu/yr savings         O           Dil MMBtu/yr savings note         HN/A           Tropane MMBtu/yr savings note         HN/A           Torpane MMBtu/yr savings note         HN/A           IMME Source at (S & Eable(S) notes         0           neasure life source         GoS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in	Savings Equation	Where: Qty = Total number of units.
days/year. Not applicable for Multifamily applications.           iours Source         Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.           iours source note         MN/A           Whyry savings         0           Whyry savings source         MN/A           Whyr savings note         MN/A           Wr eduction         0           W reduction source         MN/A           W reduction note         MN/A           W reduction source         MN/A           W reduction source         MN/A           Savings note         MN/A           W reduction note         MN/A           Savings note         MN/A           Mil Mbulyr savings note         MN/A           Savings note		
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Rd winter peak source #N/A		
	RRd winter peak source	#N/A

RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	7300.00
Sewer savings: gallons/yr	7300.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 35 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 24.5 per measure

TRL Reference Number	RI_0327
Fuel	Gas
Sector	
Project Type	Direct Install
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Spray Valve
Program Name	Direct Install
Measure Name	Pre-rinse spray valve
Measure Description	Retrofitting existing standard spray nozzles in locations where service water is supplied by natural gas fired hot water heater with new low flow pre-rinse spray nozzles with an average flow rate of 1.6 GPM.
Baseline Description	The baseline efficiency case is a standard efficiency spray valve.
Savings Principle	The high efficiency case is a low flow pre-rinse spray valve with an average flow rate of 1.6 GPM.
Energy Savings calculation method	Deemed
Savings unit	Installed pre-rinse spray valve.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
1	Qty = Total number of units.
1	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	11.4
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	8
measure life source	Veritec Consulting (2005). Region of Waterloo Pre-Rinse Spray Valve Pilot Study.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value

Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	Coincidence Factors are set to zero since demand savings typically occur during off-peak hours
Water savings: gallons/yr	6410.00
Sewer savings: gallons/yr	6410.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.05
Spill-Over (participant)	0.01
Spill-Over (non-participant)	0.00
Net-to-Gross	0.97
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 100 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 100 per measure

TRL Reference Number	RI_0058
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Fryer
Program Name	Commercial New Construction
Measure Name	Commercial gas fryer
Measure Description	The installation of a natural-gas fired fryer that is either ENERGY Star rated or has a heavy-load cooking efficiency of at least 50%. Qualified fryers use advanced burner and heat exchanger designs to use fuel more efficiently, as well as increased insulation to reduce standby heat loss.
Baseline Description	The baseline efficiency case is a typical low-efficiency gas-fired fryer with 35% cooking efficiency, 16,000 Btu preheat energy, 14,000 Btu/h Idle Energy rate, and 60 lbs/h production capacity.
Savings Principle	The high efficiency case cooking efficiency and Idle Energy Rate are site specific and can be determined on a case-by-case basis. To simplify the savings algorithm, typical values for food load (150 lbs/day) and preheat energy (15.500 Btu) are assumed.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency gas-fired fryer.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where:
Savings Equation	
	Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	58.6
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	5 #N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Qualified Gas Fryer.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.

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RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 3400 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1000 per measure

TRL Reference Number	RI_0060
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Griddle
Program Name	Commercial New Construction
Measure Name	Commercial gas griddle
Measure Description	Installation of a high efficiency gas-fired griddle.
Baseline Description	The baseline efficiency case is a standard efficiency (30% efficient) gas griddle.
Savings Principle	The high efficiency case is a gas griddle with an efficiency of 38%.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency gas-fired griddle
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	18.5
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Food Service Technology Center (2011). Gas Griddle Life-Cycle Cost Calculation. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00

CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Not to Cross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1165 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI 0068
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Steamer
Program Name	Commercial New Construction
Measure Name	Commercial gas steamer (>= 38% efficiency)
	The baseline efficiency case is a typical boiler-based steamer with the following operating parameters:
	Preheat Energy rate = 72,000 Btu/hour, Idle Energy Rate = 18,000 Btu/hour, Heavy Load Efficiency =
Measure Description	18.0%, Production Capacity per pan = 23.3 lbs/hour, Average Water Consumption Rate = 40 gal/hour, and
	Percentage of Time in Constant Steam Mode = 40%.
	The baseline efficiency case is a typical boiler-based steamer with the following operating parameters:
	cooking energy efficiency = 18%, production capacity per pan = 23.3 lbs/hr, preheat energy rate = 72,000
Baseline Description	Btu/hr, idle energy rate = 18,000 Btu/h, water consumption of 40gal/h, and Percentage of Time in
	Constant Steam Mode = 40%.
	The high efficiency case is an ENERGY STAR <sup>®</sup> qualified gas-fired steamer with the following operating
Savings Principle	parameters for a 6 pan steamer: Preheat Energy Rate = 36,000 Btu/hour, Idle Energy Rate = 12,500
Savings Finciple	Btu/hour, Heavy Load Efficiency = 38.0%, Production Capacity per pan = 20 lbs/hour, and Average Water
	Consumption Rate = 3 gallons/hour, and Percentage of Time in Constant Steam Mode = 40%.
Energy Savings calculation method	Deemed
	Installed high-efficiency gas-fired steamer.
Savings unit	
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	where.
	Oty - Total number of units
	Qty = Total number of units.
Hours	deltaMMBtu_Gas = Average annual natural gas reduction per unit. The deemed savings assumes 4,380 annual operating hours (12 hours a day * 365 days/year).
Hours	Environmental Protection Agency (2011). Savings Calculator for ENERGY Star Qualified Commercial
Hours Source	Kitchen Equipment: Steam Cooker Calcs. Accessed on 10/12/2011.
Hours course note	
Hours source note kWh/yr Savings	#N/A 0
kWh/yr savings source	#N/A
	#N/A #N/A
kWh/yr savings note	
kW reduction	
kW reduction source	#N/A #N/A
kW reduction note	
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	Food Service Technology Center (2011). Gas Conveyor Oven Life-Cycle Cost Calculator.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	Environmental Protection Agency (2011). Savings Calculator for ENERGY STAR Qualified Commercial
	Kitchen Equipment: Steam Cooker Calcs.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	Environmental Protection Agency (2011). Savings Calculator for ENERGY Star Qualified Commercial
	Kitchen Equipment: Steam Cooker Calcs. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A

Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	162060.00
Sewer savings: gallons/yr	162060.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Not to Cross services	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2000 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

TRL Reference Number	RI_0063
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Oven
Program Name	Commercial New Construction
Measure Name	Gas-fired combination oven (>= 44% efficiency)
Measure Description	Installation of high efficiency gas-fired ovens.
Baseline Description	The baseline efficiency case is a standard oven that meets the baseline cooking energy efficiency requirements shown in Table 15.
Savings Principle	The high efficiency case is an oven that meets or exceeds the high efficiency ratings shown in Table 15.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency gas-fired oven.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Heure	
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	110.3
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Food Service Technology Center (2011). Gas Combination Oven Life-Cycle Cost Calculator.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
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RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A

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RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1300 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1000 per measure

TRL Reference Number	RI 0064
Fuel	Gas
Sector	
Project Type	New Construction
	Food Service
Category	
Type	Cooking Equipment
Sub-type	Oven
Program Name	Commercial New Construction
Measure Name	Gas-fired convection oven (>= 44% efficiency)
Measure Description	Installation of high efficiency gas-fired ovens.
Baseline Description	The baseline efficiency case is a standard oven that meets the baseline cooking energy efficiency requirements shown in Table 15.
Savings Principle	The high efficiency case is an oven that meets or exceeds the high efficiency ratings shown in Table 15.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency gas-fired oven.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
1	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	30.6
Gas Heat MMBtu/yr savings	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
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Energy Reference(s) & table(s) notes measure life	0 12
	Food Service Technology Center (2012). Gas Convection Oven Life-Cycle Cost Calculator.
measure life source	http://www.fishnick.com/saveenergy/tools/calculators/govencalc.php.
measure life note	#N/A
In-service rate (ISR)	#N/A 1.00
In-service rate (ISR) In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak source RRd summer peak note	#N/A #N/A
RR demand (RRd) winter peak	0.00

#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.42
0.05
0.00
0.63
TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
(Memorandum), August 2015
#N/A
\$ 1886 per measure
#N/A
#N/A
\$ 1000 per measure

TRL Reference Number	RI_0065
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	Food Service
Туре	Cooking Equipment
Sub-type	Oven
Program Name	Commercial New Construction
Measure Name	Gas-fired conveyer oven (>= 44% efficiency)
Measure Description	Installation of high efficiency gas-fired ovens.
Baseline Description	The baseline efficiency case is a standard oven that meets the baseline cooking energy efficiency requirements shown in Table 15.
Savings Principle	The high efficiency case is an oven that meets or exceeds the high efficiency ratings shown in Table 15.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency gas-fired oven.
-	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours	
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	84.5
Gas Heat MMBtu/yr savings source	Food Service Technology Center (2011). Gas Combination Oven Life-Cycle Cost Calculator.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Food Service Technology Center (2011). Gas Conveyor Oven Life-Cycle Cost Calculator.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
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RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A

RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2100 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1000 per measure

TRL Reference Number	RI_0066
Fuel	Gas
Sector	
Project Type	New Construction
Category 	Food Service
Type	Cooking Equipment
Sub-type	Oven
Program Name	Commercial New Construction
Measure Name	Gas-fired rack oven (>= 50% efficiency)
Measure Description	Installation of high efficiency gas-fired ovens.
Baseline Description	The baseline efficiency case is a standard oven that meets the baseline cooking energy efficiency requirements shown in Table 15.
Savings Principle	The high efficiency case is an oven that meets or exceeds the high efficiency ratings shown in Table 15.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency gas-fired oven.
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	211.3
Gas Heat MMBtu/yr savings source	Food Service Technology Center (2012). Gas Convection Oven Life-Cycle Cost Calculator. http://www.fishnick.com/saveenergy/tools/calculators/govencalc.php.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	12
measure life source	Food Service Technology Center (2011). Gas Conveyor Oven Life-Cycle Cost Calculator.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	100% realization rates are assumed because savings are based on researched assumptions by FSTC.
RR demand (RRd) summer peak	0.00
	#N/A
RRd summer peak source	
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00

#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
#N/A
0.42
0.05
0.00
0.63
TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
(Memorandum), August 2015
#N/A
\$ 1000 per measure
#N/A
#N/A
\$ 4000 per measure

TRL Reference Number Fuel Sector Project Type Category Type	RI_0130 Gas C&I
Sector Project Type Category	C&I
Project Type Category	
Category	
· · ·	New Construction HVAC
туре	Heating
Sub-type	Boiler
Program Name	Commercial New Construction
Measure Name	Condensing boiler <= 300 MBH 90%
Measure Description	The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensing boilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)
Baseline Description	The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2012. Table 19 in Appendix A details the specific efficiency requirements by equipment type and capacity.
Savings Principle	The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels required by Rhode Island State Building Code. Actual site efficiencies should be determined on a case-by-case basis.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency condensing boiler
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	30.6
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings Oil MMBtu/yr savings source	0 #N/A
Oil MMBtu/yr savings source Oil MMBtu/yr savings note	#N/A #N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	1.00
Realization rate energy (KKe)	
Realization rate energy (RRe) RRe source	#N/A

RRd summer peak note       #N/A         RRd summer peak note       #N/A         RRd summer peak note       #N/A         RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak note       #N/A         Coincidence factor (CF) summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         CS wers avings: gallons/yr       0.00         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Ower savings: gallons/yr       0.00         Water / Sewer savings: gallons/yr       0.00         Manual S savings source       #N/A         Annual S savings source       #N/A         Annual S savings note       #N/A         Dne time S savings note       #N/A         Dne time S savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (predicipant)       0.00         Net-	r	
RRd summer peak note       #N/A         RR demand (Rkd) winter peak       0.00         RRd winter peak source       #N/A         RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         CF winter peak note       #N/A         Vater savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings source       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings no	RR demand (RRd) summer peak	0.00
RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         Rd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak source       #N/A         Mater savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         One time \$ savings note       #N/A         Spill-Over (participant)       0.00	RRd summer peak source	#N/A
RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.42         Spill-Over (participant)       0.05         Spill-Over (participan	RRd summer peak note	#N/A
RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings oute       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross       0.63 </td <td>RR demand (RRd) winter peak</td> <td>0.00</td>	RR demand (RRd) winter peak	0.00
Coincidence factor (CF) summer peak0.00CF summer peak source#N/ACF summer peak note#N/ACG summer peak note#N/ACF winter peak source#N/ACF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/APre-Ridership0.42Spill-Over (participant)0.05Spill-Over (participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AFetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measure Gross Measure TRC noteGross Measure TRC note#N/A	RRd winter peak source	#N/A
CF summer peak source       #N/A         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rh	RRd winter peak note	#N/A
CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Mater / Sewer savings note       #N/A         Manual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.42         Spill-Over (participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross source       #N/A         Gross Measure TRC unit       \$ 3479 per measure	Coincidence factor (CF) summer peak	0.00
Coincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings source#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpall-Dover (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross note0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measureGross Measure TRC note#N/A	CF summer peak source	#N/A
CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC note </td <td>CF summer peak note</td> <td>#N/A</td>	CF summer peak note	#N/A
CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual S savings       0.00         Annual S savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross note       #N/A         Mora Carlos note       #N/A         Gross Measure TRC ource       \$ 3479 per measure         Gross Measure TRC note       #N/A	Coincidence factor (CF) winter peak	0.00
Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross       0.63         TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC note       #N/A	CF winter peak source	#N/A
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC note#N/AGross Measure TRC note#N/A	CF winter peak note	#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AFrea-Ridership0.42Svill-Over (non-participant)0.00Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.42Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AKet-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measureGross Measure TRC note#N/A	Water / Sewer savings Source	#N/A
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.42         Spill-Over (non-participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measureGross Measure TRC note#N/A	Annual \$ savings	0.00
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measure #N/AGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measure #N/AGross Measure TRC note#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3479 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings	0.00
Free-Ridership       0.42         Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Free-Ridership	0.42
Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.05
Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3479 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross source     (Memorandum), August 2015       Net-to-Gross note     #N/A       Gross Measure TRC unit     \$ 3479 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross	0.63
Gross Measure TRC unit     \$ 3479 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross source	
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Gross Measure TRC unit	\$ 3479 per measure
	Gross Measure TRC source	
Incentive Unit \$ 1000 per measure	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 1000 per measure

TRL Reference Number       RL_0131         Sector       C&I         Sector       C&I         Project Type       New Construction         Category       HVAC         Type       Heating         Sub-type       Boiler         Program Name       Commercial New Construction         Measure Name       Condensing boiler <= 300 MBH 95%         Measure Description       The installation of a high efficiency natural gas fired condensing boilers. High efficiency boile         Measure Description       The installation of a high efficiency condensing boilers are offered as prescriptive measure         incentives for other boiler types are offered through the custom program.)       Installed 19 in Appendix A details the specific efficiency requirements by equipment type and condensing boilers are offered boiler that exceeds the efficiency levels require         Savings Principle       The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels require         Savings unit       Installed high-efficiency condensing boiler         Savings Equation       Qty = Total number of units.         dettaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       #N/A         KWh/ry savings source       #N/A         KWh/ry savings note       #N/A <t< th=""><th></th></t<>	
Sector       C&I         Project Type       New Construction         Category       HVAC         Type       Heating         Sub-type       Boiler         Program Name       Commercial New Construction         Measure Name       Condensing boiler <= 300 MBH 95%	
Project Type         New Construction           Category         HVAC           Type         Heating           Sub-type         Boiler           Program Name         Condensing boiler <= 300 MBH 95%	
Category       HVAC         Type       Heating         Sub-type       Boiler         Program Name       Condensing boiler <= 300 MBH 95%	
Type         Heating           Sub-type         Boiler           Program Name         Commercial New Construction           Measure Name         Condensing boiler <= 300 MBH 95%	
Sub-type         Boiler           Program Name         Commercial New Construction           Measure Name         Condensing boiler <= 300 MBH 95%	
Program Name         Commercial New Construction           Measure Name         Condensing boiler <= 300 MBH 95%	
Measure Name       Condensing boiler <= 300 MBH 95%	
Measure Description       The installation of a high efficiency natural gas fired condensing boilers. High efficiency boile advantage of improved design, sealed combustion and condensing flue gases in a second he to achieve improved efficiency. (Only condensing boilers are offered as prescriptive measure incentives for other boiler types are offered through the custom program.)         Baseline Description       The baseline efficiency assumes compliance with the International Energy Conservation Cod Table 19 in Appendix A details the specific efficiency requirements by equipment type and c         Savings Principle       The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels require island State Building Code. Actual site efficiencies should be determined on a case-by-case b         Savings Principle       Installed high-efficiency condensing boiler         Savings calculation method       Deemed         Savings Equation       Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation       Where:         Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       #N/A         KWh/yr savings source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings source       #N/A         KWh/yr savings source       #N/A         KWh/yr savings source       #N/A         KWh/yr savings source       #N/A	
Measure Description       advantage of improved design, sealed combustion and condensing flue gases in a second he to achieve improved design, sealed combustion and condensing flue gases in a second he to achieve improved efficiency. (Only condensing boilers are offered as prescriptive measure incentives for other boiler types are offered through the custom program.)         Baseline Description       The baseline efficiency assumes compliance with the International Energy Conservation Cod Table 19 in Appendix A details the specific efficiency requirements by equipment type and contable specific efficiency requirements by equipment type and contable specific and state Building Code. Actual site efficiencies should be determined on a case-by-case be Energy Savings calculation method         Savings Principle       The high efficiency condensing boiler         Savings unit       Installed high-efficiency condensing boiler         Savings unit       Installed high-efficiency condensing boiler         Savings Equation       Where:         Qty = Total number of units.       dettaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       #N/A         KWh/yr savings source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KW reduction note       MN/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings sourc	
Baseline Description       Table 19 in Appendix A details the specific efficiency requirements by equipment type and c         Savings Principle       The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels requirer         Island State Building Code. Actual site efficiencies should be determined on a case-by-case b       Energy Savings calculation method         Deemed       Installed high-efficiency condensing boiler       Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation       Where:       Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.       Hours         Hours       N/A         Hours Source       #N/A         KWh/yr Savings       0         kWh/yr savings source       #N/A         kWh/yr savings source       #N/A         kW reduction note       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gai Matt MMBtu/yr savings note       #N/A         Gui MMBtu/yr savings note       #N/A         Gui MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N	at exchanger
Savings Principle       Island State Building Code. Actual site efficiencies should be determined on a case-by-case b         Energy Savings calculation method       Deemed         Savings unit       Installed high-efficiency condensing boiler         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation       Where:         Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       #N/A         Hours source note       #N/A         KWh/yr savings source       #N/A         KWrduction       0         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       27.8         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A	
Savings unit       Installed high-efficiency condensing boiler         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation         Where:         Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours         Hours Source         #N/A         Hours source note         #N/A         kWh/yr savings         0         kWh/yr savings note         #N/A         kW reduction         0         kW reduction note         #N/A         KW reduction note         Gas Heat MMBtu/yr savings source         #N/A         Gas Heat MMBtu/yr savings note         #N/A         Gil MMBtu/yr savings source         #N/A         Gil MMBtu/yr savings note         #N/A         Gil MMBtu/yr savings note         W/A         Gil MMBtu/yr savings note         #N/A         Oil MMBtu/yr savings note	•
Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation         Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       #N/A         Hours source note       #N/A         kWh/yr savings       0         kWh/yr savings note       #N/A         kWh/yr savings note       #N/A         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A	
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Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A	
Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A	
Oil MMBtu/yr savings     0       Oil MMBtu/yr savings source     #N/A       Oil MMBtu/yr savings note     #N/A	
Oil MMBtu/yr savings note #N/A	
Propane MMBtu/yr savings 0	
Propane MMBtu/yr savings source #N/A	
Propane MMBtu/yr savings note #N/A	
Energy Reference(s) & table(s) notes 0	
measure life 25	
measure life source GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Poter Massachusetts. Prepared for GasNetworks.	ntial in
measure life note #N/A	
In-service rate (ISR) 1.00	
In-service rate source #N/A	
In-service rate note All installations have 100% in-service rate since programs include verification of equipment i	nstallations.
Savings Persistence Factor (SPF) 1.00	
Savings Persistence Factor source #N/A	
Savings Persistence Factor note Savings persistence is assumed to be 100%.	
Realization rate energy (RRe) 1.00	
RRe source #N/A	
RRe note Energy realization rate is 100% because deemed savings are based on evaluation results.	

RRd summer peak source       #N/A         RRd summer peak note       #N/A         RRd summer peak note       #N/A         RRd winter peak source       #N/A         RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak source       #N/A         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         CF winter peak source       #N/A         Water / Sewer savings: gallons/yr       0.00         Water / Sewer savings is onte       #N/A         Annual S savings source / description       #N/A         Annual S savings source / description       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         Spill-Over (participant)       0.00	r	
RRd summer peak note       #N/A         RR demand (Rkd) winter peak source       #N/A         RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         CF summer peak note       #N/A         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Splil-Over (non-participant)       0.00 <t< td=""><td>RR demand (RRd) summer peak</td><td>0.00</td></t<>	RR demand (RRd) summer peak	0.00
RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         Rd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Sever savings source / WN/A       Manual \$ savings         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         One time \$ savings note       #N/A         Spill-Over (participant)       0.00 <td>RRd summer peak source</td> <td>#N/A</td>	RRd summer peak source	#N/A
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RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings oute       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (pon-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Me	RR demand (RRd) winter peak	0.00
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CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3848 per measure         Gross Measur	CF summer peak note	#N/A
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One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3848 per measure \$ 3848 per measure Gross Measure TRC sourceW/A#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3848 per measure \$ M/AGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings	0.00
Free-Ridership       0.42         Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3848 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3848 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3848 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Free-Ridership	0.42
Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3848 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.05
Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3848 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross source     (Memorandum), August 2015       Net-to-Gross note     #N/A       Gross Measure TRC unit     \$ 3848 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross	0.63
Gross Measure TRC unit     \$ 3848 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross source	
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	
Gross Measure TRC note #N/A	Gross Measure TRC unit	\$ 3848 per measure
	Gross Measure TRC source	#N/A
Incentive Unit \$ 1500 per measure	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 1500 per measure

TRL Reference Number	RI_0132
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	Commercial New Construction
Measure Name	Condensing boiler 1000
Measure Description	The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensing boilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)
Baseline Description	The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2012. Table 19 in Appendix A details the specific efficiency requirements by equipment type and capacity.
Savings Principle	The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels required by Rhode Island State Building Code. Actual site efficiencies should be determined on a case-by-case basis.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency condensing boiler
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction	#N/A
kW reduction note	#N/A
	197.2
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A 0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0 25
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
	Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Energy realization rate is 100% because deemed savings are based on evaluation results.
	Life By realization rate is 100% because decined savings are based on evaluation results.

RRd summer peak note       #N/A         RRd summer peak note       #N/A         RRd summer peak note       #N/A         RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         CF winter peak source       #N/A         CS were savings: gallons/yr       0.00         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Sever savings: gallons/yr       0.00         Mater / Sever savings is onte       #N/A         Annual S savings source / description       #N/A         Annual S savings source / description       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         One time S savings note       #N/A         Spill-Over (participant)       0.00         Net	r	
RRd summer peak note       #N/A         RR demand (Rkd) winter peak       0.00         RRd winter peak source       #N/A         RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Drue time \$ savings note       #N/A         Splil-Over (non-participant)       0.00         Splil-Over (non-pa	RR demand (RRd) summer peak	0.00
RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         Rd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         Sever savings source / WN/A       Manual \$ savings         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         One time \$ savings note       #N/A         Spill-Over (participant)       0.00 <td>RRd summer peak source</td> <td>#N/A</td>	RRd summer peak source	#N/A
RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.42         Spill-Over (participant)       0.05         Spill-Over (participan	RRd summer peak note	#N/A
RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross       0.63 </td <td>RR demand (RRd) winter peak</td> <td>0.00</td>	RR demand (RRd) winter peak	0.00
Coincidence factor (CF) summer peak0.00CF summer peak source#N/ACF summer peak note#N/ACG summer peak note#N/ACF winter peak source#N/ACF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (non-participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AFetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC note#N/AGross Measure TRC note#N/A	RRd winter peak source	#N/A
CF summer peak source       #N/A         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rh	RRd winter peak note	#N/A
CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Cre-Ridership       0.42         Spill-Over (participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC conce       #N/A <td>Coincidence factor (CF) summer peak</td> <td>0.00</td>	Coincidence factor (CF) summer peak	0.00
Coincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings source#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpall-Dover (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross note0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measureGross Measure TRC note#N/A	CF summer peak source	#N/A
CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measur	CF summer peak note	#N/A
CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual S savings       0.00         Annual S savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross note       #N/A         Mora Carlos note       #N/A         Gross Measure TRC ource       \$7874 per measure         Gross Measure TRC note       #N/A	Coincidence factor (CF) winter peak	0.00
Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross       0.63         TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	CF winter peak source	#N/A
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measureGross Measure TRC note#N/A	CF winter peak note	#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.42Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AFree-Ridership0.63Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AFrea Tech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.42Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AMet-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measureGross Measure TRC source#N/A	Water / Sewer savings Source	#N/A
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         Dne time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.42         Spill-Over (non-participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measureGross Measure TRC note#N/A	Annual \$ savings	0.00
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measure \$ 7874 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measure M/AGross Measure TRC source#N/AWind America Market Resource TRC note#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 7874 per measure #N/AGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings	0.00
Free-Ridership       0.42         Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Free-Ridership	0.42
Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.05
Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 7874 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross source     (Memorandum), August 2015       Net-to-Gross note     #N/A       Gross Measure TRC unit     \$ 7874 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross	0.63
Gross Measure TRC unit     \$ 7874 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross source	
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Gross Measure TRC unit	\$ 7874 per measure
	Gross Measure TRC source	
Incentive Unit \$ 7500 per measure	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 7500 per measure

TRL Reference Number	RI 0133
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	Commercial New Construction
Measure Name	Condensing boiler 1701+ MBH
Measure Description	The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensing boilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)
Baseline Description	The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2012. Table 19 in Appendix A details the specific efficiency requirements by equipment type and capacity.
Savings Principle	The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels required by Rhode Island State Building Code. Actual site efficiencies should be determined on a case-by-case basis.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency condensing boiler
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	- #N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	345.1
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	
Savings Persistence Factor source Savings Persistence Factor note	Savings persistence is assumed to be 100%.
	•
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

r	
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 10601 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 10000 per measure

TRL Reference Number	RI_0134
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	Commercial New Construction
Measure Name	Condensing boiler 301
Measure Description	The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensing boilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)
Baseline Description	The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2012. Table 19 in Appendix A details the specific efficiency requirements by equipment type and capacity.
Savings Principle	The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels required by Rhode Island State Building Code. Actual site efficiencies should be determined on a case-by-case basis.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency condensing boiler
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction	#N/A
kW reduction note	#N/A
	58.4
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A 0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes measure life	0 25
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
	Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
	Energy realization rate is 100% because deemed savings are based on evaluation results.
RRe note	Linergy realization rate is 100% because deemed savings are based on evaluation results.

RRd summer peak source       #N/A         RRd summer peak note       #N/A         RRd summer peak note       #N/A         RRd winter peak source       #N/A         RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak source       #N/A         CF winter peak source       #N/A         Water savings: gallons/yr       0.00         CF winter peak source       #N/A         Water / Sewer savings: gallons/yr       0.00         Water / Sewer savings is onte       #N/A         Annual S savings source / description       #N/A         Annual S savings source / description       #N/A         One time S savings source / description       #N/A         Dne time S savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (participant)       0.00     <	r	
RRd summer peak note       #N/A         RR demand (Rkd) winter peak       0.00         RRd winter peak source       #N/A         RRd winter peak source       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Drue time \$ savings note       #N/A         Splil-Over (non-participant)       0.00         Splil-Over (non-pa	RR demand (RRd) summer peak	0.00
RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         Rd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak source       #N/A         CF winter peak source       #N/A         Sever savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Manual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         One time \$ savings note       #N/A         Spill-Over (participant)       0.00 <t< td=""><td>RRd summer peak source</td><td>#N/A</td></t<>	RRd summer peak source	#N/A
RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         Annual \$ savings       0.00         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Pree-Ridership       0.42         Spill-Over (participant)       0.05         Spill-Over (participan	RRd summer peak note	#N/A
RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00         CF summer peak source       #N/A         Coincidence factor (CF) winter peak       0.00         Coincidence factor (CF) winter peak       0.00         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross       0.63 </td <td>RR demand (RRd) winter peak</td> <td>0.00</td>	RR demand (RRd) winter peak	0.00
Coincidence factor (CF) summer peak0.00CF summer peak source#N/ACF summer peak note#N/ACG summer peak note#N/ACF winter peak source#N/ACF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (non-participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AStature TRC unit\$ 3879 per measureGross Measure TRC note#N/AGross Measure TRC note#N/A	RRd winter peak source	#N/A
CF summer peak source       #N/A         CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rh	RRd winter peak note	#N/A
CF summer peak note       #N/A         Coincidence factor (CF) winter peak       0.00         CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings source       #N/A         Mater / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings source / description       #N/A         One time \$ savings note       #N/A         Free-Ridership       0.42         Spill-Over (participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross source       #N/A         Gross Measure TRC unit       \$ 3879 per measure	Coincidence factor (CF) summer peak	0.00
Coincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr0.00Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings source#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross note0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	CF summer peak source	#N/A
CF winter peak source       #N/A         CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings Source       #N/A         Mater / Sewer savings source       #N/A         Annual \$ savings       0.00         Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Done time \$ savings note       #N/A         One time \$ savings note       #N/A         One time \$ savings note       #N/A         Dive (non-participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ \$3879 per measure         Gross Measure TRC note       #N/A	CF summer peak note	#N/A
CF winter peak note       #N/A         Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual S savings       0.00         Annual S savings note       #N/A         Annual S savings note       #N/A         Annual S savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.00         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross note       #N/A         Mora Carlos note       #N/A         Gross Measure TRC ource       #N/A         Gross Measure TRC note       #N/A	Coincidence factor (CF) winter peak	0.00
Water savings: gallons/yr       0.00         Sewer savings: gallons/yr       0.00         Water / Sewer savings Source       #N/A         Water / Sewer savings note       #N/A         Annual \$ savings       0.00         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         Annual \$ savings note       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.05         Spill-Over (participant)       0.00         Net-to-Gross       0.63         TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3879 per measure         Gross Measure TRC note       #N/A	CF winter peak source	#N/A
Sewer savings: gallons/yr0.00Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings source/description#N/AOne time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC note#N/AGross Measure TRC note#N/A	CF winter peak note	#N/A
Water / Sewer savings Source#N/AWater / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.42Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AFree-Ridership0.63Net-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Water savings: gallons/yr	0.00
Water / Sewer savings note#N/AAnnual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AFrea Tech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	Sewer savings: gallons/yr	0.00
Annual \$ savings0.00Annual \$ savings source / description#N/AAnnual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AOne time \$ savings note#N/ASpill-Over (participant)0.42Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross note#N/AMet-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measureGross Measure TRC source#N/A	Water / Sewer savings Source	#N/A
Annual \$ savings source / description       #N/A         Annual \$ savings note       #N/A         One time \$ savings       0.00         One time \$ savings source/description       #N/A         One time \$ savings note       #N/A         Spill-Over (participant)       0.42         Spill-Over (non-participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3879 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Water / Sewer savings note	#N/A
Annual \$ savings note#N/AOne time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measureGross Measure TRC note#N/A	Annual \$ savings	0.00
One time \$ savings0.00One time \$ savings source/description#N/AOne time \$ savings note#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measure #N/AGross Measure TRC note#N/A	Annual \$ savings source / description	#N/A
One time \$ savings source/description#N/AOne time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measure M/AGross Measure TRC note#N/A	Annual \$ savings note	#N/A
One time \$ savings note#N/AFree-Ridership0.42Spill-Over (participant)0.05Spill-Over (non-participant)0.00Net-to-Gross0.63Net-to-Gross sourceTetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015Net-to-Gross note#N/AGross Measure TRC unit\$ 3879 per measureGross Measure TRC source#N/AGross Measure TRC note#N/A	One time \$ savings	0.00
Free-Ridership       0.42         Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3879 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings source/description	#N/A
Spill-Over (participant)       0.05         Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3879 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	One time \$ savings note	#N/A
Spill-Over (non-participant)       0.00         Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3879 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Free-Ridership	0.42
Net-to-Gross       0.63         Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3879 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (participant)	0.05
Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 3879 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
Net-to-Gross source     (Memorandum), August 2015       Net-to-Gross note     #N/A       Gross Measure TRC unit     \$ 3879 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross	0.63
Gross Measure TRC unit     \$ 3879 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross source	
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Gross Measure TRC unit	\$ 3879 per measure
	Gross Measure TRC source	
Incentive Unit \$ 2000 per measure	Gross Measure TRC note	#N/A
	Incentive Unit	\$ 2000 per measure

TRL Reference Number	RI_0135
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Boiler
Program Name	Commercial New Construction
Measure Name	Condensing boiler 500
Measure Description	The installation of a high efficiency natural gas fired condensing boilers. High efficiency boilers take advantage of improved design, sealed combustion and condensing flue gases in a second heat exchanger to achieve improved efficiency. (Only condensing boilers are offered as prescriptive measures. Program incentives for other boiler types are offered through the custom program.)
Baseline Description	The baseline efficiency assumes compliance with the International Energy Conservation Code (IECC) 2012. Table 19 in Appendix A details the specific efficiency requirements by equipment type and capacity.
Savings Principle	The high efficiency case assumes a gas-fired boiler that exceeds the efficiency levels required by Rhode Island State Building Code. Actual site efficiencies should be determined on a case-by-case basis.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency condensing boiler
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	107.3
Gas Heat MMBtu/yr savings source	The Cadmus Group (2013). 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	25
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
	#N/A
In-service rate source	
In-service rate source	All installations have 100% in-service rate since programs include verification of equipment installations.
	All installations have 100% in-service rate since programs include verification of equipment installations. 1.00
In-service rate note	
In-service rate note Savings Persistence Factor (SPF)	1.00
In-service rate note Savings Persistence Factor (SPF) Savings Persistence Factor source	1.00 #N/A

RRe note	Energy realization rate is 1000/ because doemend environ are board on evolution accults
	Energy realization rate is 100% because deemed savings are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 5077 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 4000 per measure

TRL Reference Number	RI 0161
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Unit Heater
Program Name	Commercial New Construction
Measure Name	Condensing Unit heater
Measure Name	The baseline efficiency case is a standard efficiency gas fired unit heater with minimum combustion
Measure Description	efficiency of 80%, interrupted or intermittent ignition device (IID), and either power venting or an
	automatic flue damper.
Baseline Description	The baseline efficiency case is a standard efficiency unit heater.
Savings Principle	The high efficiency case is a condensing gas unit heater with 90% AFUE or greater.
Energy Savings calculation method	Deemed
Savings unit	Installed condensing unit heater.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	Where.
	Qty = Total number of units.
Hours	deltaMMBtu_Gas = Average annual natural gas reduction per unit. N/A
Hours Hours Source	
	#N/A
Hours source note	#N/A 0
kWh/yr Savings	-
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	40.9
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	
measure life source	Ecotrope, Inc. (2003). Natural Gas Efficiency and Conservation Measure Resource Assessment for the
	Residential and Commercial Sectors. Prepared for the Energy Trust of Oregon.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A

Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2400 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 750 per measure

RI_0156         Gas         C&I         New Construction         HVAC         Heating         Furnace         Commercial New Construction         Furnace 95+ AFUE (<150) w/ECM Motor         The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor (ECM) for the fan. High efficiency furnaces are better at converting fuel into direct heat and better
C&I New Construction HVAC Heating Furnace Commercial New Construction Furnace 95+ AFUE (<150) w/ECM Motor The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor
New Construction HVAC Heating Furnace Commercial New Construction Furnace 95+ AFUE (<150) w/ECM Motor The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor
HVAC Heating Furnace Commercial New Construction Furnace 95+ AFUE (<150) w/ECM Motor The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor
Heating Furnace Commercial New Construction Furnace 95+ AFUE (<150) w/ECM Motor The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor
Furnace         Commercial New Construction         Furnace 95+ AFUE (<150) w/ECM Motor
Commercial New Construction Furnace 95+ AFUE (<150) w/ECM Motor The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor
Furnace 95+ AFUE (<150) w/ECM Motor The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor
The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor
insulated to reduce heat loss. ECM fan motors significantly reduce fan motor electric consumption as compared to both shaped-pole and permanent split capacitor motors.
The baseline efficiency case is a 90% AFUE furnace in the <150 kBTuh size category.
The high efficiency case is a new furnace with AFUE >= 95% and an electronically commutated motor.
Deemed
Installed high-efficiency warm air furnace with ECM fan motor
Gross kWh = Qty × deltakWh
Gross kW = Qty × deltakW
Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Where:
Qty = Total number of units.
deltakWh = Average annual kWh reduction per unit.
deltakW = Average kW reduction per unit.
deltaMMBtu_Gas = Average annual natural gas reduction per unit
N/A #N/A
#N/A 168
Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.
#N/A
0.124
Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.
#N/A
9
NMR Group, KEMA, The Cadmus Group, Dorothy Conant (2012). Rhode Island 2011 Baseline Study of Single-Family Residential New Construction. Prepared for National Grid.
#N/A
0
#N/A
#N/A
0
#N/A
#N/A
0
18
GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
#N/A 1.00
#N/A
All installations have 100% in-service rate since programs include verification of equipment installations.
1.00

r	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
CF winter peak source	Program Administrators of Massachusetts.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1626 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI 0157
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Furnace
Program Name	Commercial New Construction
Measure Name	Furnace 97+ AFUE (<150) w/ECM Motor
Measure Description	The installation of a high efficiency natural gas warm air furnace with an electronically commutated motor (ECM) for the fan. High efficiency furnaces are better at converting fuel into direct heat and better insulated to reduce heat loss. ECM fan motors significantly reduce fan motor electric consumption as compared to both shaped-pole and permanent split capacitor motors.
Baseline Description	The baseline efficiency case is a 90% AFUE furnace in the <150 kBTuh size category.
Savings Principle	The high efficiency case is a new furnace with AFUE >= 95% and an electronically commutated motor.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency warm air furnace with ECM fan motor
	Gross kWh = Qty × deltakWh
	Gross kW = Qty × deltakW
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltakWh = Average annual kWh reduction per unit.
	deltakW = Average kW reduction per unit.
Llours	deltaMMBtu_Gas = Average annual natural gas reduction per unit
Hours	N/A #N/A
Hours Source	•
Hours source note	#N/A 168
kWh/yr Savings	
kWh/yr savings source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.
kWh/yr savings note	#N/A
kW reduction	0.124
kW reduction source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	9.9
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

Dealization rate energy (DDe)	1.00
Realization rate energy (RRe)	
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	1.00
RRd summer peak source	#N/A
RRd summer peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) winter peak	1.00
RRd winter peak source	#N/A
RRd winter peak note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
Coincidence factor (CF) summer peak	0.00
CF summer peak source	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas Program Administrators of Massachusetts.
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.16
	Energy & Resource Solutions (2011). BFM Impact Evaluation Report. Prepared for the Electric and Gas
CF winter peak source	Program Administrators of Massachusetts.
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1707 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A

TRL Reference Number	RI_0160
Fuel	Gas
Sector	
Project Type	New Construction
Category	HVAC
Туре	Heating
Sub-type	Infrared Heater
Program Name	Commercial New Construction
Measure Name	Infrared heater
Measure Description	The installation of a gas-fired low intensity infrared heating system in place of a unit heater, furnace, or other standard efficiency equipment. Infrared heating uses radiant heat as opposed to warm air to heat buildings. In commercial environments with high air exchange rates, heat loss is minimal because the space's heat comes from surfaces rather than air.
Baseline Description	The baseline efficiency case is a standard efficiency gas-fired unit heater with combustion efficiency of 80%.
Savings Principle	The high efficiency case is a gas-fired low-intensity infrared heating unit.
Energy Savings calculation method	Deemed
Savings unit	Installed infrared heater
Savings Equation	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A #N/A
kwn/yr savings note	4N/A 0
kW reduction source	#N/A
kW reduction note	#N/A 12
Gas Heat MMBtu/yr savings	
Gas Heat MMBtu/yr savings source Gas Heat MMBtu/yr savings note	#N/A
	#N/A 0
Oil MMBtu/yr savings	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	17
measure life source	Nexant (2006). DSM Market Characterization Report. Prepared for Questar Gas.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A

RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2982 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 750 per measure

Fuel         Gas           Sector         CAI           Project Type         New Construction           Consport         HVAC           Type         Heating           Sub-type         Boiler           Program Name         Commorcial New Construction           Measure Name         Combined Data and water heater(consing baller (FE 0.90, AFUE 90K)           Measure Description         This measure promotes the installation of a combined ligh-efficiency baller and water heating values are more clickent than supparted systems because they eliminate the standby heat losses of an additional tank.           Baseline Description         The baseline efficiency case is a condensing, integrated water heater.           Swings Source         The MBbits, Gas = Qyr > dettaMMbits_Gas           Swings Equation         Where:           Ours Source         AVA           MVMY Swings source         AVA           MVA <td< th=""><th>TRL Reference Number</th><th>RI 0148</th></td<>	TRL Reference Number	RI 0148
Sector         C81           Project Type         New Construction           Category         HVAC           Type         Heating           Sub-type         Boaliner           Program Name         Commercial New Construction           Medsure Name         Integrated water heating systems are more efficient than separate systems because they efficiency takes           Measure Description         Combined bolier and water heating systems are more efficient than separate systems because they efficiency and water heating systems are more efficient than separate systems because they efficiency integrated water heater/bolier with a 0.594 EF water heater.           Baarline Description         The high efficiency integrated boater heater unit.           Sarings Foncipie         The high efficiency integrated boater heater unit.           Sarings foruption         Crists MMRU, Gas = Average annual natural gas reduction per unit.           Mours         Where:         Oty = Total number of units.           detaMMBut_Gas = Average annual natural gas reduction per unit.         Mours source         #N/A           Mours source         #N/A         Mours         Mours           NA         Means source         #N/A         Mours           Mours Source         #N/A         Mours         Mours           MRMMy rawings source         #N/A         Mours <td< td=""><td></td><td></td></td<>		
Project Type         New Construction           Category         HVAC           Type         Hesting           Sub-ppe         Boiler           Program Name         Commercial New Construction           Measure Description         Integrated water heating systems are more efficient than separate systems because they diminate the standing systems are more efficient than separate systems because they diminate the standy hear losse of an additional fast.           Baseline Description         The baseline efficient y case is a condemining, integrated water heating systems are more efficient than separate systems because they diminate the standy hear losse of an additional fast.           Baseline Description         The baseline efficiency case is a condemine file fast than a RPUE >= 50%.           Baseline Stands         Description (scalable) efficiency case is a condemine file theater/boiler with an APUE >= 50%.           Baseline Stands         Gross MMBLU_Gas = Qty × deftaMMBLU_Gas           Savings Equation         Gross MMBLU_Gas = Average annual natural gas reduction per unit.           Hours Source         RN/A           Hours Source         RN/A           Whyfyr swings Source         RN/A           Whyfyr Swings Source         RN/A           Whyfyr swings Source         RN/A           Whyfyr swings source         RN/A           Whyfyredisting source         RN/A		
Category         HVAC           Type         Heating           Sub-type         Boller           Forgam Name         Commercial New Construction           Measure Name         Integrated water heater/condensing boler (EF 0.90, AFUE 90%).           Measure Name         Integrated water heater/condensing boler (EF 0.90, AFUE 90%).           Measure Description         Commercial New Construction           Baseline Description         Commercial New Construction Factors (Fe 0.90, AFUE boler with a 0.594 EF water heater.           Savings Principle         The baseline efficiency case is a condensing, integrated water heater/boler with an AFUE >= 90%.           Farey Sovings calculation method         Installed high efficiency integrated boler/water heater unit.           Gross MMBus_Gas = Qty × detaMMBtu_Gas         Gross MMBus_Gas = Qty × detaMMBtu_Gas           Savings figuation         Where:         Qty = Total number of units.           GetaMMBtu_Gas = Average annual natural gas reduction per unit.         HVA           Hours Source         #N/A           Mours Source         #N/A           Why/r Savings ource         #N/A		
Type         Heating           Sub-type         Boller           Program Name         Commercial New Construction           Measure Name         Integrated water heater/condexing boller (EF 0.90) ATUE 90%)           Measure Description         This measure promotes the installation of a combined high efficiency boller and water heating systems are more efficient than separate system bacause they combined boller and water heating systems are more efficient than separate system bacause they derindrate the standby heat losse of an additional tank.           Savings Equation         The high efficiency case is a notion and water heater.           Savings Sings Savings Calculation method         Deemed           Savings Sings Savings Calculation method         Deemed           Savings Savings Calculation         Gross MMBtu_Gas = Qxy & detaMMBtu_Gas           Savings Savings Calculation method         Deemed           Savings Savings Calculation method         Gross MMBtu_Gas           Where:         QY = Total number of units.           detaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours source           Why/r Savings Total         MVA           Why/rs Savings Total         MVA           Why/rs Savings Total         Go Savecartes, inc. and Sammit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.           MVA         MVA         MVA		
Sub-type         Boller           Program Name         Commercial New Construction           Measure Name         Integrated water heater(condensing boler (EP 0.90; AFUE 90%)           This measure permotes the installation of a combined high-efficiency boler and water heating unit.           Combined boler and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.           Saving Principle         The baseline of 00K AFUE boler with a 0.594 EF water heater.           Saving Principle         The high efficiency case is a 00K AFUE boler with a 0.594 EF water heater.           Savings calculation method         Deemed           Savings function         Installed high efficiency integrated boler/water heater unit.           Gress MMBLU_Gas = Average annual natural gas reduction per unit.         Hours           Hours         N/A           Hours Source         HV/A           Hours Source         HV/A           Wright savings onte         HV/A           Wright reduction note         HV/A           Wreduction note		
Program Name         Commercial New Construction           Measure Name         Integrated water heater/condensing buller (EF 0.90; AFUE 90%)           Measure Description         Combined buller and water heating systems are more efficient than separate systems because they eliminate the standph heat losse of an additional tank.           Baseline Description         The bis abeliance efficiency case is an 30% AFUE boller with a 0.594 EF water heater.           Swings Principle         The high efficiency case is an 30% AFUE boller with a 0.594 EF water heater.           Swings Vinciple         The high efficiency case is an 30% AFUE boller with a 0.594 EF water heater.           Swings Vinciple         The high efficiency integrated boller/water heater unit.           Energy Swings Calculation method         Deemed           Savings Unit         Gross MMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         #N/A           Hours Source         #N/A           With/rs swings note         #N/A           With/r swings note         #N/A           Oli MMBU		
Measure Name         Integrated water heater/condensing bolic (ED 90); AFUE 90%)           Measure Description         This measure permotes the installation of a combined high-efficiency/bolier and water heating unit. Combined bolier and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.           Baseline Description         The baseline of a 300 KAUL bolier with a 0.594 EF water heater.           Swings Principle         The high efficiency case is a 000 kAUL bolier with a 0.594 EF water heater.           Swings Finciple         The high efficiency case is a 000 kAUL bolier with a 0.594 EF water heater.           Swings Finciple         The high efficiency integrated bolier/water heater unit.           Gross MMBLU_Gass = Average annual natural gas reduction per unit.         Hours           Hours         N/A           Hours source ontol         #N/A           Withy swings note         #N/A           Withy swings note         #N/A           Withy swings note         #N/A           Withy swings note         #N/A           Masschusters. Prepared for Gas Networks.         GoS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Masschusters.           Minds Withy swings note         #N/A           OI MMBLU/Y swings note         #N/A           OI MMBLU/Y swings note         #N/A		
This measure promotes the installation of a combined high-efficiency boiler and water heating systems are more efficient than separate systems because they eliminate the standby heat losses of an additional tank.           Baseline Description         The baseline efficiency case is a BOXA FUE boiler with a 0.594 EF water heater.           Swings Frinciple         The high efficiency case is a BOXA FUE boiler with a 0.594 EF water heater.           Swings surit         Installed high efficiency integrated boiler/water heater unit.           Swings Equation         Installed high efficiency integrated boiler/water heater unit.           Swings Equation         Installed high efficiency integrated boiler/water heater unit.           Hours         Mhere:           Oty = Total number of units.         defaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         M/A           Hours Source note         M/A           Why reduction source         M/A           Worldvicton source         M/A           Worldvicton source         M/A           Sa Heat MMBtu/yr swings source         M/A           Gas Heat MMBtu/yr swings source         M/A           Gas Heat MMBtu/yr swings note         M/A           Ol MMBtu/yr swings note         M/A           Ol MMBtu/yr swings note         M/A           Ol MMBtu/yr swings note         M/A		
Measure Description         Combined boiler and water heating yestems are more efficient than separate systems because they eliminate the standby heat losses of an additional tark.           Baseline Description         The baseline efficiency case is an 80% AFUE boiler with a 0.594 EF water heater.           Savings Finciple         The high efficiency case is an condensing integrated water heater/boiler with an AFUE >= 90%.           Energy Savings calculation method         Deemed           Savings Finciple         The high efficiency case is a condensing integrated water heater unit.           Gross MMBtu_Gas = Quy x deltaMMBtu_Gas         Where:           Savings Equation         Quy = Total number of units.           deftaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours Source note           HN/A         Hours Source note         HN/A           Hours Source note         HN/A         Hours Number of units.           wireduction source         HN/A         Hours Numeer of UNA           Wreduction source         HN/A         Hours Numeer of UNA           Wreduction source         HN/A         Hours Numeer of UNA           Gas Heat MMBtu/yr savings source         HN/A         Hours Numeer of UNA           Gas Heat MMBtu/yr savings source         HN/A         Hours Numeer of UNA           Oli MMBtu/yr savings source         HN/A         Hours Numeer of UNA <td></td> <td></td>		
eliminate the standby heat losses of an additional tank.           Baseline Description         The baseline officiency 20se is a condensing, integrated water heater/boiler with an AFUE >= 90%.           Dereng Swings calculation method         Deemed           Savings unit         Installed high efficiency integrated boiler/water heater unit.           Savings sung         Gross MMBtu_Gas = Qty x dettaMMBtu_Gas           Savings Equation         Where:           Qty = Total number of units,         dettaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         MN/A           Hours Source note         MN/A           Hours Source note         MN/A           Wreduction source         MN/A           Wreduction source         MN/A           Wreduction source         MN/A           Savings source         MN/A           Saving Savings source	Massura Description	
Baseline Description         The baseline efficiency case is a 00% AFUE boller with a 0.594 EF water heater.           Savings Principle         The high efficiency case is a condensing, integrated water heater./boller with an AFUE >= 90%.           Baseline Savings unit         Installed high efficiency integrated boller/water heater unit.           Savings Lequation         Gross MMBtu_Gas = Qty x dettaMMBtu_Gas           Savings Equation         Qty = Total number of units. detlaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source         MVA           Hours Source note         MVA           Wir reduction source         MVA           Sas Heat MMBtu/yr savings source         MVA           MMA         Gas Heat MMBtu/yr savings source           MIXA         MA           Mixing Saschusetts. Prepared for GasNetworks.         Gas Heat MMBtu/yr savings source           MIXA         MXA           MMA         MXA           Mixing Mixing Saschusetts. Prepared for GasNetworks.         Gas Heat MMBtu/yr savings source           MIXA         MIXA	Measure Description	
Savings Principle         The high efficiency case is a condensing, integrated water heater/boiler with an AFUE >= 90%.           Energy Savings calculation method         Deemed           savings unit         installed high efficiency integrated boiler/water heater unit.           Gross MMBtu_Gas = City × deltaMMBtu_Gas         Where:           Ofly = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         #N/A           Hours Source         #N/A           Hours Source         #N/A           Why? savings source         #N/A           Why? savings source         #N/A           Wreduction outce         #N/A           Wreduction outce         #N/A           Wreduction outce         #N/A           Gas Heat MMBtu/fy savings source         #N/A           Gas Heat MMBtu/fy savings note         #N/A           Wreduction outce         #N/A           Gas Heat MMBtu/fy savings note         #N/A           Gas Heat MMBtu/fy savings note         #N/A           MMEU/fy savings note         #N/A           Oli MMBtu/fy savings note	Pacalina Description	
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	RRd winter peak source	#N/A

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Net-to-Gross source       TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study (Memorandum), August 2015         Net-to-Gross note       #N/A         Gross Measure TRC unit       \$ 1273 per measure         Gross Measure TRC source       #N/A         Gross Measure TRC note       #N/A	Spill-Over (non-participant)	0.00
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Gross Measure TRC unit     \$ 1273 per measure       Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross source	(Memorandum), August 2015
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Net-to-Gross note	#N/A
Gross Measure TRC source     #N/A       Gross Measure TRC note     #N/A	Gross Measure TRC unit	\$ 1273 per measure
	Gross Measure TRC source	
Incontive Unit ¢ 1500 per measure	Gross Measure TRC note	#N/A
incentive onic là ton hei measure	Incentive Unit	\$ 1500 per measure

TRL Reference Number	RI 0329
Fuel	Gas
Sector	C&I
Project Type	New Construction
, ,,	Water Heating
Category Type	Water Heating
Sub-type	Condensing Water Heater
Program Name	Commercial New Construction
Measure Name	Condensing stand Alone Water Heater
Measure Description	The installation of a high-efficiency water heaters. Indirect water heaters use a storage tank that is heated by the main boiler. The energy stored by the water tank allows the boiler to turn off and on less often, saving considerable energy. Tankless water heaters circulate water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.
Baseline Description	The baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code. For condensing stand-alone water heaters, the baseline is a stand-alone tank water heater with a thermal efficiency of 80%.
Savings Principle	The high efficiency case is either for a condensing stand-alone commercial water heater with a thermal efficiency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu, a tankless water heater that is ENERGY STAR® rated with an Energy Factor of at least .67 and a nominal input of 75,000 Btu/hour or less, or an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency water heater.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	25
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00

RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	#N/A
RRd summer peak source RRd summer peak note	#N/A #N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2340 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure
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Fuel         Gas           Sector         C&L           Project Type         New Construction           Category         Water Heating           Type         New Construction           Sub-Type         Indirect Water Heater           Sub-Type         Indirect Water Heater           Program Name         Commercial New Construction           Measure Name         Indirect water heater (E >= 0.82, CAL >= 85%)           Measure Description         by the main boiler. The energy stored by the water that allows the boiler to turn off and on le saving considerable energy. Tankless water heaters inculate water through heat exchanger for immediate use, eliminating the standy heat tos associated with a bace schanger for immediate use, eliminating the standy heat tos associated with a storage tank.           Baseline Description         Island State Building Code. For condensing stand-alone commercial water heater with a time off schoor of at less to and anomal input of 75,00 or less, or an indirect with a threng Tactor of at less to and an onmal input of 75,00 or less, or an indirect Water heater.           Savings calculation method         Deemed           Savings calculation method         Deemed           Savings calculation         Installed high efficiency water heater.           Where:         Qty = Total number of units.           Ours Source         M/A           Whyre:         MA           Whyre waings sou	e Number RI 0340	
Sector         C&I           Project Type         New Construction           Category         Water Heating           Type         Water Heating           Type         Water Heater           Sub-Type         Indirect Water Heater           Program Name         Commercial New Construction           Measure Name         Indirect Water Heater (F >> 0.82, CAE >> 85%)           Measure Name         Indirect Water Heater (F >> 0.82, CAE >> 85%)           Measure Description         Saving considerable energy. Tankless water heaters inculates water through a heat exchanger for immediate use, eliminating the standby heat loss associated with a storage tank.           Baseline Description         Ibe Maeline efficiency cae sassumes compliance with the efficiency reparametria sa mandating the standby heat loss associated with a storage tank.           Savings Principle         The high efficiency or greater and a capacity between 75.000 Btu and 300.000 or less, or an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater and a capacity between 75.000 Btu and 300.000 or less, or an indirect water heater.           Savings unit         Installed high efficiency water heater.           Savings surit         Installed high efficiency water heater.           Hours Source         MVA           Where:         Qiy = Total number of units.           OH = Total number of units.         deltaMMMBtu_Gas = Average annual natu		
Project Type       New Construction         Category       Water Heating         Type       Water Heater         Sub-type       Indirect Water Heater         Program Name       Commercial New Construction         Measure Name       Indirect Water Heater (E >= 0.82, CAE >= 85%)         Measure Name       The installation of a high-efficiency water heaters. Indirect water heaters use a storage tank to by the main boiler. The energy stored by the water tank allows the boiler to turn off and on le saving considerable energy. Tankless water heaters direculate water though a heat exchanger for immediate use, eliminating the standty heat los associated with a storage tank.         Baseline Description       Is and State Building Code. For condensing stand-alone water heaters, the baseline is a stand-water heater with a termal efficiency of 2005.         Savings Principle       The high efficiency vase is either for a condensing stand-alone water heater, the high efficiency vase is dister of a least. 67 and a nominal input of 75.00 or less, or an indirect water heater.         Savings Principle       Deemed         Energy Savings calculation method       Deemed         Savings variag       Deemed         Savings Equation       Where:         Quy = Total number of units.       detaMMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Surce note       FN/A         WAreduction       O		
Category         Water Heating           Type         Water Heater           Sub-type         Indirect Water Heater           Program Name         Commercial New Construction           Measure Name         Indirect Water Heater           Measure Name         Indirect Water Heater           Measure Name         Indirect Water Heater Facer (EF > 0.82, CAE >= 85%)           Measure Description         The installation of a high-efficiency water heaters inculate water through a heat exchanger for immediate use, eliminating the standby heat loss associated with a storage tank.           Baseline Description         The baseline efficiency case assumes compliance with the efficiency requirements as mandater shate Building Code. For condensing stand-alone water heaters, the baseline is a stand-water heater with a termal efficiency of 80%.           Savings Principle         The high efficiency case is either for a condensing stand-alone commercial water heater with a ENERGY STAR* rated with an Combined Appliance Efficiency (CAE) of 85% or greater and a capacity between 75,000 Bus and 300,000 Bus, a tankles with at ENERGY STAR* rated with an Combined Appliance Efficiency (CAE) of 85% or greater and a capacity between 75,000 Bus and 300,000 Bus, a tankles with the STAR STAR* rated with a Combined Appliance Efficiency (CAE) of 85% or greater and a capacity between 75,000 Bus and 300,000 Bus, a tankles with the STAR STAR rated With an Energy Factor of at least .67 and a nombal prince 75,000 or ress, or an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater and a capacity between 75,000 Bus and 300,000 Bus, a tankles withat is ENERGY STAR* rated with a		struction
Type         Water Heater           Sub-type         Indirect Water Heater           Program Name         Commercial New Construction           Measure Name         Indirect water inter (FF >= 0.82, CAE >= 85%)           Measure Name         Indirect water inter (FF >= 0.82, CAE >= 85%)           Measure Description         The installation of a high-efficiency water heaters. Indirect water through a heat exchanger for immediate use, eliminating the standy had Ioss associated with a storage tank.           Baseline Description         The baseline efficiency case assumes compliance with the efficiency requerements as mandat.           Savings Principle         The high efficiency case is either for a condensing stand-alone commercial water heater with.           Savings Principle         The high efficiency case is either for a condensing stand-alone commercial water heater with a test Building Code. For condensing stand-alone commercial water heater with a test Building Code of 95% or greater and a capacity between 75,000 But and 300,000 But, and 180,000 But and 180,000		
Sub-type         Indirect Water Heater           Program Name         Commercial New Construction           Measure Name         Indirect water heater (EF >= 0.82, CAE >= 85%)           Measure Name         The installation of a high-efficiency water heaters. Indirect water heaters use a storage tank to by the water tank allows the boiler to turn off and on le saving considerable energy. Tankiess water heaters circulate water through a heat exchanger for immediate use, eliminating the standy heat loss associated with a storage tank.           Baseline Description         The baseline efficiency care assumes compatingnes with the efficiency requirements as mandati Island State Building Code, For condensing stand-alone water heaters, the baseline is a stand-water heater with a termal efficiency care assumes compating stand-alone commercial water heater with a termal efficiency of 80%.           Savings Principle         The high efficiency cares is their for a condensing stand-alone commercial water heater with a is INERGY STAR* rated with an Energy Factor of at least. 67 and a nominal input of 75,000 or less, or an indirect water heater.           Savings calculation method         Deemed           Savings Equation         Where:           Qty = Total number of units.         delfaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           HVM/r Savings note         MI/A           KWh/ry savings ource         MI/A           KWh/ry savings ource         MI/A           KWh/ry savings source         M		•
Program Name         Commercial New Construction           Measure Name         Indirect water heater (EF > 0.82, CAE > 85%)           Measure Description         The installation of a high-efficiency water heaters, indirect water heaters use a storage tank they the main boiler. The energy stored by the water tank allows the boiler to turn off and on le saving considerable energy. Tanklesis water heaters circulate water through a heat exchanger for immediate use, eliminating the standby heat loss associated with a storage tank.           Baseline Description         Island State Building Code. For condensing stand alone water heaters, the baseline is a stand-water heater with a thermal efficiency of 95% or greater and a capacity between 75,000 Btu and 3000 Btu, a tankless with the stRNGY STAR* flated with an Energy Factor of at less. 67 and a nominal input of 75,00 or less, or an indirect water heater.           Savings Calculation method         Deemed           Deemed         Savings and instruction.           Savings calculation         Where:           Qity = Total number of units.         deltaMMBtu_Gas = Qty × deltaMMBtu_Gas           Why/ry savings source         #N/A           Hours Source note         #N/A           Wh/ry rawings note         #N/A           Why/ry savings note         #N/A           Why/ry savings note         #N/A           KWh/ry savings note         #N/A           Measure conce         #N/A           KWh/ry savings note         #N/A <td></td> <td></td>		
Measure Name         Indirect water heater (EF >= 0.82, CAE >= 85%)           Measure Description         The installation of a high-efficiency water heaters. Indirect water heaters inculate water through a heat exchanger for immediate use, eliminating the standby heat loss associated with a storage tank.           Baseline Description         The baseline efficiency case assumes compliance with the efficiency requirements as mandatic island State Building Code. For condensing stand alone water heaters, the baseline is a stand-water heater with a thermal efficiency of 80%.           Savings Principle         The high efficiency case is either for a condensing stand-alone commercial water heater with a terfliciency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu, a tankless with this is ENERGY STAR* rated with an Energy Factor of at least. 67 and anominal input of 75,00 or less, or an indirect water heater.           Savings calculation method         Deemed           Savings Equation         Where:           Qty = Total number of units.         delraMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source         M/A           MYA         WhyA           KWh/Yr savings source         M/A           KWh/Yr savings source         M/A           KWh/Yr savings source         M/A           M/A         M/A           KWh/Yr savings		
The installation of a high-efficiency water heaters. Indirect water heaters use a storage tank tilby the main bolier. The energy stored by the water trank allows the bolier to turn off and on the saving considerable energy. Tankless water heaters inculate water through a heat exchanger for immediate use, eliminating the standy beat loss associated with a storage tank.           Baseline Description         The baseline efficiency case assumes compliance with the efficiency requirements as mandatus Island State Building Code. For condensing stand-alone commercial water heater with stand State Building Code. For condensing stand-alone commercial water heater with a thermal efficiency or 95% or greater and a capacity between 75,000 But and 300,000 But, antakess with at is ENERGY STAR® rated with an Energy Factor of at least. 57 and a nominal input of 75,00 or reles, or an indirect water heater.           Savings Principle         Desmed           Energy Savings calculation method         Desmed           Savings unit         Installed high-efficiency water heater.           Savings calculation         Orters.           Gross MMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         IN/A           Hours Source note         IN/A           Why reavings source         IN/A           WMy/Yr savings source         IN/A           WMy/Yr savings source         IN/A           WMy/Yr savings source         IN/A           Gas Heat MMBtu/Yr savings source         IN/A           Gas Heat MMBtu/Yr savings sourc		
Measure Description         by the main bolier. The energy stored by the water tank allows the bolier to turn off and on le saving considerable energy. Tankless water heaters circulate water through a heat exchanger for immediate use, eliminating the standby heat loss associated with a storage tank.           Baseline Description         Island State Building Code. For condensing stand-alone water heaters, the baseline is a stand-water heater with a thermal efficiency of 90%.           Savings Principle         The high efficiency case is either for a condensing stand-alone commercial water heater with a thermal efficiency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu, a tankless withat is ISCRGY STAR® Tated with an Increape Factor of at least. 67 and a nominal input of 75,000 Stu and in lipust of 75,000 Stu and 10,000 Stu as tankless with a Storage tank.           Savings calculation method         Deemed           Savings Equation         Where:           Qity = Total number of units.         deitaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         #N/A           Hours Source         #N/A           KWh/ry savings source         #N/A           KWh/ry savings source         #N/A <td></td> <td>watch fielder (E1 &gt;= 0.02; CAE &gt;= 0570)</td>		watch fielder (E1 >= 0.02; CAE >= 0570)
Baseline Description         Island State Building Code. For condensing stand-alone water heaters, the baseline is a stand-water heater with a thermal efficiency of 80%.           Savings Principle         The high efficiency case is either for a condensing stand-alone commercial water heater with a efficiency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu, a tankless w that is ENERGY STAR® rated with an Energy Factor of at least. 67 and a nominal input of 75,00 or less, or an indirect water heater.           Energy Savings calculation method         Deemed           Savings unit         Installed high-efficiency water heater.           Savings Equation         Gross MMBtu_Cas = Qty × deltaMMBtu_Gas           Savings Equation         Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source         #N/A           Hours Source note         #N/A           KWh/yr savings note         #N/A           KW reduction         O           KW reduction         O           KW reduction         O           Savings source         #N/A           KW reduction note         #N/A           Gas Heat MMBtu/yr savings source         #N/A           KW reduction note         M/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source	cription by the n saving c for imm	onsiderable energy. Tankless water heaters circulate water through a heat exchanger to be heated ediate use, eliminating the standby heat loss associated with a storage tank.
Savings Principle       efficiency of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu, a tankless we that is ENERGY STAR* rated with an Energy Factor of at least. 67 and a nominal input of 75,000 or less, or an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater and a combined Appliance Efficiency application of equipment in the theory (CAE) of 85% or greater and (SAE) of 0 combined Appliance Effic	cription Island St	line efficiency case assumes compliance with the efficiency requirements as mandated by Rhode ate Building Code. For condensing stand-alone water heaters, the baseline is a stand-alone tank ater with a thermal efficiency of 80%.
Savings unit       Installed high-efficiency water heater.         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation       Where:         Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours source note       #N/A         Hours source note       #N/A         KWh/yr savings source       #N/A         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KW reduction       0         KW reduction note       #N/A         Gas Heat MMBtu/yr savings onte       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Olil MMBtu/yr savings source       #N/A         Olil MMBtu/yr savings note       #N/A         Olil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life <t< td=""><td>ple efficience that is E</td><td>efficiency case is either for a condensing stand-alone commercial water heater with a thermal y of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu, a tankless water heater NERGY STAR® rated with an Energy Factor of at least .67 and a nominal input of 75,000 Btu/hour r an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater.</td></t<>	ple efficience that is E	efficiency case is either for a condensing stand-alone commercial water heater with a thermal y of 95% or greater and a capacity between 75,000 Btu and 300,000 Btu, a tankless water heater NERGY STAR® rated with an Energy Factor of at least .67 and a nominal input of 75,000 Btu/hour r an indirect water heater with a Combined Appliance Efficiency (CAE) of 85% or greater.
Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Savings Equation         Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       #N/A         Hours Source note       #N/A         KWh/yr Savings       0         KWh/yr savings source       #N/A         KW reduction       0         KW reduction source       #N/A         KW reduction source       #N/A         KW reduction source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oli MMBtu/yr savings note       #N/A         Oli MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Oli MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life note       #N/A         I	s calculation method Deemed	
Savings Equation       Where:         Qty = Total number of units.       deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours Source       M/A         Hours source note       #N/A         KWh/yr Savings       0         KWh/yr savings note       #N/A         KWh/yr savings note       #N/A         KWr eduction       0         KW reduction note       #N/A         KW reduction note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         OI IMMBtu/yr savings ource       #N/A         OI IMMBtu/yr savings ource       #N/A         OI IMMBtu/yr savings note       #N/A         Propane MMBtu/yr savings ource       #N/A         Propane MMBtu/yr savings ource       #N/A         Propane MMBtu/yr savings note       #N/A <t< td=""><td>Installec</td><td>high-efficiency water heater.</td></t<>	Installec	high-efficiency water heater.
Savings Equation       Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       #N/A         Hours source note       #N/A         KWh/yr Savings       0         KWh/yr savings note       #N/A         kWh/yr savings note       #N/A         kWr eduction       0         kW reduction note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         OI IMMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Oil MMBtu/yr savings ource       #N/A         OI IMMBtu/yr savings ource       #N/A         Oil MMBtu/yr savings ource       #N/A         Oil MMBtu/yr savings ource       #N/A         Oil MMBtu/yr savings ource       #N/A         Propane MMBtu/yr savings note       M/A         Propane MMBtu/yr savings no	Gross M	MBtu_Gas = Qty × deltaMMBtu_Gas
Hours       N/A         Hours Source       #N/A         Hours Source note       #N/A         Hours source note       #N/A         Kwh/yr Savings       0         kWh/yr savings note       #N/A         kWh/yr savings note       #N/A         kWr eduction       0         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings ource       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life       15         measure life note       #N/A         In-service rate (SIR)       1.00         In-service rate source	tion Qty = Tc	
Hours Source       #N/A         Hours source note       #N/A         KWh/yr savings       0         kWh/yr savings source       #N/A         kWh/yr savings note       #N/A         kWr eduction       0         kW reduction source       #N/A         kW reduction note       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       19         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR) <td< td=""><td></td><td></td></td<>		
Hours source note       #N/A         kWh/yr Savings       0         kWh/yr savings source       #N/A         kWh/yr savings note       #N/A         kWr eduction       0         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       19         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate (ISR)       1.00         In-service rate note		
kWh/yr Savings       0         kWh/yr savings source       #N/A         kWh/yr savings note       #N/A         kW reduction       0         kW reduction source       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rat		
kWh/yr savings source       #N/A         kWh/yr savings note       #N/A         kW reduction       0         kW reduction source       #N/A         kW reduction note       #N/A         kW reduction note       #N/A         kW reduction note       #N/A         Gas Heat MMBtu/yr savings       19         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life note       15         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate (ISR)       1.00         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment in:		
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Gas Heat MMBtu/yr savings       19         Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification o		
Gas Heat MMBtu/yr savings source       #N/A         Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life note       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations		
Gas Heat MMBtu/yr savings note       #N/A         Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment in:	., .	
Oil MMBtu/yr savings       0         Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service ra		
Oil MMBtu/yr savings source       #N/A         Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment in:	., .	
Oil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment include verification include verification inc		
Propane MMBtu/yr savings       0         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations		
Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations		
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Energy Reference(s) & table(s) notes       0         measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment in:		
measure life       15         measure life source       GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment in:		
GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potent Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment in:		
Massachusetts. Prepared for GasNetworks.         measure life note       #N/A         In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations	GDS Ass	
In-service rate (ISR)       1.00         In-service rate source       #N/A         In-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate si	Massach	usetts. Prepared for GasNetworks.
In-service rate source #N/A In-service rate note All installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verification of equipment installations have 100% in-service rate since programs include verifications include verifications include verifications inc		
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	e source #N/A	
	e note All insta	lations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF) 1.00	stence Factor (SPF) 1.00	
Savings Persistence Factor source #N/A		
Savings Persistence Factor note Savings persistence is assumed to be 100%.	stence Factor note Savings	ersistence is assumed to be 100%.
Realization rate energy (RRe) 1.00	te energy (RRe) 1.00	

RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak note	#N/A #N/A
	0.00
RR demand (RRd) winter peak	
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1749 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 400 per measure
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TRL Reference Number Fuel Sector	RI_0343 Gas
	Gas
Sector	
	C&I
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Tankless Water Heater
Program Name	Commercial New Construction
Measure Name	On-demand tankless water heater (EF>=0.82)
	Tankless water heaters circulate water through a heat exchanger to be heated for immediate use,
Measure Description	eliminating the standby heat loss associated with a storage tank.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
	The high efficiency case is a tankless water heater that is ENERGY STAR® rated with an Energy Factor of at
Savings Principle	
Frankrik Carriera anlaulation weath ad	least 0.82.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency water heater.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
	#N/A
kWh/yr savings source	
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	6.3
	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
Gas Heat MMBtu/yr savings source	Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A #N/A
	·
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
	Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
	#N/A 0.00

RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 2817 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 500 per measure

TRL Reference Number	RI 0344
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	Water Heating
Туре	Water Heater
Sub-type	Tankless Water Heater
Program Name	Commercial New Construction
Measure Name	On-demand tankless water heater (EF>=0.90)
Measure Description	Condensing water tankless water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy and circulating water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
Savings Principle	The high efficiency case is a tankless water heater that is ENERGY STAR <sup>®</sup> rated with an Energy Factor of at least 0.90.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency water heater.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	89
Gas Heat MMBtu/yr savings source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
	Index

RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 3449 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 800 per measure

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TRL Reference Number	RI 0344
Fuel	Gas
Sector	
Project Type	New Construction
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Category	Water Heating Water Heater
Type	
Sub-type	Tankless Water Heater
Program Name	Commercial New Construction
Measure Name	On-demand tankless water heater (EF>=0.95)
Measure Description	Condensing water tankless water heaters recover energy by using either a larger heat exchanger or a second heat exchanger to reduce the flue-gas temperature to the point that water vapor condenses, thus releasing even more energy and circulating water through a heat exchanger to be heated for immediate use, eliminating the standby heat loss associated with a storage tank.
Baseline Description	The baseline efficiency case is a standalone tank water heater with an energy factor of 0.61.
·	The high efficiency case is a tankless water heater that is ENERGY STAR <sup>®</sup> rated with an Energy Factor of at
Savings Principle	least 0.95.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency water heater.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
	0
kWh/yr Savings	-
kWh/yr savings source	#N/A #N/A
kWh/yr savings note	
kW reduction	
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	90
Gas Heat MMBtu/yr savings source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	20
measure life source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
monsuro lifo noto	Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source In-service rate note	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A Savings paggistance is assumed to be 100%
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A

8	
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.42
Spill-Over (participant)	0.05
Spill-Over (non-participant)	0.00
Net-to-Gross	0.63
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 3449 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 800 per measure

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TRL Reference Number	RI 0352
Fuel	Gas
Sector	C&I
Project Type	New Construction
Category	Whole Building
Туре	Custom
Sub-type	Whole Building
Program Name	Commercial New Construction
Measure Name	Custom New Construction
Measure Description	The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.
Energy Savings calculation method	Custom
Savings unit	Installed custom efficiency application.
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	Calc
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	mult
measure life source	#N/A
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.

Realization rate energy (RRe)	0.76
RRe source	
	KEMA (2011). Impact Evaluation of C&I Custom Gas Installations. Prepared for National Grid.
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	Calc
Sewer savings: gallons/yr	Calc
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.09
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.91
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 8863.71 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 6647.78 per measure

TRL Reference Number	RI 0005
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	Building Shell
Туре	Air Sealing
Sub-type	Air Sealing/Infiltration
Program Name	Commercial and Industrial MultiFamily
Measure Name	MF Air Sealing
Measure Description	Thermal shell air leaks are sealed through strategic use and location of air-tight materials.
	The baseline efficiency case is the existing building before the air sealing measure is implemented. The
Baseline Description	baseline building is characterized by the existing CFM50 measurement (CFM50PRE) for single family
	homes, or the existing air changes per hour (ACHPRE)
	The high efficiency case is the existing building after the air sealing measure is implemented. The high
	efficiency building is characterized by the new CFM50 measurement for single family homes
Savings Principle	(CFM50POST), or the new air changes per hour (ACHPOST) for multi-family facilities, which is measured
	after the air sealing measure is implemented.
Energy Savings calculation method	Calculated using site-specific inputs
Savings unit	Completed air sealing project.
	Gross MMBtu Gas = (CFM50_pre - CFM50_post) / LBL × HDD × (Hours per Day) × (Minutes per Hour) ×
	(Btu/ft3-°F) × CorrectionFactor / SeasonalEff / (Btu per MMBtu)
	Where:
	CFM50_pre = CFM50 measurement before air sealing
	CFM50_post = CFM50 measurement after air sealing (cu.ft./min)
	LBL = LBL factor - This factor is determined as the product of the N-factor and a Height Correction Factor
	according to BPI Protocol
Savings Equation	4644 HDD = Heating degree days (deg. F-day); This value is an average BASE 60 Annual Heating Degree
	Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year
	data. http://www.ncdc.noaa.gov
	24 Hours per Day = Conversion factor
	60 Minutes per Hour = Conversion factor
	0.018 Btu/ft3-°F = Heat capacity of 1 cubic foot of air at 70 °F
	1 CorrectionFactor = Correction factor determined by auditor (e.g. for seasonal homes): Default
	0.7 SeasonalEff = Heating system seasonal efficiency factor determined by auditor for homes heated with
	natural gas: Default
	1,000,000 Btu per MMBtu = Conversion factor
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Sourco	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours Source Hours source note	
	and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	and southeastern Massachusetts based on NOAA 30-year data. #N/A
Hours source note kWh/yr Savings	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0
Hours source note kWh/yr Savings kWh/yr savings source	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A #N/A
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A 0
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A 0 #N/A 0
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A 0 0 #N/A #N/A #N/A
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A 0 0 #N/A functional data data data data data data data da
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A 0 0 #N/A Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 4N/A #N/A 4N/A Calc Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 4W/A #N/A 4W/A 4W/A Calc Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note Oil MMBtu/yr savings	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A 0 2 4 #N/A 0 2 2 2 2 2 2 2 2 2 2 2 2 2
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings note	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 #N/A #N/A 4 N/A 0 Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators. #N/A 0
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	and southeastern Massachusetts based on NOAA 30-year data.         #N/A         0         #N/A         #N/A         0         #N/A         Ø         #N/A         Ø         #N/A         Calc         Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012).         Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for         Massachusetts Program Administrators.         #N/A         0         #N/A
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note Propane MMBtu/yr savings	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 0 #N/A #N/A 0 0 Calc Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators. #N/A 0 0 #N/A 0 0 0 #N/A 0 0
Hours source note kWh/yr Savings kWh/yr savings source kWh/yr savings note kW reduction kW reduction source kW reduction note Gas Heat MMBtu/yr savings Gas Heat MMBtu/yr savings source Oil MMBtu/yr savings Oil MMBtu/yr savings source Oil MMBtu/yr savings note	and southeastern Massachusetts based on NOAA 30-year data. #N/A 0 4N/A #N/A 4N/A 0 4N/A 0 Calc Calc Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators. #N/A 0 N/A 0 N/A 0 N/A 0 HN/A 4N/A

measure life	15
measure life source	GDS Associates, Inc. (2007). Measure Life Report: Residential and Commercial/Industrial Lighting and
	HVAC Measures. Prepared for The New England State Program Working Group.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC source	#N/A #N/A
Incentive Unit	N/A

	DL 0024
TRL Reference Number	RI_0021
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	Commercial and Industrial MultiFamily
Measure Name	MF Other Insulation
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
Baseline Description	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.
Savings Principle	The high efficiency case is the existing facility or equipment after the implementation of additional insulation.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	3.15
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	#N/A 0
measure life	25
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
	#N/A
Savings Persistence Factor source	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A

RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	N/A

	DL 0040
TRL Reference Number	RI_0019
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	Building Shell
Туре	Insulation
Sub-type	Other
Program Name	Commercial and Industrial MultiFamily
Measure Name	MF Other Insulation
Measure Description	Insulation upgrades (other than basement, roofs, and walls) applied in existing facilities.
Baseline Description	The baseline efficiency case is the existing facility or equipment prior to the implementation of additional insulation.
Savings Principle	The high efficiency case is the existing facility or equipment after the implementation of additional insulation.
Energy Savings calculation method	Deemed
Savings unit	Completed insulation project.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units.
11	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	Heating hours are characterized by the heating degree days for the facility, 4644.
Hours Source	This value is an average BASE 60 Annual Heating Degree Day value for weather stations in Rhode Island and southeastern Massachusetts based on NOAA 30-year data.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	Calculated by RISE Engineering according to algorithms found in The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for Massachusetts Program Administrators.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings source	#N/A #N/A
Energy Reference(s) & table(s) notes	#N/A 0
measure life	25
measure life source	The Cadmus Group (2012). Massachusetts 2011 Residential Retrofit Multifamily Program Impact Analysis. Prepared for the Massachusetts Program Administrators.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate (ISK)	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe source RRe note	#N/A Energy realization rate is 100% because deemed savings are based on evaluation results.
	0.00
RR demand (RRd) summer peak RRd summer peak source	#N/A
RRd summer peak note	#N/A

RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.20
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.80
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	N/A

TRL Reference Number	RI_0071
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Boiler Control
Program Name	Commercial Retrofit
	Boiler reset control (multi
Measure Name	
Measure Description	Boiler reset controls are devices that automatically control boiler water temperature based on outdoor
	temperature using a software program.
Baseline Description	The baseline efficiency case is a boiler without reset controls.
Savings Principle	The high efficiency case is a boiler with reset controls.
Energy Savings calculation method	Deemed
Savings unit	Boiler reset control installed on existing boiler.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
	Where:
Savings Equation	
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	35.5
	Environmental Protection Agency (2011). Savings Calculator for ENERGY STAR Qualified Commercial
Gas Heat MMBtu/yr savings source	Kitchen Equipment: Steam Cooker Calcs.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
., -	
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	ACEEE (2006). Emerging Technologies Report: Advanced Boiler Controls. Prepared for ACEEE.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00

CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.06
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.94
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 993 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 225 per measure

TRL Reference Number	RI 0152
Fuel	Gas
	C&I
Sector	Retrofit
Project Type	HVAC
Category	
Type	Heating
Sub-type	Efficient Heating
Program Name	Commercial and Industrial MultiFamily
Measure Name	MF Heating System Replacement
Measure Description	Replacement of an existing gas heating system with a new high efficiency system. Electric savings are
	achieved from reduced run time of the heating system fan(s).
Baseline Description	The baseline case is the existing heating system.
Savings Principle	The high efficiency case is the new efficient heating equipment.
Energy Savings calculation method	Deemed
Savings unit	Installed high-efficiency natural gas heating system.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	Calc
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	Calc
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	Calc
Gas Heat MMBtu/yr savings source	GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in Massachusetts. Prepared for GasNetworks.
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	18
measure life source	Environmental Protection Agency (2009). Life Cycle Cost Estimate for ENERGY STAR Furnace.
measure life note	#N/A
	1.00
In-service rate (ISR) In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Dorsistones Faster (CDF)	1.00
Savings Persistence Factor (SPF)	
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	#N/A
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note Coincidence factor (CF) summer peak	#N/A

CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	#N/A
Net-to-Gross note	The Net-to-Gross ratio is Assumed to be 100%.
Gross Measure TRC unit	N/A
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	N/A

TRL Reference Number	RI_0083
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	HVAC
Туре	Controls
Sub-type	Thermostat
Program Name	Commercial Retrofit
Measure Name	Programmable thermostat
Measure Description	Installation of programmable thermostats with the ability to adjust heating or air-conditioning operating times according to a pre-set schedule to meet occupancy needs and minimize redundant HVAC operation.
Baseline Description	The baseline efficiency case is an HVAC system using natural gas to provide space heating without a programmable thermostat.
Savings Principle	The high efficiency case is an HVAC system using natural gas to provide space heating with a programmable thermostat installed.
Energy Savings calculation method	Deemed
Savings unit	Installed programmable thermostat
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	3.2
Gas Heat MMBtu/yr savings source	E-mail correspondence among MA PAs and Ralph Prahl
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	15
measure life source	Environmental Protection Agency (2010). Life Cycle Cost Estimate for Programmable Thermostats. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A

#N/A
#N/A
0.00
#N/A
#N/A
0.00
#N/A
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#N/A
0.00
#N/A
#N/A
0.00
0.00
0.00
1.00
TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
(Memorandum), August 2015
#N/A
\$ 184.97 per measure
#N/A
#N/A
\$ 184.97 per measure

TRL Reference Number	RI_0175
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	HVAC
Туре	Steam Traps
Sub-type	Steam Trap
Program Name	Commercial Retrofit
Measure Name	Steam trap HVAC
Measure Description	The repair or replacement of malfunctioning steam traps.
Baseline Description	The baseline efficiency case is a failed steam trap.
Savings Principle	The high efficiency case is a repaired or replaced steam trap.
Energy Savings calculation method	Deemed
Savings unit	Repaired or replaced steam trap.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where:
	Qty = Total number of units.
	deltaMMBtu_Gas = Average annual natural gas reduction per unit.
Hours	N/A
Hours Source	#N/A
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	25.7
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings	0
	-
Propane MMBtu/yr savings source	#N/A
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	6
measure life source	DNV GL MA 2013 Prescriptive Gas Impact Evaluation: Steam Trap Evaulation Phase 1
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	1.00
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
	le. A

Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 250 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 75 per measure

-	
TRL Reference Number	RI_0290
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Faucet Aerator
Program Name	Commercial and Industrial MultiFamily
Measure Name	Faucet aerator
	Installation of a faucet aerator with a flow rate of 1.5 GPM or less on an existing faucet with high flow in a
Measure Description	commercial setting with service water heated by natural gas.
Baseline Description	The baseline efficiency case is a 2.2 GPM faucet.
Savings Principle	The high efficiency case is a faucet with 1.5 GPM or less aerator installed.
Energy Savings calculation method	Deemed
Savings unit	Installed faucet aerator.
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu_Gas = Average annual natural gas reduction per unit.
	The calculator used to determine the deemed savings uses a default operation of 30 minuts/day, 260
Hours	days/year. Not applicable for Multifamily applications.
	Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.
Hours Source	Accessed on 10/12/2011.
Hours source note	#N/A
kWh/yr Savings	
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.36
Gas Heat MMBtu/yr savings source	#N/A
Gas Heat MMBtu/yr savings note	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings note	#N/A
Propane MMBtu/yr savings	0
Propane MMBtu/yr savings source	Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life	7
measure life source	Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.96
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
RR demand (RRd) summer peak	
RRd summer peak source	#N/A
RRd summer peak source RRd summer peak note	#N/A #N/A
RR demand (RRd) winter peak	0.00

RRd winter peak source#N/ARRd winter peak note#N/ACoincidence factor (CF) summer peak0.00CF summer peak source#N/ACF summer peak note#N/ACoincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak source#N/ACF winter peak note#N/ACF winter peak note#N/ACF winter peak note#N/ASewer savings: gallons/yr332.00Sewer savings: gallons/yr0.00	
Coincidence factor (CF) summer peak0.00CF summer peak source#N/ACF summer peak note#N/ACoincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/ACF winter peak note#N/AWater savings: gallons/yr332.00	
CF summer peak source#N/ACF summer peak note#N/ACoincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr332.00	
CF summer peak note#N/ACoincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr332.00	
Coincidence factor (CF) winter peak0.00CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr332.00	
CF winter peak source#N/ACF winter peak note#N/AWater savings: gallons/yr332.00	
CF winter peak note #N/A Water savings: gallons/yr 332.00	
Water savings: gallons/yr 332.00	
Sower covings, gollons $hr$ 0.00	
Sewer savings, gallons/yi	
Water / Sewer savings Source #N/A	
Water / Sewer savings note #N/A	
Annual \$ savings 0.00	
Annual \$ savings source / description #N/A	
Annual \$ savings note #N/A	
One time \$ savings 0.00	
One time \$ savings source/description #N/A	
One time \$ savings note #N/A	
Free-Ridership 0.00	
Spill-Over (participant) 0.00	
Spill-Over (non-participant) 0.00	
Net-to-Gross 1.00	
TetraTech (2015) 2013-1	4 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source (Memorandum), August	2015
Net-to-Gross note #N/A	
Gross Measure TRC unit N/A	
Gross Measure TRC source #N/A	
Gross Measure TRC note #N/A	
Incentive Unit N/A	

Intel         Gas           Sector         C81           Project Type         Retrofit           Catagory         Water Heating           Type         Flow Control           Sub-type         Lew Flow Showerhead           Progen Name         Commercial Retrofit           Measure Name         Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           Baseline Description         Demend           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Fareys Savings calculation method         Demend           Savings Trinciple         Gross MMHu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours source         RN/A           Hours source note         RN/A           Wir returns         N/A           Wir reduction oto         0           Wir reduction oto         N           Savings Source         RN/A           Wir reduction source         RN/A           Wir reduction source         RN/A           Wir reduction source         RN/A           Wir reduction source         RN/A           O         Wir reduction source		
Sector         C&I           Project Type         Betrofit           Category         Water Hesting           Type         Flow Control           Sub type         Cow Flow Showerhead           Program Name         Commercial Retrofit           Measure Name         Com Flow Showerhead           Measure Description         installation of a low flow showerhead.           Measure Description         installation of a low flow showerhead.           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings unit         Gross MMBlu_Gas = Qty x detlaMMBlu_Gas           Savings unit         Gross MMBlu_Gas = Qty x detlaMMBlu_Gas           Savings Loution         Where:           Chy = Total number of units.         detlaMMBlu_Gas = Qty x detlaMMBlu_Gas           Savings Loution         M/A           Why resings note         BV/A           Why resings note         BV/A </td <td>TRL Reference Number</td> <td>RI_0371</td>	TRL Reference Number	RI_0371
Project Type         Retrofit           Category         Water Heating           Type         Flow Control           Sub-type         Commercial lettrofit           Measure Name         Commercial lettrofit           Measure Description         Installation of a low flow showerhead           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Gross MMBtu, Gas = Average annual natural gas reduction per unit.         Hours Source           Savings Source         RV/A           Hours Source note         RV/A           Hours Source note         RV/A           VM/ryr Swings coute         RV/A           VM/ryr swings note         RV/A           VM/ryr swings coute         RV/A           VM/ryr swings coute         RV/A           VM reduction note         RV/A           VM reduction source         RV/A           VM reduction source         RV/A           VM reduction source         RV/A	Fuel	
Category         Water Heating           Type         IDev Corrol           Sub-type         Low Flow Showerhead           Program Name         Commercial Retroft           Measure Name         Low Flow Showerhead           Measure Description         Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           Baseline Description         0           Swings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Swings calculation method         Deemed           Swings principle         The high efficiency case is a 1.5 GPM showerhead.           Swings suit         Installed low-flow showerhead           Swings Equation         Where:           City = Total number of units.         delta/MMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         MVA           Hours Source         MVA           Whyfyr swings source         MVA           Wir reduction source         MVA           Wir reduction source         MVA           Wir reduction source         MVA           Mir reduction source         MVA           Mir reduction source         MVA           Mir reduction source         MVA           <	Sector	C&I
Type         How Control           Sub type         Low Flow Showerhead           Program Name         Commercial Retrofit           Measure Bescription         Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           Baseline Description         0           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Savings support of the high efficiency case is a 1.5 GPM showerhead.         Generation of the high efficiency case is a 1.5 GPM showerhead.           Savings Equation         O         Gress MMEL Case = Quy x deftaMMBL/Case           Savings Equation         VM = Total number of units.           Hours Source         MVA           Hours Source note         MVA           Moly savings note         MVA           Mol	Project Type	Retrofit
Sub-type         Low Flaw Showerhead           Program Name         Commercial Retroft:           Measure Description         Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           Baseline Description         0           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings unit         Installed low-flow showerhead           Gross MMBLu_Gas = Qty × deltaMMBLu_Gas         Qty = Total number of units.           GlataMMBLu_Gas = Average annual natural gas reduction per unit.         Hours Surce           Hours Surce         N/A           Hours Surce note         N/A           KWHyr savings source         N/A           KWHyr savings note         N/A           KWHyr savings source         N/A           Gas Heat MMBLu/r savings note         N/A           Gas Heat MMBLu/r savings note         N/A           Gas Heat MM	Category	Water Heating
Program Name         Commercial Retrofit           Measure Description         Low FLow Showerhead           Measure Description         0           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Savings Equation         Gross MMBLu_Gas = Quy × deltaMMBLu_Gas           Savings Equation         Gross MMBLu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source         N/A           Hours Source note         N/A           KMb/ry savings source         N/A           KWb/ry savings note         N/A           Wr eduction source         AN/A           Vir douction note         AN/A	Туре	Flow Control
Neasure Name         Low Flow Showchead           Measure Description         Installation of a low flow showchead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           Baseline Description         0           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings unit         Installed low flow showerhead           Savings unit         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Savings Liquidion         Where:           Oty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         MVA           Hours Source note         MVA           Whyr savings source         MVA           WWr reduction out         0           WWr reduction note         MVA           WWr reduction note         MVA           WW reduction note         MVA           WW reduction note         MVA           WW reduction note         MVA           Gas heat MMBtu/vr savings note         MVA           MVA         MVA           OI MMBtu/vr savings note         MVA           OI MMBtu/vr savings note         MVA           Di MMBtu/vr savings note<	Sub-type	Low Flow Showerhead
Measure Name         Low-Flow Showerhead           Measure Description         Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with service water heated by natural gas.           Baseline Description         0           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings Init         Gross MMBtu_Gas = City × dettaMMBtu_Gas           Savings Equation         Where:           City = Total number of units.         detlaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source         #N/A           Hours Source note         #N/A           KW reduction out         0           KW reduction out         0           KW reduction out         #N/A           KW reduction out         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings note         #N/A     <		Commercial Retrofit
Measure Description         service water heated by natural gas.           Baseline Description         0           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings unit         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Savings unit         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Savings Equation         Where:           Qty = Total number of units.         deltaMMBtu Gas = Average annual natural gas reduction per unit.           Hours Source note         #N/A           Hours Source note         #N/A           KWh/yr savings note         #N/A           KWh/yr savings note         #N/A           KWh/yr savings source         #N/A           KWr reduction source         #N/A           KWr reduction source         #N/A           KWr reduction source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           OII MMBtu/yr savings source         #N/A           OII MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings note         #N/A           INMA         M/A		Low-Flow Showerhead
Measure Description         service water heated by natural gas.           Baseline Description         0           Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings unit         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Savings unit         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Savings Equation         Where:           Qty = Total number of units.         deltaMMBtu Gas = Average annual natural gas reduction per unit.           Hours Source note         #N/A           Hours Source note         #N/A           KWh/yr savings note         #N/A           KWh/yr savings note         #N/A           KWh/yr savings source         #N/A           KWr reduction source         #N/A           KWr reduction source         #N/A           KWr reduction source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           Gas Heat MMBtu/yr savings source         #N/A           OII MMBtu/yr savings source         #N/A           OII MMBtu/yr savings source         #N/A           Propane MMBtu/yr savings note         #N/A           INMA         M/A		Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with
Baseline Description         0           Savings Enclution method         Deened           Energy Savings calculation method         Deened           Savings unit         Installed low-flow showerhead           Savings Equation         Gross MMRU_Gas = City × deltaMMRtu_Gas           Savings Equation         Where:           City = Total number of units.         deltaMMRtu_Gas = Average annual natural gas reduction per unit.           Hours Source         #N/A           Hours Source note         #N/A           Hours Source MIN/A         #N/A           Wryfry savings note         #N/A           WWryfry savings note         #N/A           WW reduction source         #N/A           WW reduction source         #N/A           WW reduction source         #N/A           WW reduction source         #N/A           Gas Heat MMRU/r savings ource         #N/A           Gas Hout MMRU/r savings ource         #N/A           MV/A         MVA           MUMU/r savings note         #N/A           MUMA	Measure Description	-
Savings Principle         The high efficiency case is a 1.5 GPM showerhead.           Energy Savings calculation method         Deemed           Savings unit         Gross MMBtu_Case = Cty × deltaMMBtu_Gas           Savings unit         Gross MMBtu_Case = Cty × deltaMMBtu_Gas           Savings unit         Gross MMBtu_Case = Cty × deltaMMBtu_Gas           Savings time         Where:           Oty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         #N/A           Hours source note         #N/A           WM/ry ravings source         #N/A           WWh/ry savings source         #N/A           WW/reduction source         #N/A           WW reduction note         #N/A           Gas Heat MMBtu/r savings source         #N/A           Gas Heat MMBtu/ry savings source         #N/A           OI MMBtu/ry savings source         #N/A           OI MMBtu/ry savings source         #N/A           OI MMBtu/ry savings source         #N/A           Propane MMBtu/ry savings note         #N/A           OI MMBtu/ry savings note         #N/A           OI MMBtu/ry savings note         #N/A           OI MMBtu/ry savings note         #N/A           O         Propane MMBtu/ry sa	Baseline Description	
Energy Savings calculation method         Deemed           Savings unit         installed low-flow showerhead           Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Savings Equation         Where:           Qty = Total number of units.         deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         N/A           Hours Source note         N/A           KMM/ry Savings         0           KMM/ry savings note         N/A           KWM/ry savings note         N/A           KW reduction         0           KW reduction note         N/A           Gas Heat MMBtu/ry savings source         N/A           Gas Heat MMBtu/ry savings note         N/A           OI MMBtu/ry savings note         N/A           OI MMBtu/ry savings note         N/A           OI MMBtu/ry savings note         N/A           Propane MMBtu/ry savings note         N/A           Propane MMBtu/ry savings note         N/A <t< td=""><td>· · ·</td><td></td></t<>	· · ·	
Savings unit         Installed low-flow showsrhead           Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           Where:           Qty = Total number of units.           deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source         BN/A           KMP/ry savings source         BN/A           KMP/ry savings note         BN/A           KMP/ry savings note         BN/A           KMV reduction source         BN/A           KM reduction source         BN/A           Gas Heat MMBtu/yr savings source         BN/A           Gas Heat MMBtu/yr savings note         BN/A           Propane MMBtu/yr savings note         BN/A           Propane MMBtu/yr savings note         BN/A           Propane MMBtu/yr savings note         BN/A           Energy Reference(s) & table(s) notes         0           IN MA         Energy Refer		
Gross MMBtu_Gas = Qty × detaMMBtu_Gas           Savings Equation         Where: Qty = Total number of units. detaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source note         #N/A           Hours Source note         #N/A           Hours Source note         #N/A           KMM/ry savings source         #N/A           KMM/ry savings note         #N/A           KWMry savings note         #N/A           KW reduction source         #N/A           KW reduction note         #N/A           Gas Heat MMBtu/ry savings source         #N/A           Gas Heat MMBtu/ry savings source         #N/A           Gas Heat MMBtu/ry savings source         #N/A           Gas Heat MMBtu/ry savings note         #N/A           Gil MMBtu/ry savings note         #N/A           Gas Heat MMBtu/ry savings note         #N/A           Gas Heat MMBtu/ry savings note         #N/A           Gil MMBtu/ry savings note         #N/A           Gropane MMBtu/ry savings note         #N/A           Energy Reference[s] & table(s) notes         0           Orpane MMBtu/ry savings note         #N/A           Energy Reference[s] & table(s) notes         0           In-service rate source		
Savings Equation       Where:         City = Total number of units.       detaMMBtu_Gas = Average annual natural gas reduction per unit.         Hours       N/A         Hours Source       HN/A         Hours Source note       HN/A         KMM/Yr savings Source       HN/A         KWM/Yr savings Source       HN/A         KWM/Yr savings Source       HN/A         KWM/Yr savings Source       HN/A         KW reduction note       HN/A         KW reduction source       HN/A         KW reduction note       HN/A         Gas Heat MMBtu/yr savings Source       HN/A         Propane MMBtu/yr savings source       HN/A         Propane MMBtu/yr savings source       HN/A         Propane MMBtu/yr savings source       HN/A         Energy Reference(s) & table(s) notes       0         In-service rate (SR)       1.00         In-service rate (SR)       1.00         In-service rate note       HN/A         Savings Persistence Factor (SPF)       1.00 <t< td=""><td></td><td></td></t<>		
Savings Equation         Dty = Total number of units. deltaMMBtu [Gss = Average annual natural gas reduction per unit.           Hours         N/A           Hours Source (MN)A         MN/A           Hours Source note (MN)A         MN/A           KVM/ry savings Source (MN)A         MN/A           KV reduction note (MN)A         MN/A           Gas Heat MMBtu/ry savings source (MN)A         MN/A           Gas Heat MMBtu/ry savings source (MN)A         MN/A           Oil MMBtu/ry savings source (MN)A         MN/A           Oil MMBtu/ry savings source (MN)A         MN/A           Oil MMBtu/ry savings source (MN)A         MN/A           Propane MMBtu/ry savings source (MN)A         MN/A           Propane MMBtu/ry savings source (MN)A         MN/A           Propane MMBtu/ry savings source (MN)A         O           Propane MMBtu/ry savings source (MN)A         O           Propane MMBtu/ry savings source (MN)A         O           Reasure life         7           measure life         7           Measure life source (MN)A         O           Savings Persistence Factor SOURCE (MN)A <td></td> <td>GIOSS WINDLU_Gas - QLY × GEILAMIVIBLU_Gas</td>		GIOSS WINDLU_Gas - QLY × GEILAMIVIBLU_Gas
Savings Equation         Dty = Total number of units. deltaMMBtu (Gs = Average annual natural gas reduction per unit.           Hours         N/A           Hours source note         #N/A           Hours source note         #N/A           KMM/ry savings ource         #N/A           KMM/ry savings note         #N/A           KMM/ry savings source         #N/A           KMM/ry savings note         #N/A           KMM reduction         0           KW reduction note         #N/A           Gas Heat MMStu/ry savings source         #N/A           Gas Heat MMStu/ry savings source         #N/A           Oil MMStu/ry savings source         #N/A           Oil MMStu/ry savings source         #N/A           Oil MMStu/ry savings source         #N/A           Propane MMStu/ry savings source         #N/A           Propane MMStu/ry savings note         #N/A           Propane MMStu/ry savings note         #N/A           Propane MMStu/ry savings note         #N/A           Energy Reference(s) & table(s) notes         0           In-service rate (SR)         1.00           In-service rate (SR)         1.00           In-service rate note         #N/A           Savings Persistence Factor Note         #N/A		14/1
deltaMMBtu_Gas = Average annual natural gas reduction per unit.           Hours Source         N/A           Hours Source note         HN/A           KWh/yr savings source         HN/A           Wh/yr savings note         HN/A           KWh/yr savings note         HN/A           KWh/yr savings note         HN/A           KW reduction         O           KW reduction note         HN/A           Gas Heat MMBtu/yr savings         S.2           Gas Heat MMBtu/yr savings note         HN/A           Gas Heat MMBtu/yr savings         O           Oli MMBtu/yr savings note         HN/A           Gas Heat MMBtu/yr savings note         HN/A           Gas Heat MMBtu/yr savings note         HN/A           Gil MMBtu/yr savings note         HN/A           Oli MMBtu/yr savings note         HN/A           Gil MMBtu/yr savings note         HN/A           Propane MMBtu/yr savings note         HN/A           Energy Reference(s) & table(s) notes         0           Propane MMBtu/yr savings note         HN/A           Energy Reference(s) & table(s) notes         0           measure life note         HN/A           In-service rate source         HN/A           Savings Persistence Factor source <td>Savings Equation</td> <td>where:</td>	Savings Equation	where:
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Savings Persistence Factor note#N/ARealization rate energy (RRe)1.00RRe source#N/ARRe note#N/ARR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00RRd summer peak note#N/ARR demand (RRd) winter peak0.00RRd winter peak source#N/ARRd winter peak source#N/ARRd winter peak note#N/ARRd winter peak note#N/ACoincidence factor (CF) summer peak0.00	Savings Persistence Factor (SPF)	
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RRe source#N/ARRe note#N/ARR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00RRd winter peak source#N/ARRd winter peak source#N/ARRd winter peak note#N/ACoincidence factor (CF) summer peak0.00	Savings Persistence Factor note	#N/A
RRe source#N/ARRe note#N/ARR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00RRd winter peak source#N/ARRd winter peak source#N/ARRd winter peak note#N/ACoincidence factor (CF) summer peak0.00	Realization rate energy (RRe)	1.00
RRe note#N/ARR demand (RRd) summer peak0.00RRd summer peak source#N/ARRd summer peak note#N/ARR demand (RRd) winter peak0.00RRd winter peak source#N/ARRd winter peak note#N/ARRd winter peak note#N/ACoincidence factor (CF) summer peak0.00		#N/A
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RRd summer peak source       #N/A         RRd summer peak note       #N/A         RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00	RR demand (RRd) summer peak	
RRd summer peak note       #N/A         RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00		
RR demand (RRd) winter peak       0.00         RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00	· ·	
RRd winter peak source       #N/A         RRd winter peak note       #N/A         Coincidence factor (CF) summer peak       0.00	· · · · · · · · · · · · · · · · · · ·	
RRd winter peak note     #N/A       Coincidence factor (CF) summer peak     0.00		
Coincidence factor (CF) summer peak 0.00	•	
	•	
	· · · · ·	
CF summer peak source #N/A		
CF summer peak note #N/A	CF summer peak note	ĦΝ/A

Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	0.00
Sewer savings: gallons/yr	0.00
Water / Sewer savings Source	#N/A
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.06
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	0.94
Net-to-Gross source	#N/A
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 200 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 200 per measure

TRL Reference Number	RI 0319
Fuel	Gas
Sector	C&I
Project Type	Retrofit
Category	Water Heating
Туре	Flow Control
Sub-type	Low Flow Showerhead
Program Name	Commercial and Industrial MultiFamily
Measure Name	Low-flow showerhead
	Installation of a low flow showerhead with a flow rate of 1.5 GPM or less in a commercial setting with
Measure Description	service water heated by natural gas.
Baseline Description	The baseline efficiency case is a 2.5 GPM showerhead.
Savings Principle	The high efficiency case is a 1.5 GPM showerhead.
Energy Savings calculation method	Deemed
Savings unit	Installed low-flow showerhead
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas
Savings Equation	Where: Qty = Total number of units. deltaMMBtu Gas = Average annual natural gas reduction per unit.
	The calculator used to determine the deemed savings uses a default operation of 20 minutes/day, 365
Hours	days/year. Not applicable for Multifamily applications.
	Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads.
Hours Source	Accessed on 10/12/2011.
Hours source note	#N/A
kWh/yr Savings	0
kWh/yr savings source	#N/A
kWh/yr savings note	#N/A
kW reduction	0
kW reduction source	#N/A
kW reduction note	#N/A
Gas Heat MMBtu/yr savings	0.48
Gas Heat MMBtu/yr savings	#N/A
Gas Heat MMBtu/yr savings source	#N/A
Oil MMBtu/yr savings	0
Oil MMBtu/yr savings	#N/A
Oil MMBtu/yr savings note	#N/A
	0
Propane MMBtu/yr savings	
Propane MMBtu/yr savings source	Federal Energy Management Program (2010). Energy Cost Calculator for Faucets and Showerheads. Accessed on 10/12/2011.
Propane MMBtu/yr savings note	#N/A
Energy Reference(s) & table(s) notes	0
measure life measure life source	7 GDS Associates, Inc. and Summit Blue Consulting (2009). Natural Gas Energy Efficiency Potential in
	Massachusetts. Prepared for GasNetworks.
measure life note	#N/A
In-service rate (ISR)	1.00
In-service rate source	#N/A All installations have 100% in-service rate since programs include verification of equipment installations.
Savings Persistence Factor (SPF)	1.00
Savings Persistence Factor source	#N/A
Savings Persistence Factor note	Savings persistence is assumed to be 100%.
Realization rate energy (RRe)	0.93
RRe source	#N/A
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value
	0.00
RR demand (RRd) summer peak	
RR demand (RRd) summer peak RRd summer peak source	
RR demand (RRd) summer peak RRd summer peak source RRd summer peak note	#N/A #N/A

#N/A
#N/A
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1.00
TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
(Memorandum), August 2015
#N/A
N/A
#N/A
#N/A
N/A

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TRL Reference Number	RI_0326	
Fuel	Gas	
Sector	C&I	
Project Type	Retrofit	
Category	Water Heating	
Туре	Flow Control	
Sub-type	Low Flow Spray Valve	
Program Name	Commercial Retrofit	
Measure Name	Pre-rinse spray valve	
Measure Description	Retrofitting existing standard spray nozzles in locations where service water is supplied by natural gas fired hot water heater with new low flow pre-rinse spray nozzles with an average flow rate of 1.6 GPM.	
Baseline Description	The baseline efficiency case is a standard efficiency spray valve.	
Savings Principle	The high efficiency case is a low flow pre-rinse spray valve with an average flow rate of 1.6 GPM.	
Energy Savings calculation method	Deemed	
Savings unit	Installed pre-rinse spray valve.	
	Gross MMBtu_Gas = Qty × deltaMMBtu_Gas	
Savings Equation	Where: Qty = Total number of units.	
11	deltaMMBtu_Gas = Average annual natural gas reduction per unit.	
Hours		
Hours Source	#N/A	
Hours source note	#N/A	
kWh/yr Savings	0	
kWh/yr savings source	#N/A	
kWh/yr savings note	#N/A	
kW reduction	0	
kW reduction source	#N/A	
kW reduction note	#N/A	
Gas Heat MMBtu/yr savings	11.4	
Gas Heat MMBtu/yr savings source	#N/A	
Gas Heat MMBtu/yr savings note	#N/A	
Oil MMBtu/yr savings	0	
Oil MMBtu/yr savings source	#N/A	
Oil MMBtu/yr savings note	#N/A	
Propane MMBtu/yr savings	0	
Propane MMBtu/yr savings source	Veritec Consulting (2005). Region of Waterloo Pre-Rinse Spray Valve Pilot Study.	
Propane MMBtu/yr savings note	#N/A	
Energy Reference(s) & table(s) notes	0	
measure life	8	
measure life source	Veritec Consulting (2005). Region of Waterloo Pre-Rinse Spray Valve Pilot Study.	
measure life note	#N/A	
In-service rate (ISR)	1.00	
In-service rate source	#N/A	
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.	
Savings Persistence Factor (SPF)	1.00	
Savings Persistence Factor source	#N/A	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.	
Realization rate energy (RRe)	1.00	
RRe source	#N/A	
RRe note	Realization rate is assumed to be 100% since evaluation adjusts deemed savings value	
RR demand (RRd) summer peak	0.00	
RRd summer peak source	#N/A	
RRd summer peak note	#N/A	
RR demand (RRd) winter peak	0.00	
RRd winter peak source	#N/A	
RRd winter peak note	#N/A	
	1	

Coincidence factor (CF) summer peak	0.00	
CF summer peak source	#N/A	
CF summer peak note	#N/A	
Coincidence factor (CF) winter peak	0.00	
CF winter peak source	#N/A	
CF winter peak note	#N/A	
Water savings: gallons/yr	6410.00	
Sewer savings: gallons/yr	6410.00	
Water / Sewer savings Source	#N/A	
Water / Sewer savings note	#N/A	
Annual \$ savings	0.00	
Annual \$ savings source / description	#N/A	
Annual \$ savings note	#N/A	
One time \$ savings	0.00	
One time \$ savings source/description	#N/A	
One time \$ savings note	#N/A	
Free-Ridership	0.06	
Spill-Over (participant)	0.00	
Spill-Over (non-participant)	0.00	
Net-to-Gross	0.94	
Net-to-Gross source	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study	
Net-to-Gross source	(Memorandum), August 2015	
Net-to-Gross note	#N/A	
Gross Measure TRC unit	\$ 100 per measure	
Gross Measure TRC source	#N/A	
Gross Measure TRC note	#N/A	
Incentive Unit	\$ 100 per measure	

Uset         Gas           extor         C&I           roject Type         Retrofit           atgepty         Whole Building           type         Custom           usb-type         Custom           usb-type         Commercial Retrofit           dessure Name         Building operator solution poperator ability to optimize facility ass and electricity utilization.           dessure Description         Class improves a building operator ability to optimize facility ass and electricity use.           averings Principle         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           averings straings calculation method         Course completion by building operator attending a class on improving the efficiency of facility gas and electricity use.           averings straings aurit         Gross bWh - 04 valitabWh           Gross bWh - 04 valitabW         Gross bWh - 04 valitabW           Gross bWh - 04 valitabW         Gross bWh - 04 valitabW           Gross bWh - 04 valitabW         Gross bWh - 04 valitabW           Gross bWh - 04 valitabW         Gross bWh - 04 valitabW           Gross bWh - 04 valitabW         Gross bWh - 04 valitabW           Gross bWh - 04 valitabW         Gross bWh - 04 valitabW           Gross bWh - 04 valitabW         Gross bWh - 04 valitabW			
Sector         C81           Treplet Type         Retrofit           Targetyry         Whole Hulding           Type         Custom           Sector Retrofit         Building operator scriftication           Program Name         Commercial Retrofit           Messure Description         Class of the Interplet in the Interplet in Interplet in Interplet in Interplet	TRL Reference Number	RI_0349	
Toget Type         Retrofit           Taggory         Whole Building           Type         Cvstom           Sub-type         Certification           Program Name         Building operator cartification           Measure Description         Class improves a building operator at the ding a class on improving the efficiency of facility gas and electricity utilization.           Savings Principle         The taseline efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           Savings Principle         The time efficiency case is a building operator           Savings unit         Course completion by building operator           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW           Grass KW = Qty x detaXW         Grass KW = Qty x detaXW	Fuel	Gas	
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Integration         Whole Building           Sype         Contom           Sub-type         Continue           Sub-type         Continue           System         Commercial Retrofit           Wessure Description         Class improves a building operator's ability to optimize facility gas and electricity utilization.           Saselline Description         The baseline efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           Savings Principle         The baseline efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           Savings Vinciple         The baseline of thom by building operator           Sirvas WM - Care Completion by building operator         Gross KW - Care operator           Sirvas WM - Care operator         Gross KW - Care operator           Sirvas SW = Care operator         Gross KW - Care operator           Sirvas SW = Care operator         Gross KW - Care operator           Sirvas SW = Care operator         Gross KW - Care operator           Sirvas SW = Care operator         Gross KW - Care operator           Sirvas SW = Care operator         MYA           Source         MYA           Source         MYA           Source NVA         MYA           Wreduction operator	Project Type		
Type         Custom           bit-type         Certification           Program Name         Commercial Retroft           Weasure Name         Building operator artification           Weasure Name         Building operator artification           Measure Description         The baseline efficiency case is a building operator not attending a class on improving the efficiency of facility gas and electricity use.           avings Principle         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           Garse XW Diff y set.         Deemed           Savings Unit         Gorses XW Diff y efficiency case is a building operator           Garse XW Diff y set.         Gorses XW Diff y efficiency case is a building operator           Garse XW Diff y efficiency case is a building operator         Gross XW Diff y efficiency case is a building operator           Garse XW Diff y efficiency case and electricity use.         Gross XW Diff y efficiency case and the set of the s		Whole Building	
sibilitype         Certification           Vietyrgam Name         Commercial Retrofit           Vessure Name         Building operator extification           Vessure Description         Class improves a building operator's ability to optimize facility gas and electricity utilization.           Sacine Description         The baseline efficiency case is a building operator not attending a class on improving the efficiency of facility gas and electricity use.           avings Principle         The high efficiency case is a building operator           avings unit         Corres completion by building operator           Gross KW = Ory × deltaXW         Gross KW = Ory × deltaXW           Gross KW = Ory × deltaXW         Gross KW = Ory × deltaXW           Gross KW = Ory × deltaXW         Gross KW = Ory × deltaXW           Gross KW = Ory × deltaXW         Gross KW = Ory × deltaXW           Gross KW = Ory × deltaXW         Gross KW = Ory × deltaXW           Gross Surce         N/A           MV/ry Savings tore         N/A			
Togram Name         Commercial Retrofit           Weasure Name         Building operator certification           Weasure Description         Class improves a building operator shifty to optimize facility gas and electricity utilization.           Saceline Description         The baseline efficiency case is a building operator not attending a class on improving the efficiency of facility gas and electricity use.           avings Principle         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           intergy Swings calculation method         Deemed           Gorass KW > QV x deltaWM         Gross SW A QV x deltaWM           Gross SW A QV x deltaWM         Gross SW A QV x deltaWM           Gross SW A QV x deltaWM         Gross SW A QV x deltaWM           Gurss Completion by building operator         Clay = Total number of units.           detatW A exerage annual kWh reduction per unit.         detatW A exerage annual natural gas reduction per unit.           durts Source         MVA           MVA         Source Source           MVA         RUW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)           Vriggram. Prepared for NEEP.           Why're savings source         MVA           Wireduction source         MVA           Wireduction source         MVA      <			
desize Name         Building operator certification           Wessure Description         Class improves a building operator's ability to optimize facility gas and electricity utilization.           Sacelline Description         The baseline efficiency case is a building operator not attending a class on improving the efficiency of facility gas and electricity use.           Saveline Description         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           Singer Savings calculation method         Descreed           Gross KW - Day × deltakW         Gross KW - Day × deltakW           Gross KW - Day × deltakW         Gross KW - Day × deltakW           Gross KW - Day × deltakW         Gross KW - Day × deltakW           Gross Sum - Day × deltakW         Gross KW - Day × deltakW           Gross Sum - Day × deltakW         Gross KW - Day × deltakW           Gross Sum - Day × deltakW         Gross KW - Day × deltakW           Marrs         N/A			
Vessure Description         Class improves a building operator's ability to optimize facility gas and electricity utilization.           Saseline Description         The baseline efficiency case is a building operator not attending a class on improving the efficiency of facility gas and electricity use.           avings Principle         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           intergy Savings calculation method         Decemed           avings unit         Gross KVD = Cly × delta&WH           Gross KVD = Cly × delta&WH         Gross KVD = Cly × delta&WH           Gross KVD = Cly × delta&WH         Gross KVD = Cly × delta&WH           Gross KVD = Cly × delta&WH         Gross KVD = Cly × delta&WH           Gross KVD = Cly × delta&WH         Gross KVD = Cly × delta&WH           Gross KVD = Cly × delta&WH         Gross KVD = Cly × delta&WH           Gross Source         M/A           Mours avings note         #N/A           Moursavi	-		
Baseline Description         The baseline efficiency case is a building operator not attending a class on improving the efficiency of facility gas and electricity use.           Savings Principle         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           Savings unit         Course completion by building operator           Gross KW = Cly x deltaKWh         Gross KW = Cly x deltaKWh           Gross KW = Cly x deltaKWh         Gross KW = Cly x deltaKWh           Gross KW = Cly x deltaKWh         Gross KW = Cly x deltaKWh           Gross KW = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KW = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KW = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KW = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KWH = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KW = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KWH = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KWH = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross KWH = Cly x deltaKW         Gross KWH = Cly x deltaKWh           Gross Surce OH         M/A           Mours Source         N/A           Mours Source         FM/A           Wreduction note			
Jaskine Uescription         facility gas and electricity use.           savings Principle         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           intrgy Savings calculation method         Decemed           savings unit         Course completion by building operator           Gross KW = Qt × deltakWh         Gross KW = Qt × deltakWh           Gross KW = Qt × deltakWh         Gross KW = Qt × deltakWh           savings Equation         Where:           Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.           deltakWh = Average N meduciton per unit.         deltakWh = Average N meduciton per unit.           dours         N/A           fours Source         #N/A           fours source note         #N/A           Why/r savings note         #N/A           Why/r savings note         #N/A           Why/r savings note         #N/A           WW/reduction notce         #N/A           Wa reduction notce         #N/A           Wire duction notce         #N/A           Sa Heat MMBtu/r savings note         #N/A           Wire duction notce         #N/A           Wire duction notce         #N/A           Wire duction notce         #N/A     <			
awings Principle         The high efficiency case is a building operator attending a class on improving the efficiency of facility gas and electricity use.           inergy Savings calculation method         Deemed           awings unit         Course completion by building operator           Gross KWH = Cly × deltakWh         Gross KWH = Cly × deltakWh           Gross KWH = Cly × deltakWh         Gross KWH = Cly × deltakWh           Gross KWH = Cly × deltakWh         Gross KWH = Cly × deltakWh           Gross KWH = Cly × deltakWh         Gross KWH = Cly × deltakWh           duty = Total number of units.         deltaKWH = Average AW reduction per unit.           deltaKWH KW = Gas = Average AWP reduction per unit.         deltaKWH = Average AWP reduction per unit.           dours Source         M/A           MV/Arr Savings         22273           Wh/yr savings ource         HN/A           WW/yr savings ource         HN/A           WW/yr savings ource         HN/A           Wreduction source         HN/A           Sak Heat MMBtu/yr savings note         HN/A           MI/A         HM/A           Sak Heat MMBtu/yr savings note	Baseline Description		
avangs runcple         and electricity use.           avangs values calculation method         Deemed           avings unit         Course completion by building operator           Gross kWh = Qty × dettakWh         Gross kWh = Qty × dettakWh           Gross KWA = Qty × dettakWh         Gross KWA = Qty × dettakWh           Gross MMBtu_Gas = Qty × dettakWh         Gross MMBtu_Gas           Qty = Total number of units.         dettakMh = Average annual kWh reduction per unit.           dettakMh = Average annual kWh reduction per unit.         dettakMhBtu_Gas = Average annual natural gas reduction per unit.           dours Source         M/A         M/A           dours Source         M/A         M/A           whry /r savings         22273         M/A           Wh/r savings note         M/A         M/A           Wh/ry savings note         M/A         M/A           Wr reduction note         M/A         M/A           Gas Heat MMBtu/yr savings         334.3         The Cadmus Group, inc. (2012) Memo to HEHE Grogram Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           MMMBtu/yr savings note         M/A         M/A           MMMBtu/yr savings note         M/A         M/A           MMMBtu/yr savings note         M/A         M/A	· · · · · · · · · · · · · · · · · · ·	, <del>,</del> ,	
and electricity use.           rergy Savings calculation method         Deemed           awings unit         Course completion by building operator           Gross KW = City × deltakWh         Gross KW = City × deltakWh           Gross KW = City × deltakWh         Gross KW = City × deltakWh           Gross KW = City × deltakWh         Gross KW = City × deltakWh           Gross KW = City × deltakWh         Gross KW = City × deltakWh           durss         deltaKWh = Average annual kWh reduction per unit.           dettaMMBtu_Gas = Average annual natural gas reduction per unit.         dettaMMBtu_Gas = Average annual natural gas reduction per unit.           fours Source         RV/A         MVA           Whyr savings         22273         RUW Analytic (2005).           Whyr savings source         Program. Prepared for NEEP.         NVA           Wr eduction note         RV/A         MVA           Wr eduction note         RV/A         Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Sas Heat MMBtu/yr savings source         RV/A         Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           MV/A         Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         RVA           More durition note         RV/A         Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.	Savings Principle	The high efficiency case is a building operator attending a class on improving the efficiency of facility gas	
avings unit         Course completion by building operator           Gross kWh = Qty × detaXWh         Gross kWh = Qty × detaXWh           Gross KW = Qty × detaXWh         Gross KWh = Qty × detaXWh           Gross KWh = Qty × detaXWh         Gross KWh = Qty × detaXWh           Gross KWh = Qty × detaXWh         Gross KWh = Qty × detaXWh           Gross KWH = Qty × TotaI number of units.         detaXWh = Average annual KWh reduction per unit.           detaXWh = Average annual KWh reduction per unit.         detaXWh = Average annual natural gas reduction per unit.           dours Source         RN/A           MVA         Mores Source           MVA         Mores Source           MVA         Mores Source           MVA         Source           Wh/r savings source         RN/A           Wreduction source         RN/A           Wreduction source         RN/A           Sas Heat MMBtu/ry savings source         RN/A           Sas Heat MMBtu/ry savings note         RN/A           MVA         MVA           MMA         More           Sas Heat MMBtu/ry savings note         RN/A           MMA         More           Sas Heat MMBtu/ry savings note         RN/A           MMA         More           Sas Heat MMBtu/ry		and electricity use.	
Gross kWh = Qty × deltakWh         Qty = Total number of units.         deltakWh = Average annual kWh reduction per unit.         deltakW = Average annual kWh reduction per unit.         deltakWBL Gas = Average annual natural gas reduction per unit.         deltakWBL Gas = Average annual natural gas reduction per unit.         dours source       #N/A         wr reduction note       #N/A         gas Heat MMBtu/yr savings source       #N/A         Sas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings source       #N/A         Sas Heat MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       #N/A         Program Prepared for NEEP.       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note </td <td>Energy Savings calculation method</td> <td>Deemed</td>	Energy Savings calculation method	Deemed	
Gross KW = Qty × deltakW         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas         Where:         Qty = Total number of units.         deltaWM = Average annual KWh reduction per unit.         deltaWM = Average annual atural gas reduction per unit.         deltaWM = Average annual natural gas reduction per unit.         deltaWM = Average annual natural gas reduction per unit.         dours Source note       #N/A         MV/ry Savings       22273         Wh/ry savings source       #N/A         Writy Savings note       #N/A         Wreduction source       #N/A         W reduction source       #N/A         W reduction source       #N/A         Sas Heat MMBtu/yr savings source       #N/A         Bas Heat MMBtu/yr savings source       #N/A         DII MMBtu/yr savings source       #N/A         DII MMBtu/yr savings source       #N/A         DII MMBtu/yr savings source       #N/A         Program.       #N/A         DII MMBtu/yr savings source       #N/A         Program.       #N/A         DII MMBtu/yr savings source       #N/A         Program.       #N/A         DII MMBtu/yr savings source       #N/A         Program MStu/yr savings source       #N/A </td <td>Savings unit</td> <td>Course completion by building operator</td>	Savings unit	Course completion by building operator	
savings Equation         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           where:         Cty = Total number of units.           deltaWb = Average annual kWh reduction per unit.         deltaWb = Average annual natural gas reduction per unit.           deltaWb = Average Wreduction per unit.         deltaWb = Average annual natural gas reduction per unit.           dours Source M         N/A           dours Source note         MNA           dours Source note         MNA           why'r savings Note         PhOgram. Prepared for NEEP.           Wh/r savings note         MNA           wr eduction one         MNA           Gas Heat MMBtu/yr savings note         MNA           Savings Persistence Factor Sign on the EMA         Savings Note           MM/r savings note         MNA           Gas Heat MMBtu/yr savings note         MNA           Savings Note         MNA           Savings Source         MNA           Oli MMBtu/yr savings note         MNA           Savings Note         MNA           Savings Source		Gross kWh = Qty × deltakWh	
savings Equation         Gross MMBtu_Gas = Qty × deltaMMBtu_Gas           where:         Cty = Total number of units.           deltaWb = Average annual kWh reduction per unit.         deltaWb = Average annual natural gas reduction per unit.           deltaWb = Average Wreduction per unit.         deltaWb = Average annual natural gas reduction per unit.           dours Source M         N/A           dours Source note         MNA           dours Source note         MNA           why'r savings Note         PhOgram. Prepared for NEEP.           Wh/r savings note         MNA           wr eduction one         MNA           Gas Heat MMBtu/yr savings note         MNA           Savings Persistence Factor Sign on the EMA         Savings Note           MM/r savings note         MNA           Gas Heat MMBtu/yr savings note         MNA           Savings Note         MNA           Savings Source         MNA           Oli MMBtu/yr savings note         MNA           Savings Note         MNA           Savings Source		$Gross kW = Qty \times deltakW$	
Savings Equation       Where:         City = Total number of units.         deltakWh = Average annual kWh reduction per unit.         deltakW = Average Wreduction per unit.         deltakW = Average Wreduction per unit.         deltakWt = Average Wreduction per unit.         deltakWt = Average annual natural gas reduction per unit.         dours Source       MNA         dours source note       MNA         Wh/yr savings source       FNA         Program. Prepared for NEEP.         Wh/yr savings note       MNA         Wreduction note       MNA         Wareduction note       MNA         Sas Heat MMBtu/yr savings source       HNA         Sas Heat MMBtu/yr savings source       MNA         Sas Heat MMBtu/yr savings source       MNA         Sas Heat MMBtu/yr savings source       MNA         Sitt MMBtu/yr savings source       MNA <t< td=""><td></td><td></td></t<>			
avings Equation       Qt y = Total number of units.         deltakW = Average annual kWh reduction per unit.       deltakW = Average annual kWh reduction per unit.         detatMMBtu_Gas = Average annual natural gas reduction per unit.       deltakW = Average kW reduction per unit.         doturs Source       #N/A         MV/ry savings       22273         Wth/yr savings source       #N/A         Wth/yr savings source       #N/A         Wth/yr savings note       #N/A         Wth/yr savings note       #N/A         Wth/wr reduction source       #N/A         Sas Heat MMBtu/yr savings       334.1         Sas Heat MMBtu/yr savings source       The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Sas Heat MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings source       #N/A         Program MBtu/yr savings source       #N/A         Program MBtu/yr savings note       #N/A         Program MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr sav			
avings Equation       Qt y = Total number of units.         deltakW = Average annual kWh reduction per unit.       deltakW = Average annual kWh reduction per unit.         detatMMBtu_Gas = Average annual natural gas reduction per unit.       deltakW = Average kW reduction per unit.         doturs Source       #N/A         MV/ry savings       22273         Wth/yr savings source       #N/A         Wth/yr savings source       #N/A         Wth/yr savings note       #N/A         Wth/yr savings note       #N/A         Wth/wr reduction source       #N/A         Sas Heat MMBtu/yr savings       334.1         Sas Heat MMBtu/yr savings source       The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Sas Heat MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings source       #N/A         Program MBtu/yr savings source       #N/A         Program MBtu/yr savings note       #N/A         Program MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr sav		Where	
deltakWh = Average annual kWh reduction per unit.           deltakWh = Average kW reduction per unit.           deltakWh = Average kW reduction per unit.           dours Source         N/A           ours source note         #N/A           wWhyr savings         22273           WWhyr savings source         RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)           Program. Prepared for NEEP.         WN/A           WW reduction out         0           Wr reduction note         #N/A           Sa Steat MMBtu/yr savings         334.1           Sas Heat MMBtu/yr savings note         #N/A           Sas Heat MMBtu/yr savings note         #N/A           JII MMBtu/yr savings note         #N/A           Sas Heat MMBtu/yr savings note         #N/A           JII MMBtu/yr savings note         #N/A           DII MMBtu/yr savings note         #N/A           Program MMBtu/yr savings note         #N/A           Program MMBtu/yr savings note         #N/A           Program IMMBtu/yr savings note         #N/A           No	Savings Equation	where.	
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Hours         N/A           Hours Source         HN/A           Hours Source note         HN/A           Cours Source note         HN/A           Wh/yr Savings         22273           RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)           Program. Prepared for NEEP.           Wh/yr savings note         HN/A           W reduction source         HN/A           Warduction note         HN/A           Sas Heat MMBtu/yr savings         334.1           Sas Heat MMBtu/yr savings source         HN/A           Sas Heat MMBtu/yr savings note         HN/A           JIM MBtu/yr savings source         HN/A           Dil MMBtu/yr savings note         HN/A           Dil MMBtu/yr savings note         HN/A           O         O           Dil MMBtu/yr savings note         HN/A           Dir Mpace MMBtu/yr savings note         HN/A           Dil MMBtu/yr savings note         HN/A           Dir Mpace MMBtu/yr savings note         HN/A           Diroprane MMBtu/yr savings note         HN/A			
Hours Source note     HN/A       Yours Source note     HN/A       Wh/yr savings     22273       Wh/yr savings source     RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)       Program. Prepared for NEEP.       Wh/yr savings note     HN/A       Wr reduction source     HN/A       Sas Heat MMBtu/yr savings     334.1       Tas Heat MMBtu/yr savings source     The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.       Tas Heat MMBtu/yr savings note     HN/A       Dil MMBtu/yr savings source     HN/A       Dil MMBtu/yr savings source     HN/A       Dil MMBtu/yr savings note     HN/A       Propane Iffe source     RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)       Program. Prepared for NEEP.     Program. Prepared for NEEP.       Propane Iffe source     HN/A       Inservice rate (ISR)     1.00       n-service rate (ISR)		deltaMMBtu_Gas = Average annual natural gas reduction per unit	
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WM/yr Savings         22273           RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)           Program. Prepared for NEEP.           WM/yr savings note         #N/A           Wr reduction on         0           Wr eduction note         #N/A           Sas Heat MMBtu/yr savings         334.1           Sas Heat MMBtu/yr savings ource         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Sas Heat MMBtu/yr savings         0           Dil MMBtu/yr savings         0           Dil MMBtu/yr savings         0           Dil MMBtu/yr savings note         #N/A           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Propane MMBtu/yr savings note         #N/A           Dil MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared f	Hours Source	#N/A	
WM/yr Savings         22273           RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)           Program. Prepared for NEEP.           WM/yr savings note         #N/A           Wr reduction on         0           Wr eduction note         #N/A           Sas Heat MMBtu/yr savings         334.1           Sas Heat MMBtu/yr savings ource         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Sas Heat MMBtu/yr savings         0           Dil MMBtu/yr savings         0           Dil MMBtu/yr savings         0           Dil MMBtu/yr savings note         #N/A           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Propane MMBtu/yr savings note         #N/A           Dil MMBtu/yr savings note         #N/A           Propane MMBtu/yr savings note         #N/A           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared f	Hours source note	#N/A	
RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.         WM/yr savings note         #N/A         W reduction         0         WW reduction note         #N/A         Sas Heat MMBtu/yr savings         334.1         Sas Heat MMBtu/yr savings source         Sas Hat MMBtu/yr savings note         #N/A         Dil MMBtu/yr savings note         #N/A         Propane MMBtu/yr savings note         #N/A         Dil MMBtu/yr savings note         #N/A         Propane MMBtu/yr savings note         #N/A         Propane IMBtu/yr savings note         #N/A         Propane IMBtu/yr savings note         #N/A<	kWh/yr Savings		
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WM/yr savings note       #N/A         WW reduction       0         WW reduction source       #N/A         Ww reduction note       #N/A         Sas Heat MMBtu/yr savings       334.1         Sas Heat MMBtu/yr savings source       The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Sas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings note       #N/A         O       Propane MMBtu/yr savings note         Propane MMBtu/yr savings note       #N/A         Innessure life       5         RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.         measure life note       #N/A         n-service rate (ISR)       1.00         n-service rate source       #N/A         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.	kWh/yr savings source		
W reduction       0         WV reduction source       #N/A         WV reduction note       #N/A         Sas Heat MMBtu/yr savings       334.1         Sas Heat MMBtu/yr savings source       The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Sas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings source       #N/A         Oopropane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Program. Prepared for NEEP.       Program. Prepared for NEEP.         Program. Prepared for NEEP.       Program. Prepared for NEEP.         Program. Prepared for NEEP.       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       Ruw Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       Ruw Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       N/A       Inservice rate (ISR)         n-service rate (ISR)       1.00       Inservice rate source	kWh/vr savings note		
Wreduction source       #N/A         Wreduction note       #N/A         Gas Heat MMBtu/yr savings       334.1         Sas Heat MMBtu/yr savings source       The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Sas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings       0         Dil MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Program. Prepared for NEEP.       Program. Prepared for NEEP.         Program. Prepared for NEEP.       Program. Prepared for NEEP.         Program. Prepared for NEEP.       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       Program. Prepared for NEEP.         measure life       S         n-service rate (ISR)       1.00         n-service rate (ISR)       1.00         n-service rate note       All installations have 100% in-service rate since p			
W reduction note       #N/A         Gas Heat MMBtu/yr savings       334.1         Gas Heat MMBtu/yr savings source       The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Gas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Propane IMBtu/yr savings note       #N/A         Standards on NEEP.       Propane Iffe         Standards on NEEP.       S         Propane Iffe note       #N/A         n-service rate (ISR)       1.00         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00			
Gas Heat MMBtu/yr savings       334.1         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Gas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings note       #N/A         O       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.         Propane MMBtu/yr savings note       #N/A         O       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.         Propane MMBtu/yr savings note       #N/A         Energy Reference(5) & table(5) notes       0         neasure life source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.         n-service rate (ISR)       1.00         n-service rate (ISR)       1.00         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00			
Sas Heat MMBtu/yr savings source         The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.           Sas Heat MMBtu/yr savings note         #N/A           Dil MMBtu/yr savings note         #N/A           Propane IMBtu/yr savings note         #N/A           Propane IMBtu/yr savings note         #N/A           Inergy Reference(s) & table(s) notes         0           Program. Prepared for NEEP.         Program. Prepared for NEEP.           Program. Prepared for NEEP.         Program. Prepared for NEEP.           measure life note         #N/A           n-service rate (ISR)         1.00           n-service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate energy (RRe)			
Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Sas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings note       #N/A         Opropane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.         Propane MMBtu/yr savings note       #N/A         One MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Program. Prepared for NEEP.       0         Program. Prepared for NEEP.       0         measure life       5         measure life note       #N/A         n-service rate (ISR)       1.00         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00	Gas Heat MMBtu/yr savings		
Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.         Gas Heat MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings note       #N/A         Oppane MMBtu/yr savings source       #N/A         Propane MMBtu/yr savings note       #N/A         Program. Prepared for NEEP.       Program. Prepared for NEEP.         Propane Iffe       5         measure life       5         measure life source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       Program. Prepared for NEEP.         measure life note       #N/A         n-service rate (ISR)       1.00         n-service rate source       #N/A         avings Persistence Factor note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor note       Savings persistence is assu	Gas Heat MMBtu/vr savings source	The Cadmus Group, Inc. (2012) Memo to HEHE Program Administrators Re: Impacts of Upcoming Federal	
Dil MMBtu/yr savings       0         Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Propane MMBtu/yr savings note       #N/A         Program. Prepared for NEEP.       Program. Prepared for NEEP.         Program life       5         measure life       5         measure life source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       Program. Prepared for NEEP.         measure life note       #N/A         n-service rate (ISR)       1.00         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00	Sus field with buy yr suvings source	Standards on HEHE.Gas Space and Water Heating Measures; June 8, 2012.	
Dil MMBtu/yr savings source       #N/A         Dil MMBtu/yr savings note       #N/A         Dil MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Propane MMBtu/yr savings note       #N/A         Propane MMBtu/yr savings note       #N/A         Energy Reference(s) & table(s) notes       0         measure life       5         measure life source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       5         measure life source       RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)         Program. Prepared for NEEP.       N/A         n-service rate life note       #N/A         n-service rate (ISR)       1.00         n-service rate source       #N/A         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00	Gas Heat MMBtu/yr savings note	#N/A	
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Propane MMBtu/yr savings source         RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.           Propane MMBtu/yr savings note         #N/A           Energy Reference(s) & table(s) notes         0           measure life         5           measure life source         RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.           measure life note         #N/A           n-service rate (ISR)         1.00           n-service rate source         #N/A           n-service rate note         All installations have 100% in-service rate since programs include verification of equipment installations.           Savings Persistence Factor (SPF)         1.00           Savings Persistence Factor note         Savings persistence is assumed to be 100%.           Realization rate energy (RRe)         1.00			
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measure life sourceRLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC) Program. Prepared for NEEP.measure life note#N/An-service rate (ISR)1.00n-service rate source#N/An-service rate noteAll installations have 100% in-service rate since programs include verification of equipment installations.Savings Persistence Factor (SPF)1.00Savings Persistence Factor source#N/ASavings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00	• · · · · · ·		
measure life source       Program. Prepared for NEEP.         measure life note       #N/A         n-service rate (ISR)       1.00         n-service rate source       #N/A         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00	measure life	-	
Program. Prepared for NEEP.         measure life note       #N/A         n-service rate (ISR)       1.00         n-service rate source       #N/A         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00	measure life source		
n-service rate (ISR)       1.00         n-service rate source       #N/A         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00			
n-service rate source       #N/A         n-service rate note       All installations have 100% in-service rate since programs include verification of equipment installations.         Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00	measure life note		
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Savings Persistence Factor (SPF)       1.00         Savings Persistence Factor source       #N/A         Savings Persistence Factor note       Savings persistence is assumed to be 100%.         Realization rate energy (RRe)       1.00			
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Savings Persistence Factor noteSavings persistence is assumed to be 100%.Realization rate energy (RRe)1.00			
Realization rate energy (RRe) 1.00			
Re source #N/A			
	RRe source	#N/A	

r	
RRe note	Realization rate is 100% since gross savings values are based on evaluation results.
RR demand (RRd) summer peak	0.00
RRd summer peak source	#N/A
RRd summer peak note	#N/A
RR demand (RRd) winter peak	0.00
RRd winter peak source	#N/A
RRd winter peak note	#N/A
Coincidence factor (CF) summer peak	0.00
CF summer peak source	#N/A
CF summer peak note	#N/A
Coincidence factor (CF) winter peak	0.00
CF winter peak source	#N/A
CF winter peak note	#N/A
Water savings: gallons/yr	26171.00
Sewer savings: gallons/yr	0.00
Water / Course and ingo Course	RLW Analytics (2005). Impact and Process Evaluation Building Operator Training and Certification (BOC)
Water / Sewer savings Source	Program. Prepared for NEEP.
Water / Sewer savings note	#N/A
Annual \$ savings	0.00
Annual \$ savings source / description	#N/A
Annual \$ savings note	#N/A
One time \$ savings	0.00
One time \$ savings source/description	#N/A
One time \$ savings note	#N/A
Free-Ridership	0.00
Spill-Over (participant)	0.00
Spill-Over (non-participant)	0.00
Net-to-Gross	1.00
	TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study
Net-to-Gross source	(Memorandum), August 2015
Net-to-Gross note	#N/A
Gross Measure TRC unit	\$ 1695 per measure
Gross Measure TRC source	#N/A
Gross Measure TRC note	#N/A
Incentive Unit	\$ 1250 per measure

TRL Reference Number	RI 0353	
Fuel	Gas	
Sector	C&I	
Project Type	Retrofit	
Category	Whole Building	
Туре	Custom	
Sub-type	Whole Building	
Program Name	Commercial Retrofit	
Measure Name	Custom Retrofit	
Measure Description	Custom Retront The Custom project track is offered for energy efficiency projects involving complex site-specific applications that require detailed engineering analysis and/or projects which do not qualify for incentives under any of the prescriptive rebate offering. Projects offered through the custom approach must pass a cost-effectiveness test based on project-specific costs and savings.	
Baseline Description	For Lost Opportunity projects, the baseline efficiency case assumes compliance with the efficiency requirements as mandated by Rhode Island State Building Code or industry accepted standard practice. For retrofit projects, the baseline efficiency case is based on site-specific information.	
Savings Principle	The high efficiency case is specific to the custom project and may include one or more energy efficiency measures. Energy and demand savings calculations are based on projected or measured changes in equipment efficiencies and operating characteristics and are determined on a case-by-case basis. The project must be proven cost-effective in order to qualify for energy efficiency incentives.	
Energy Savings calculation method	Custom	
Savings unit	Installed custom efficiency application.	
Savings Equation	Gross kWh = deltakWh_custom Gross Summer kW = deltakW_sp_custom Gross Winter kW = deltakW_wp_custom Gross MMBtu Gas = deltaMMBtu_Gas_custom Gross MMBtu Oil = deltaMMBtu_Oil_custom	
Hours	N/A	
Hours Source	#N/A	
Hours source note	#N/A	
kWh/yr Savings	Calc	
kWh/yr savings source	#N/A	
kWh/yr savings note	#N/A	
kW reduction	Calc	
kW reduction source	#N/A	
kW reduction note	#N/A	
Gas Heat MMBtu/yr savings	Calc	
Gas Heat MMBtu/yr savings source	#N/A	
Gas Heat MMBtu/yr savings note	#N/A	
Oil MMBtu/yr savings	Calc	
Oil MMBtu/yr savings source	#N/A	
Oil MMBtu/yr savings note	#N/A	
Propane MMBtu/yr savings	0	
Propane MMBtu/yr savings source	#N/A	
Propane MMBtu/yr savings note	#N/A	
Energy Reference(s) & table(s) notes	0	
measure life	mult	
measure life source	#N/A	
measure life note	#N/A	
In-service rate (ISR)	1.00	
In-service rate source	#N/A	
In-service rate note	All installations have 100% in-service rate since programs include verification of equipment installations.	
Savings Persistence Factor (SPF)	1.00	
Savings Persistence Factor source	#N/A	
Savings Persistence Factor note	Savings persistence is assumed to be 100%.	
Realization rate energy (RRe)	0.78 KEMA (2011). Impact Evaluation of C&I Custom Gas Installations. Prepared for National Grid.	

#N/A	
0.00	
#N/A	
#N/A	
0.00	
#N/A	
#N/A	
0.00	
#N/A	
#N/A	
0.00	
#N/A	
#N/A	
Calc	
Calc	
#N/A	
#N/A	
0.00	
#N/A	
#N/A	
0.00	
#N/A	
#N/A	
0.23	
0.00	
0.00	
0.78	
TetraTech (2015) 2013-14 Rhode Island C&I Natural Gas Free Ridership and Spillover Study	
(Memorandum), August 2015	
#N/A	
\$ 26831.24 per measure	
#N/A	
#N/A	
\$ 17851.68 per measure	

Building Area Type	Lighting Power Density (W/ft2) [1]
Automotive Facility	0.9
Convention Center	1.2
Court House	1.2
Dining: Bar Lounge/Leisure	1.3
Dining: Cafeteria/Fast Food	1.4
Dining: Family	1.6
Dormitory	1
Fire Stations	0.8
Exercise Center	1
Gymnasium	1.1
Healthcare-Clinic	1
Hospital	1.2
Hotel	1
Library	1.3
Manufacturing Facility	1.3
Motel	1
Motion Picture Theatre	1.2
Multi-Family	0.7
Museum	1.1
Office	0.9
Parking Garage	0.3
Penitentiary	1
Performing Arts Theatre	1.6
Police/Fire Station	1
Post Office	1.1
Religious Building	1.3
Retail	1.4
School/University	1.2
Sports Arena	1.1
Town Hall	1.1
Transportation	1
Warehouse	0.6
Workshop	1.4

Table 1: Lighting Power Densities Using the Building Area Method (WATTSb,i)

[1] IECC 2012

Table 2: Lighting Power Densities Using the Space-by-Space Method (WATTSb,i)

	Lighting Power
Common Space Types	Density (W/ft <sup>2</sup> )
Atrium – First 40 feet in height	0.03 per ft. ht.
Atrium – Above 40 feet in height	0.02 per ft. ht.
Audience/seating	
For Auditorium	0.9
For performing arts theater	2.6
For motion picture theater	1.2
Classroom/lecture/training	1.3
Conference/meeting/multipurpose	1.2
Corridor/transition	0.7
Dining Area	0.9
Bar/lounge/leisure dining	1.4
Family dining area	1.4
Dressing/fitting room performing arts theater	1.1
Electrical/mechanical	1.1
Food preparation	1.2
Laboratory for classrooms	1.3
Laboratory for medical/industrial/research	1.8
Lobby	1.1
Lobby for performing arts theater	3.3
Lobby for motion picture theater	1
Locker room	0.8
Lounge/Recreation	0.8
Office - enclosed	1.1
Office – open plan	1
Restroom	1
Sales area	1.6
Stairway	0.7
Storage	0.8
Workshop	1.6
Courthouse/police station/penitentiary	
Courtroom	1.9
Confinement cells	1.1
Judge Chambers	1.3
Penitentiary audience seating	0.5
Penitentiary classroom	1.3
Penitentiary dining	1.1
BUILDING SPECIFIC SPACE-BY-SPACE TY	PES
Automotive – service/repair	0.7
Bank/office – banking activity area	1.5
Dormitory living quarters	1.1
Gymnasium/fitness center	

Fitness area	0.9
Gymnasium audience/seating	0.4
Playing area	1.4
COMMON SPACE-BY-SPACE TYPES	1.4
Healthcare clinic/hospital	
Corridors/transition	1
Exam/treatment	1.7
Emergency	0.8
Public and staff lounge	0.8
Medical Supplies	1.4
Nursery	0.9
Nurse Station	1
Physical Therapy	0.9
Patient room	0.7
Pharmacy	1.2
Radiology/imaging	1.3
Operating room	2.2
Recovery	1.2
Lounge Recreation	0.8
Laundry – washing	0.6
Hotel	
Dining area	1.3
Guest rooms	1.1
Hotel lobby	2.1
Highway lodging dining	1.2
Highway lodging guest rooms	1.1
Library	
Stacks	1.7
Card File and cataloguing	1.1
Reading area	1.2
Manufacturing	
Corridors/transition	0.4
Detailed Manufacturing	1.3
Equipment Room	1
Extra high bay (> 50-foot floor-ceiling height)	1.1
High bay (25 – 50-foot floor-ceiling height)	1.2
Low bay (< 25-foot floor-ceiling height)	1.2
Museum	
General Exhibition	1
Restoration	1.7
Parking Garage – garage areas	0.2
Convention Center	
Exhibit space	1.5
Audience/seating area	0.9

Fire Stations	
Engine Room	0.8
Sleeping quarters	0.3
Post Office	
Sorting area	0.9
Religious building	
Fellowship hall	0.6
Audience seating	2.4
Worship pulpit/choir	2.4
Retail	
Dressing/fitting area	0.9
Mall concourse	1.6
Sales area	1.6
BUILDING SPECIFIC SPACE-BY-SPACE	TYPES
Sports areana	
Audience seating	0.4
Court sports area – Class 4	0.7
Court sports area – Class 3	1.2
Court sports area – Class 2	1.9
Court sports area – Class 1	3
Ring sports area	2.7
Transportation	
Air/train/bus baggage area	1
Airport concourse	0.6
Terminal – ticket counter	1.5
Warehouse	
Fine material storage	1.4
Medium/bulky material	0.6

[1] IECC 2012

Device Code	Device Description	Rated
		<u>Watts</u>
	LED Exit Signs	
1E0002	2.0 WATT LED	2
1E0003	3.0 WATT LED	3
1E0005	5.0 WLED	5
1E0005C	0.5 WATT LEC	0.5
1E0008	8.0 WLED	8
1E0015	1.5 WATT LED	1.5
1E0105	10.5 WATT LED	10.5
	Compact Fluorescents (CFL's)	
2C0007S	2/7W COMPACT HW	18
1C0005S	5W COMPACT HW	7
1C0007S	7W COMPACT HW	9
1C0009S	9W COMPACT HW	11
1C0011S	11W COMPACT HW	13
1C0013S	13W COMPACT HW	15
1C0018E	18W COMPACT HW ELIG	20
1C0018S	18W COMPACT HW	20
1C0022S	22W COMPACT HW	24
1C0023E	1/23W COMPACT HW ELIG	25
1C0026E	26W COMPACT HW ELIG	28
1C0026S	26W COMPACT HW	28
1C0028S	28W COMPACT HW	30
1C0032E	32W COMPACT HW ELIG	34
1C0032S	32W CIRCLINE HW	34
1C0042E	1/42W COMPACT HW ELIG	48
1C0044S	44W CIRCLINE HW	46
1C0057E	1/57W COMPACT HW ELIG	65
1C2232S	22/32W CIRCLINE HW	58
1C2D10E	10W 2D COMPACT HW ELIG	12
1C2D16E	16W 2D COMPACT HW ELIG	18
1C2D21E	21W 2D COMPACT HW ELIG	22
1C2D28E	28W 2D COMPACT HW ELIG	28
1C2D38E	38W 2D COMP.HW ELIG	36
1C3240S	32/40W CIRCLINE HW	80
2C0005S	2/5W COMPACT HW	14
2C0009S	2/9W COMPACT HW	22
2C0011S	2/11W COMPACT HW	26
2C0013E	2/13W COMPACT HW ELIG	28
2C0013S	2/13W COMPACT HW	30

## Table 3: New Construction Proposed Lighting Wattage Tables

Derrice Code	Device Description	Rated			
Device Code	Device Description	<u>Watts</u>			
	Compact Fluorescents (CFL's) (cont)				
2C0018E	2/18W COMP. HW ELIG	40			
2C0026E	2/26W COMP. HW ELIG	54			
2C0032E	2/32W COMPACT HW ELIG	68			
2C0042E	2/42W COMPACT HW ELIG	100			
3C0009S	3/9W COMPACT HW	33			
3C0013S	3/13W COMPACT HW	45			
3C0018E	3/18W COMPACT HW ELIG	60			
3C0026E	3/26W COMPACT HW ELIG	82			
3C0032E	3/32W COMPACT HW ELIG	114			
3C0042E	3/42W COMPACT HW ELIG	141			
4C0018E	4/18W COMPACT HW ELIG	80			
4C0026E	4/26W COMPACT HW ELIG	108			
4C0032E	4/32W COMPACT HW ELIG	152			
4C0042E	4/42W COMPACT HW ELIG	188			
6C0026E	6/26W COMPACT HW ELIG	162			
6C0032E	6/32W COMPACT HW ELIG	228			
6C0042E	6/42W COMPACT HW ELIG	282			
8C0026E	8/26W COMPACT HW ELIG	216			
8C0032E	8/32W COMPACT HW ELIG	304			
8C0042E	8/42W COMPACT HW ELIG	376			
	T5 Systems				
1F14SSE	1L2' 14W T5/ELIG	16			
2F14SSE	2L2' 14W T5/ELIG	32			
3F14SSE	3L2' 14W T5/ELIG	50			
4F14SSE	4L2' 14W T5/ELIG	68			
1F24HSE	1L2' 24W T5HO/ELIG	29			
2F24HSE	2L2' 24W T5HO/ELIG	52			
3F24HSE	3L2' 24W T5HO/ELIG	80			
1F21SSE	1L3' 21W T5/ELIG	24			
2F21SSE	2L3' 21W T5/ELIG	47			
1F39HSE	1L3' 39W T5HO/ELIG	42			
2F39HSE	2L3' 39W T5HO/ELIG	85			
1F28SSE	1L4' 28W T5/ELIG	32			
2F28SSE	2L4' 28W T5/ELIG	63			
3F28SSE	3L4' 28W T5/ELIG	95			
4F28SSE	4L4' 28W T5/ELIG	126			
6F28SSE	6L4' 28W T5/ELIG	189			
1F47HSE	1L4' 47W T5HO/ELIG	53			
2F47HSE	2L4' 47W T5HO/ELIG	103			
3F47HSE	3L4' 47W T5HO/ELIG	157			

Device Code	Device Description	Rated
Device Code	Device Description	<u>Watts</u>
	T5 Systems (cont.)	
4F47HSE	4L4' 47W T5HO/ELIG	200
5F47HSE	5L4' 47W T5HO/ELIG	260
6F47HSE	6L4' 47W T5HO/ELIG	303
1F50HSE	1L4' 50W T5HO/ELIG	58
2F50HSE	2L4' 50W T5HO/ELIG	110
3F50HSE	3L4' 50W T5HO/ELIG	168
4F50HSE	4L4' 50W T5HO/ELIG	215
5F50HSE	5L4' 50W T5HO/ELIG	278
6F50HSE	6L4' 50W T5HO/ELIG	325
1F54HSE	1L4' 54W T5HO/ELIG	59
2F54HSE	2L4' 54W T5HO/ELIG	117
3F54HSE	3L4' 54W T5HO/ELIG	177
4F54HSE	4L4' 54W T5HO/ELIG	234
5F54HSE	5L4' 54W T5HO/ELIG	294
6F54HSE	6L4' 54W T5HO/ELIG	351
8F54HSE	8L4' 54W T5HO/ELIG	468
10F54HSE	10L4' 54W T5HO/ELIG	585
	Two Foot High Efficient T8 Systems	
1F17ESL	1L2' 17W T8EE/ELEE LOW PWR	14
1F17ESN	1L2' 17W T8EE/ELEE	17
1F17ESH	1L2' 17W T8EE/ELEE HIGH PWR	20
1F28BXE	1L2' F28BX/ELIG	32
2F17ESL	2L2' 17W T8EE/ELEE LOW PWR	27
2F17ESN	2L2' 17W T8EE/ELEE	32
2F17ESH	2L2' 17W T8EE/ELEE HIGH PWR	40
2F28BXE	2L2' F28BX/ELIG	63
3F17ESL	3L2' 17W T8EE/ELEE LOW PWR	39
3F17ESN	3L2' 17W T8EE/ELEE	46
3F17ESH	3L2' 17W T8EE/ELEE HIGH PWR	61
3F28BXE	3L2' F28BX/ELIG	94
	Three Foot High Efficient T8 System	S
1F25ESL	1L3' 25W T8EE/ELEE LOW PWR	21
1F25ESN	1L3' 25W T8EE/ELEE	24
1F25ESH	1L3' 25W T8EE/ELEE HIGH PWR	30
2F25ESL	2L3' 25W T8EE/ELEE LOW PWR	40
2F25ESN	2L3' 25W T8EE/ELEE	45
2F25ESH	2L3' 25W T8EE/ELEE HIGH PWR	60
3F25ESL	3L3' 25W T8EE/ELEE LOW PWR	58
51 25 262		
3F25ESN	3L3' 25W T8EE/ELEE	67

Device Code	Device Description	Rated <u>Watts</u>
Four	Foot T8 High Efficient / Reduce Wattage Syst	tems
1F25EEH	1L4' 25W T8EE/ELEE HIGH PWR	30
1F25EEE	1L4' 25W T8EE/ELEE	22
1F25EEL	1L4' 25W T8EE/ELEE LOW PWR	19
2F25EEH	2L4' 25W T8EE/ELEE HIGH PWR	57
2F25EEE	2L4' 25W T8EE/ELEE	43
2F25EEL	2L4' 25W T8EE/ELEE LOW PWR	37
3F25EEH	3L4' 25W T8EE/ELEE HIGH PWR	86
3F25EEE	3L4' 25W T8EE/ELEE	64
3F25EEL	3L4' 25W T8EE/ELEE LOW PWR	57
4F25EEH	4L4' 25W T8EE/ELEE HIGH PWR	111
4F25EEE	4L4' 25W T8EE/ELEE	86
4F25EEL	4L4' 25W T8EE/ELEE LOW PWR	75
1F28EEH	1L4' 28W T8EE/ELEE HIGH PWR	33
1F28EEE	1L4' 28W T8EE/ELEE	24
1F28EEL	1L4' 28W T8EE/ELEE LOW PWR	22
2F28EEH	2L4' 28WT8EE/ELEE HIGH PWR	64
2F28EEE	2L4' 28W T8EE/ELEE	48
2F28EEL	2L4' 28W T8EE/ELEE LOW PWR	42
3F28EEH	3L4' 28W T8EE/ELEE HIGH PWR	96
3F28EEE	3L4' 28W T8EE/ELEE	72
3F28EEL	3L4' 28W T8EE/ELEE LOW PWR	63
4F28EEH	4L4' 28W T8EE/ELEE HIGH PWR	126
4F28EEE	4L4' 28W T8EE/ELEE	94
4F28EEL	4L4' 28W T8EE/ELEE LOW PWR	83
1F30EEH	1L4' 30W T8EE/ELEE HIGH PWR	36
1F30EEE	1L4' 30W T8EE/ELEE	26
1F30EEL	1L4' 30W T8EE/ELEE LOW PWR	24
2F30EEH	2L4' 30WT8EE/ELEE HIGH PWR	69
2F30EEE	2L4' 30W T8EE/ELEE	52
2F30EEL	2L4' 30W T8EE/ELEE LOW PWR	45
3F30EEH	3L4' 30W T8EE/ELEE HIGH PWR	103
3F30EEE	3L4' 30W T8EE/ELEE	77
3F30EEL	3L4' 30W T8EE/ELEE LOW PWR	68

Device Code	Device Description	Rated <u>Watts</u>	
Fou	Four Foot T8 High Efficient / Reduce Wattage Systems (cont.)		
4F30EEH	4L4' 30W T8EE/ELEE HIGH PWR	133	
4F30EEE	4L4' 30W T8EE/ELEE	101	
4F30EEL	4L4' 30W T8EE/ELEE LOW PWR	89	
1F32EEH	1L4' 32W T8EE/ELEE HIGH PWR	38	
1F32EEE	1L4' 32W T8EE/ELEE	28	
1F32EEL	1L4' 32W T8EE/ELEE LOW PWR	25	
2F32EEH	2L4' 32W T8EE/ELEE HIGH PWR	73	
2F32EEE	2L4' 32W T8EE/ELEE	53	
2F32EEL	2L4' 32W T8EE/ELEE LOW PWR	47	
3F32EEH	3L4' 32W T8EE/ELEE HIGH PWR	109	
3F32EEE	3L4' 32W T8EE/ELEE	82	
3F32EEL	3L4' 32W T8EE/ELEE LOW PWR	72	
4F32EEH	4L4' 32W T8EE/ELEE HIGH PWR	141	
4F32EEE	4L4' 32W T8EE/ELEE	107	
4F32EEL	4L4' 32W T8EE/ELEE LOW PWR	95	
6F32EEH	6L4' 32W T8EE/ELEE HIGH PWR	218	
6F32EEE	6L4' 32W T8EE/ELEE	168	
6F32EEL	6L4' 32W T8EE/ELEE LOW PWR	146	
	Eight Foot T8 Systems		
1F59SSE	1L8' T8/ELIG	60	
1F80SSE	1L8' T8 HO/ELIG	85	
2F59SSE	2L8' T8/ELIG	109	
2F59SSL	2L8' T8/ELIG LOW PWR	100	
2F80SSE	2L8' T8 HO/ELIG	160	
	LED Lighting Fixtures		
1L002	2 WATT LED	2	
1L003	3 WATT LED	3	
1L004	4 WATT LED	4	
1L005	5 WATT LED	5	
1L006	6 WATT LED	6	
1L007	7 WATT LED	7	
1L008	8 WATT LED	8	
1L009	9 WATT LED	9	
1L010	10 WATT LED	10	
1L011	11 WATT LED	11	
1L012	12 WATT LED	12	
1L013	13 WATT LED	13	
1L014	14 WATT LED	14	
1L015	15 WATT LED	15	
1L016	16 WATT LED	16	
1L017	17 WATT LED	17	

		Rated			
Device Code	<b>Device Description</b>	Watts			
	LED Lighting Fixtures (cont.)				
1L018	18 WATT LED	18			
1L019	19 WATT LED	19			
1L020	20 WATT LED	20			
1L021	21 WATT LED	21			
1L022	22 WATT LED	22			
1L023	23 WATT LED	23			
1L024	24 WATT LED	24			
1L025	25 WATT LED	25			
1L026	26 WATT LED	26			
1L027	27 WATT LED	27			
1L028	28 WATT LED	28			
1L029	29 WATT LED	29			
1L030	30 WATT LED	30			
1L031	31 WATT LED	31			
1L032	32 WATT LED	32			
1L033	33 WATT LED	33			
1L034	34 WATT LED	34			
1L035	35 WATT LED	35			
1L036	36 WATT LED	36			
1L037	37 WATT LED	37			
1L038	38 WATT LED	38			
1L039	39 WATT LED	39			
1L040	40 WATT LED	40			
1L041	41 WATT LED	41			
1L042	42 WATT LED	42			
1L043	43 WATT LED	43			
1L044	44 WATT LED	44			
1L045	45 WATT LED	45			
1L046	46 WATT LED	46			
1L047	47 WATT LED	47			
1L048	48 WATT LED	48			
1L049	49 WATT LED	49			
1L050	50 WATT LED	50			
1L055	55 WATT LED	55			
1L060	60 WATT LED	60			
1L070	70 WATT LED	70			
1L073	73 WATT LED	73			
1L075	75 WATT LED	75			
1L080	90 WATT LED	90			
1L085	85 WATT LED	85			
1L090	90 WATT LED	90			

Device Code	<b>Device Description</b>	Rated Watts
	LED Lighting Fixtures (cont.)	
1L095	95 WATT LED	95
1L100	100 WATT LED	100
1L106	106 WATT LED	106
1L107	107 WATT LED	107
1L116	116 WATT LED	116
1L120	120 WATT LED	120
1L125	125 WATT LED	125
1L130	130 WATT LED	130
1L135	135 WATT LED	135
1L140	140 WATT LED	140
1L145	145 WATT LED	145
1L150	150 WATT LED	150
1L155	155 WATT LED	155
1L160	160 WATT LED	160
1L165	165 WATT LED	165
1L170	170 WATT LED	170
1L175	175 WATT LED	175
1L180	180 WATT LED	180
1L185	185 WATT LED	185
1L190	190 WATT LED	190
1L200	200 WATT LED	200
1L210	210 WATT LED	210
1L220	220 WATT LED	220
1L240	240 WATT LED	240
	Electronic Metal Halide Lamps	-
1M0150E	150W METAL HALIDE EB	160
1M0200E	200W METAL HALIDE EB	215
1M0250E	250W METAL HALIDE EB	270
1M0320E	320W METAL HALIDE EB	345
1M0350E	350W METAL HALIDE EB	375
1M0400E	400W METAL HALIDE EB	430
1M0450E	400W METAL HALIDE EB	480
	MH Track Lighting	
1M0020E	20W MH SPOT	25
1M0025E	25W MH SPOT	25
1M0035E	35W MH SPOT	44
1M0039E	39W MH SPOT	47
1M0050E	50W MH SPOT	60
1M0070E	70W MH SPOT	80
1M0100E	100W MH SPOT	111
1M0150E	150W MH SPOT	162

		Rated
Device Code	Device Description	Watts
	Incandescent Lamps	
110015	15W INC	15
110020	20W INC	20
110025	25W INC	25
110034	34W INC	34
110036	36W INC	36
110040	40W INC	40
110042	42W INC	42
110045	45W INC	45
110050	50W INC	50
110052	52W INC	52
110054	54W INC	54
110055	55W INC	55
110060	60W INC	60
110065	65W INC	65
110067	67W INC	67
110069	69W INC	69
110072	72W INC	72
110075	75W INC	75
110080	80W INC	80
110085	85W INC	85
110090	90W INC	90
110093	93W INC	93
110100	100W INC	100
110120	120W INC	120
110125	125W INC	125
110135	135W INC	135
110150	150W INC	150
110200	200W INC	200
110300	300W INC	300
110448	448W INC	448
110500	500W INC	500
110750	750W INC	750
111000	1000W INC	1000
111500	1500W INC	1500
Low Voltage Ha	alogen Fixture ( includes Trans	former)
1R0020	20W LV HALOGEN FIXT	30
1R0025	25W LV HALOGEN FIXT	35
1R0035	35W LV HALOGEN FIXT	45

# Table 4: Retrofit Existing Lighting Wattage Tables

Device Code	Device Description	Rated Watts	
Low Voltage Halogen Fixture ( includes Transformer) (cont.)			
1R0042	42W LV HALOGEN FIXT	52	
1R0050	50W LV HALOGEN FIXT	60	
1R0065	65W LV HALOGEN FIXT	75	
1R0075	75W LV HALOGEN FIXT	85	
H	lalogen/Quartz Lamps		
1T0035	35W HALOGEN LAMP	35	
1T0040	40W HALOGEN LAMP	40	
1T0042	42W HALOGEN LAMP	42	
1T0045	45W HALOGEN LAMP	45	
1T0047	47W HALOGEN LAMP	47	
1T0050	50W HALOGEN LAMP	50	
1T0052	52W HALOGEN LAMP	52	
1T0055	55W HALOGEN LAMP	55	
1T0060	60W HALOGEN LAMP	60	
1T0072	72W HALOGEN LAMP	72	
1T0075	75W HALOGEN LAMP	75	
1T0090	90W HALOGEN LAMP	90	
1T0100	100W HALOGEN LAMP	100	
1T0150	150W HALOGEN LAMP	150	
1T0200	200W HALOGEN LAMP	200	
1T0250	250W HALOGEN LAMP	250	
1T0300	300W HALOGEN LAMP	300	
1T0350	350W HALOGEN LAMP	350	
1T0400	400W HALOGEN LAMP	400	
1T0425	425W HALOGEN LAMP	425	
1T0500	500W HALOGEN LAMP	500	
1T0750	750W HALOGEN LAMP	750	
1T0900	900W HALOGEN LAMP	900	
1T1000	1000W HALOGEN LAMP	1000	
1T1200	1200W HALOGEN LAMP	1200	
1T1500	1500W HALOGEN LAMP	1500	
	Mercury Vapor (MV)		
1V0040S	40W MERCURY	50	
1V0050S	50W MERCURY	75	
1V0075S	75W MERCURY	95	
1V0100S	100W MERCURY	120	
1V0175S	175W MERCURY	205	
1V0250S	250W MERCURY	290	
1V0400S	400W MERCURY	455	

Device Code	<b>Device Description</b>	Rated Watts
Low	v Pressure Sodium (LPS)	
1V0700S	700W MERCURY	775
1V1000S	1000W MERCURY	1075
2V0400S	2/400W MERCURY	880
1L0035S	35W LPS	60
1L0055S	55W LPS	85
1L0090S	90W LPS	130
1L0135S	135W LPS	180
1L0180S	180W LPS	230
Higl	n Pressure Sodium (HPS)	•
1H0035S	35W HPS	45
1H0050S	50W HPS	65
1H0070S	70W HPS	90
1H0100S	100W HPS	130
1H0150S	150W HPS	190
1H0200S	200W HPS	240
1H0225S	225W HPS	275
1H0250S	250W HPS	295
1H0310S	310W HPS	350
1H0360S	360W HPS	435
1H0400S	400W HPS	460
1H0600S	600W HPS	675
1H0750S	750W HPS	835
1H1000S	1000W HPS	1085
11 (00200	Metal Halide (MH)	40
1M0032S	32W METAL HALIDE	40
1M0050S	50W METAL HALIDE	65
1M0070S	70W METAL HALIDE	95
1M0100S	100W METAL HALIDE	120
1M0150S	150W METAL HALIDE	190
1M0175S	175W METAL HALIDE	205
1M0250S	250W METAL HALIDE	295
1M0360S	360W METAL HALIDE	430
1M0400S	400W METAL HALIDE	455
1M0750S	750W METAL HALIDE	825
1M1000S	1000W METAL HALIDE	1075
1M1500S	1500W METAL HALIDE	1615
1M1800S	1800W METAL HALIDE	1875

Device Code	Device Description	Rated Watts	
Pulse Start Metal Halide Lamp/Ballast			
1M0100P	100W MH CWA	128	
1M0100R	100W MH LINEAR	118	
1M0150P	150W MH CWA	190	
1M0150R	150W MH LINEAR	172	
1M0175P	175W MH CWA	208	
1M0175R	175W MH LINEAR	190	
1M0200P	200W MH CWA	232	
1M0200R	200W MH LINEAR	218	
1M0250P	250W MH CWA	288	
1M0250R	250W MH LINEAR	265	
1M0300P	300W MH CWA	342	
1M0300R	300W MH LINEAR	324	
1M0320P	320W MH CWA	365	
1M0320R	320W MH LINEAR	345	
1M0350P	350W MH CWA	400	
1M0350R	350W MH LINEAR	375	
1M0400P	400W MH CWA	455	
1M0400R	400W MH LINEAR	430	
1M0450P	450W MH CWA	508	
1M0450R	450W MH LINEAR	480	
1M0750P	750W MH CWA	815	
1M0750R	750W MH LINEAR	805	
1M0875P	875W MH CWA	950	
1M0875R	875W MH LINEAR	927	
1M1000P	1000W MH CWA	1080	
Tw	o Foot T8 / T12 Systems		
1F20SSS	F20T12/HPF(1)	32	
1F80BXE	1L2' F80BXE/ELIG	90	
1F55BXE	1L2' F55BX/ELIG	56	
2F17SSE	2L2' 17W T8/ELIG	37	
2F17SSL	2L2' 17W T8/ELIG LOW POWER	27	
2F17SSM	2L2' 17W T8/EEMAG	45	
2F20SSS	F20T12/HPF(2)	56	
2F24HSS	2L2' 24 T12HO/STD/STD	85	
2F40BXE	2L2' F40BX/ELIG	72	
2F50BXE	2L2' F50BX/ELIG	108	
2F55BXE	2L2'55BXE/ELIG	112	
3F17SSE	3L2' 17W T8/ELIG	53	
3F17SSL	3L2' 17W T8/ELIG LOW POWER	39	

Device Code	Device Description	Rated Watta
Two F	Coot T8 / T12 Systems (cont.)	<u>Watts</u>
3F20SSS	F20T12/HPF(3)	78
3F40BXE	3L2' F40BX/ELIG	102
3F50BXE	3L2' F50BX/ELIG	162
3F55BXE	3L2' F55BX/ELIG	162
4F17SSE	4L2' 17W T8/ELIG	62
4F36BXE	4L2' F36BX/ELIG	148
4F40BXE	4L2' F40BX/ELIG	148
4F40BXH	4L 40W T5 (Std.) HIGH LMN	170
4F50BXE	4L2' F50BX/ELIG	216
4F55BXE	4L2' F55BX/ELIG	210
5F40BXE	5L2' F40BX/ELIG	190
5F50BXE	5L2' F50BX/ELIG	270
	5L2' F55BX/ELIG	
5F55BXE		280
6F36BXE	6L2' F36BX/ELIG	212
6F40BXE	6L2' F40BX/ELIG	204
6F50BXE	6L2' F50BX/ELIG	324
6F55BXE	6L2' F55BX/ELIG	336
8F36BXE	8L2' F36BX/ELIG	296
8F40BXE	8L2' F40BX/ELIG	288
8F50BXE	8L2' F50BX/ELIG	432
8F55BXE	8L2' F55BX/ELIG	448
9F36BXE	9L2' F36BX/ELIG	318
9F40BXE	9L2' F40BX/ELIG	306
9F50BXE	9L2' F50BX/ELIG	486
9F55BXE	9L2' F55BX/ELIG	504
12F40BE	12L2' F40BX/ELIG	408
12F50BE	12L2' F50BX/ELIG	648
12F55BE	12L2' F55BX/ELIG	672
701		
	ree Foot T8 / T12 Systems	20
1F30SEM	1L3' 30W T12 EE/EEMAG	38
1F30SES	1L3' 30W T12 EE/STD	42
1F30SSS	1L3' 30W T12 STD/STD	46
1F25SSE	1L3' 25W T8/ELIG	24
1F25SSH	1L3' 25W T8/ELIG HIGH LMN	28
2F30SEE	2L3' 30W T12 EE/ELIG	49
2F30SEM	2L3' 30W T12 EE/EEMAG	66
2F30SES	2L3' 30W T12 EE/STD	73
2F30SSS	2L3' 30W T12 STD/STD	80
2F25SSE	2L3' 25W T8/ELIG	47
2F25SSM	2L3' 25W T8/EEMAG	65

Device Code	Device Description	Rated Watts		
Thr	Three Foot T8 / T12 Systems			
3F30SSS	3L3' 30W T12 STD/STD	140		
3F30SES	3L3' 30W T12 EE/STD	127		
3F25SSE	3L3' 25W T8/ELIG	68		
4F25SSE	4L3' 25W T8/ELIG	88		
Fo	our Foot F48 T8 Systems			
1F48SES	1L4' F48T12EE/STD	50		
1F48SSS	1L4' F48T12/STD	60		
2F48SES	2L4' F48T12EE/STD	82		
2F48SSS	2L4' F48T12/STD	102		
3F48SES	3L4' F48T12EE/STD	132		
3F48SSS	3L4' F48T12/STD	162		
4F48SES	4L4' F48T12EE/STD	164		
4F48SSS	4L4' F48T12/STD	204		
1F48HES	1L4' F48HO/EE/STD	80		
1F48HSS	1L4' F48H0/STD/STD	85		
2F48HES	2L4' F48HO/EE/STD	135		
2F48HSS	2L4' F48H0/STD/STD	145		
3F48HES	3L4' F48HO/EE/STD	215		
3F48HSS	3L4' F48H0/STD/STD	230		
4F48HES	4L4' F48HO/EE/STD	270		
4F48HSS	4L4' F48H0/STD/STD	290		
Four	Foot F48VHO T12 Systems			
1F48VES	1L4' F48VHO/EE/STD	123		
1F48VSS	1L4' F48VHO/STD/STD	138		
2F48VES	2L4' F48VHO/EE/STD	210		
2F48VSS	2L4' F48VHO/STD/STD	240		
3F48VES	3L4' F48VHO/EE/STD	333		
3F48VSS	3L4' F48VHO/STD/STD	378		
4F48VES	4L4' F48VHO/EE/STD	420		
4F48VSS	4L4' F48VHO/STD/STD	480		
ŀ	Four Foot T12 Systems			
1F40SEE	1L4' EE/ELIG	38		
1F40SEM	1L4' EE/EEMAG	40		
1F40SES	1L4' EE/STD	50		
1F40SSE	1L4' STD/ELIG	46		
1F40SSM	1L4' STD/EEMAG	50		
1F40SSS	1L4' STD/STD	57		
1F40HSE	1L4' HO/STD/ELIG	59		

Device Code	Device Description	Rated						
		<u>Watts</u>						
Four Foot T12 Systems (cont.)           2F40SEE         2L4' EE/ELIG         60								
2F40SEE								
2F40SEM	2L4' EE/EEMAG	70						
2F40SES	2L4' EE/STD	80						
2F40SSE	2L4' STD/ELIG	72						
2F40SSM	2L4' STD/EEMAG	86						
2F40SSS	2L4' STD/STD	94						
3F40SEE	3L4' EE/ELIG	90						
3F40SEM	3L4' EE/EEMAG	110						
3F40SES	3L4' EE/STD	130						
3F40SSE	3L4' STD/ELIG	110						
3F40SSM	3L4' STD/EEMAG	136						
3F40SSS	3L4' STD/STD	151						
4F40SEE	4L4' EE/ELIG	120						
4F40SEM	4L4' EE/EEMAG	140						
4F40SES	4L4' EE/STD	160						
4F40SSE								
4F40SSM	4L4' STD/EEMAG	172						
4F40SSS	4L4' STD/STD	188						
6F40SSS	S 6L4' STD/STD							
	Four Foot T8 Systems							
1F32SSE	1L4' T8/ELIG	30						
1F32SSL	1L4' T8/ELIG LOW POWER	26						
1F32SSM	1L4' T8/EEMAG	37						
1F32SSH	1L4' T8/ELIG HIGH LMN	36						
2F32SSE	2L4' T8/ELIG	60						
2F32SSH	2L4' T8/ELIG HIGH LMN	78						
2F32SSL	2L4' T8/ELIG LOW PWR	52						
2F32SSM	2L4' T8/EEMAG	70						
3F32SSE	3L4' T8/ELIG	88						
3F32SSH	3L4' T8/ELIG HIGH LMN	112						
3F32SSL	3L4' T8/ELIG LOW POWER	76						
3F32SSM	3L4' T8/EEMAG	107						
4F32SSE	4L4' T8/ELIG	112						
4F32SSH	4L4' T8/ELIG HIGH LMN	112						
4F32SSL	4L4' T8/ELIG LOW PWR	98						
4F32SSM	4L4' T8/EEMAG	140						
5F32SSE	5L4' T8/ELIG	140						
5F32SSH	5L4' T8/ELIG HIGH LMN	148						
6F32SSE	6L4' T8/ELIG HIGH LMIN	190 174						
8F32SSH	8L4' T8/ELIG HIGH LMN	312						

Device Code	Device Description	Rated <u>Watts</u>
	re Foot T8 / T12 Systems	
	<b>1</b> - 4	
1F60HSM	1L5' HO/STD/EEMAG	90
1F60HSE	1L5' HO/STD/ELIG	70
1F60SSM	1L5'/STD/EEMAG	73
1F60TSM	1L5' T10HO/STD/EEMAG	135
2F40HSE	2L5' HO/STD/ELIG	123
2F40TSE	2L5'T8/ELIG	68
2F60HSM	2L5' HO/STD/EEMAG	178
2F60SSM	2L5'/STD/EEMAG	122
3F40TSE	3L5'T8/ELIG	106
Six F	oot T12 & T12HO Systems	•
1F72HSE	1L6' T8HO/ELIG	80
1F72HSS	1L6' F72HO/STD/STD	113
1F72SSM	1L6' STD/EEMAG	80
1F72SSS	1L6' STD/STD	95
2F72HSE	2L6'T8 HO/ELIG	160
2F72HSM	2L6' F72HO/STD/EEMAG	193
2F72HSS	2L6' F72HO/STD	195
2F72SSM	2L6' STD/EEMAG	135
2F72SSS	2L6' STD/STD	173
Device Code	<b>Device Description</b>	Rated
		<u>Watts</u>
Eig	ght Foot T12HO Systems	T
1F96HES	1L8' HO/EE/STD	125
1F96HSS	1L8' HO/STD/STD	135
2F96HEE	2L8' HO/EE/ELIG	170
2F96HEM	2L8' HO/EE/EEMAG	207
2F96HES	2L8' HO/EE/STD	227
2F96HSE	2L8' HO/STD/ELIG	195
2F96HSM	2L8' HO/STD/EEMAG	237
2F96HSS	2L8' HO/STD/STD	257
3F96HES	3L8' HO/EE/STD	352
3F96HSS	3L8' HO/STD/STD	392
4F96HEE	4L8' HO/EE/ELIG	340
4F96HEM	4L8' HO/EE/EEMAG	414
4F96HES	4L8' HO/EE/STD	454
4E04USE	4L8' HO/STD/ELIG	390
4F96HSE		
4F96HSE 4F96HSM	4L8' HO/STD/EEMAG	474

Device Code	Device Code Device Description				
Eight Foot T12VHO Systems					
1F96VES	1L8' VHO/EE/STD	200			
1F96VSS	1L8' VHO/STD/STD	230			
2F96VES	2L8' VHO/EE/STD	390			
2F96VSS	2L8' VHO/STD/STD	450			
3F96VES	3L8' VHO/EE/STD	590			
3F96VSS	3L8' VHO/STD/STD	680			
4F96VES	4L8' VHO/EE/STD	780			
4F96VSS	4L8' VHO/STD/STD	900			
]	Eight Foot T8 Systems				
1F59SSE	1L8' T8/ELIG	60			
1F80SSE	1L8' T8 HO/ELIG	85			
2F59SSE	2L8' T8/ELIG	109			
2F59SSL	2L8' T8/ELIG LOW PWR	100			
2F80SSE	2L8' T8 HO/ELIG	160			
E	Cight Foot T12 Systems				
1F96SEE	1L8' EE/ELIG	60			
1F96SES	1L8' EE/STD	83			
1F96SSE	1L8' STD/ELIG	70			
1F96SSS	1L8' STD/STD	100			
2F96SEE	2L8' EE/ELIG	109			
2F96SEM	2L8' EE/EEMAG	123			
2F96SES	2L8' EE/STD	138			
2F96SSE	2L8' STD/ELIG	134			
2F96SSM	2L8' STD/EEMAG	158			
2F96SSS	2L8' STD/STD	173			
3F96SES	3L8' EE/STD	221			
3F96SSS	3L8' STD/STD	273			
4F96SEE	4L8' EE/ELIG	218			
4F96SEM	4L8' EE/EEMAG	246			
4F96SES	4L8' EE/STD	276			
4F96SSE	4L8' STD/ELIG	268			
4F96SSM	4L8' STD/EEMAG	316			
4F96SSS	4L8' STD/STD	346			

Device Code	Code <u>Device Description</u>					
LED Exit Signs						
1E0002	1E0002 2.0 WATT LED					
1E0003	3.0 WATT LED	3				
1E0005	5.0 WLED	5				
1E0005C	0.5 WATT LEC	0.5				
1E0008	8.0 WLED	8				
1E0015	1.5 WATT LED	1.5				
1E0105	10.5 WATT LED	10.5				
(	Compact Fluorescents (CFL's)					
2C0007S	2/7W COMPACT HW	18				
1C0005S	5W COMPACT HW	7				
1C0007S	7W COMPACT HW	9				
1C0009S	9W COMPACT HW	11				
1C0011S	11W COMPACT HW	13				
1C0013S	13W COMPACT HW	15				
1C0018E	18W COMPACT HW ELIG	20				
1C0018S	18W COMPACT HW	20				
1C0022S	22W COMPACT HW	24				
1C0023E	1/23W COMPACT HW ELIG	25				
1C0026E	26W COMPACT HW ELIG	28				
1C0026S	26W COMPACT HW	28				
1C0028S	28W COMPACT HW	30				
1C0032E	32W COMPACT HW ELIG	34				
1C0032S	32W CIRCLINE HW	34				
1C0042E	1/42W COMPACT HW ELIG	48				
1C0044S	44W CIRCLINE HW	46				
1C0057E	1/57W COMPACT HW ELIG	65				
1C2232S	22/32W CIRCLINE HW	58				
1C2D10E	10W 2D COMPACT HW ELIG	12				
1C2D16E	16W 2D COMPACT HW ELIG	18				
1C2D21E	21W 2D COMPACT HW ELIG	22				
1C2D28E	28W 2D COMPACT HW ELIG	28				
1C2D38E	38W 2D COMP.HW ELIG	36				
1C3240S	32/40W CIRCLINE HW	80				
2C0005S	2/5W COMPACT HW	14				
2C0009S	2/9W COMPACT HW	22				
2C0011S	2/11W COMPACT HW	26				
2C0013E	2/13W COMPACT HW ELIG	28				
2C0013S	2/13W COMPACT HW	30				

### Table 5: Retrofit Proposed Lighting Wattage Tables

Device Code	Device Description	Rated Watts					
Com	Compact Fluorescents (CFL's) (cont.)						
2C0018E	2/18W COMP. HW ELIG	40					
2C0026E	2/26W COMP. HW ELIG	54					
2C0032E	2/32W COMPACT HW ELIG	68					
2C0042E	2/42W COMPACT HW ELIG	100					
3C0009S	3/9W COMPACT HW	33					
3C0013S	3/13W COMPACT HW	45					
3C0018E	3/18W COMPACT HW ELIG	60					
3C0026E	3/26W COMPACT HW ELIG	82					
3C0032E	3/32W COMPACT HW ELIG	114					
3C0042E	3/42W COMPACT HW ELIG	141					
4C0018E	4/18W COMPACT HW ELIG	80					
4C0026E	4/26W COMPACT HW ELIG	108					
4C0032E	4/32W COMPACT HW ELIG	152					
4C0042E	4/42W COMPACT HW ELIG	188					
6C0026E	6/26W COMPACT HW ELIG	162					
6C0032E	6/32W COMPACT HW ELIG	228					
6C0042E	6/42W COMPACT HW ELIG	282					
8C0026E	8/26W COMPACT HW ELIG	216					
8C0032E	8/32W COMPACT HW ELIG	304					
8C0042E	8/42W COMPACT HW ELIG	376					
	T5 Systems						
1F14SSE	1L2' 14W T5/ELIG	16					
2F14SSE	2L2' 14W T5/ELIG	32					
3F14SSE	3L2' 14W T5/ELIG	50					
4F14SSE	4L2' 14W T5/ELIG	68					
1F24HSE	1L2' 24W T5HO/ELIG	29					
2F24HSE	2L2' 24W T5HO/ELIG	52					
3F24HSE	3L2' 24W T5HO/ELIG	80					
1F21SSE	1L3' 21W T5/ELIG	24					
2F21SSE	2L3' 21W T5/ELIG	47					
1F39HSE	1L3' 39W T5HO/ELIG	42					
2F39HSE	2L3' 39W T5HO/ELIG	85					
1F28SSE	1L4' 28W T5/ELIG	32					
2F28SSE	2L4' 28W T5/ELIG	63					
3F28SSE	3L4' 28W T5/ELIG	95					
4F28SSE	4L4' 28W T5/ELIG	126					
6F28SSE	6L4' 28W T5/ELIG	189					
1F47HSE	1L4' 47W T5HO/ELIG	53					
2F47HSE	2L4' 47W T5HO/ELIG	103					
3F47HSE	3L4' 47W T5HO/ELIG	157					

Dovice Code	Device Code Device Description						
Device Code	Device Description	<u>Watts</u>					
T5 Systems (cont.)							
4F47HSE	4L4' 47W T5HO/ELIG	200					
5F47HSE	5L4' 47W T5HO/ELIG	260					
6F47HSE	6L4' 47W T5HO/ELIG	303					
1F50HSE	1L4' 50W T5HO/ELIG	58					
2F50HSE	2L4' 50W T5HO/ELIG	110					
3F50HSE	3L4' 50W T5HO/ELIG	168					
4F50HSE	4L4' 50W T5HO/ELIG	215					
5F50HSE	5L4' 50W T5HO/ELIG	278					
6F50HSE	6L4' 50W T5HO/ELIG	325					
1F54HSE	1L4' 54W T5HO/ELIG	59					
2F54HSE	2L4' 54W T5HO/ELIG	117					
3F54HSE	3L4' 54W T5HO/ELIG	177					
4F54HSE	4L4' 54W T5HO/ELIG	234					
5F54HSE	5L4' 54W T5HO/ELIG	294					
6F54HSE	6L4' 54W T5HO/ELIG	351					
8F54HSE	8L4' 54W T5HO/ELIG	468					
10F54HSE	10L4' 54W T5HO/ELIG	585					
Tw	o Foot High Efficient T8 Systems						
1F17ESL	1L2' 17W T8EE/ELEE LOW PWR	14					
1F17ESN	1L2' 17W T8EE/ELEE	17					
1F17ESH	1L2' 17W T8EE/ELEE HIGH PWR	20					
1F28BXE	1L2' F28BX/ELIG	32					
2F17ESL	2L2' 17W T8EE/ELEE LOW PWR	27					
2F17ESN	2L2' 17W T8EE/ELEE	32					
2F17ESH	2L2' 17W T8EE/ELEE HIGH PWR	40					
2F28BXE	2L2' F28BX/ELIG	63					
3F17ESL	3L2' 17W T8EE/ELEE LOW PWR	39					
3F17ESN	3L2' 17W T8EE/ELEE	46					
3F17ESH	3L2' 17W T8EE/ELEE HIGH PWR	61					
3F28BXE	3L2' F28BX/ELIG	94					
Thr	ee Foot High Efficient T8 Systems						
1F25ESL	1L3' 25W T8EE/ELEE LOW PWR	21					
1F25ESN	1L3' 25W T8EE/ELEE	24					
1F25ESH	1L3' 25W T8EE/ELEE HIGH PWR	30					
2F25ESL	2L3' 25W T8EE/ELEE LOW PWR	40					
2F25ESN	2L3' 25W T8EE/ELEE	45					
2F25ESH	2L3' 25W T8EE/ELEE HIGH PWR	60					
3F25ESL	3L3' 25W T8EE/ELEE LOW PWR	58					
3F25ESN	3L3' 25W T8EE/ELEE	67					
3F25ESH	3L3' 25W T8EE/ELEE HIGH PWR	90					

Device Code	<b>Device Description</b>	Rated Watts						
Four Foot	Four Foot T8 High Efficient / Reduce Wattage Systems							
1F25EEH	1L4' 25W T8EE/ELEE HIGH PWR	30						
1F25EEE	1L4' 25W T8EE/ELEE	22						
1F25EEL	1L4' 25W T8EE/ELEE LOW PWR	19						
2F25EEH	2L4' 25W T8EE/ELEE HIGH PWR	57						
2F25EEE	2L4' 25W T8EE/ELEE	43						
2F25EEL	2L4' 25W T8EE/ELEE LOW PWR	37						
3F25EEH	3L4' 25W T8EE/ELEE HIGH PWR	86						
3F25EEE	3L4' 25W T8EE/ELEE	64						
3F25EEL	3L4' 25W T8EE/ELEE LOW PWR	57						
4F25EEH	4L4' 25W T8EE/ELEE HIGH PWR	111						
4F25EEE	4L4' 25W T8EE/ELEE	86						
4F25EEL	4L4' 25W T8EE/ELEE LOW PWR	75						
1F28EEH	1L4' 28W T8EE/ELEE HIGH PWR	33						
1F28EEE	1L4' 28W T8EE/ELEE	24						
1F28EEL	1L4' 28W T8EE/ELEE LOW PWR	22						
2F28EEH	2L4' 28WT8EE/ELEE HIGH PWR	64						
2F28EEE	2L4' 28W T8EE/ELEE	48						
2F28EEL	2L4' 28W T8EE/ELEE LOW PWR	42						
3F28EEH	3L4' 28W T8EE/ELEE HIGH PWR	96						
3F28EEE	3L4' 28W T8EE/ELEE	72						
3F28EEL	3L4' 28W T8EE/ELEE LOW PWR	63						
4F28EEH	4L4' 28W T8EE/ELEE HIGH PWR	126						
4F28EEE	4L4' 28W T8EE/ELEE	94						
4F28EEL	4L4' 28W T8EE/ELEE LOW PWR	83						
1F30EEH	1L4' 30W T8EE/ELEE HIGH PWR	36						
1F30EEE	1L4' 30W T8EE/ELEE	26						
1F30EEL	1L4' 30W T8EE/ELEE LOW PWR	24						
2F30EEH	2L4' 30WT8EE/ELEE HIGH PWR	69						
2F30EEE	2L4' 30W T8EE/ELEE	52						
2F30EEL	2L4' 30W T8EE/ELEE LOW PWR	45						
3F30EEH	3L4' 30W T8EE/ELEE HIGH PWR	103						
3F30EEE	3L4' 30W T8EE/ELEE	77						
3F30EEL	3L4' 30W T8EE/ELEE LOW PWR	68						
4F30EEH	4L4' 30W T8EE/ELEE HIGH PWR	133						
4F30EEE	4L4' 30W T8EE/ELEE	101						
4F30EEL	4L4' 30W T8EE/ELEE LOW PWR	89						
1F32EEH	1L4' 32W T8EE/ELEE HIGH PWR	38						
1F32EEE	1L4' 32W T8EE/ELEE	28						
1F32EEL	1L4' 32W T8EE/ELEE LOW PWR	25						
2F32EEH	2L4' 32W T8EE/ELEE HIGH PWR	73						
2F32EEE	2L4' 32W T8EE/ELEE	53						

Device Code	vice Code <u>Device Description</u>						
Watts           Four Foot T8 High Efficient / Reduce Wattage Systems (cont.)							
2F32EEL	2L4' 32W T8EE/ELEE LOW PWR	47					
3F32EEH	3L4' 32W T8EE/ELEE HIGH PWR	109					
3F32EEE	3L4' 32W T8EE/ELEE	82					
3F32EEL	3L4' 32W T8EE/ELEE LOW PWR	72					
4F32EEH	4L4' 32W T8EE/ELEE HIGH PWR	141					
4F32EEE	4L4' 32W T8EE/ELEE	107					
4F32EEL	4L4' 32W T8EE/ELEE LOW PWR	95					
6F32EEH	6L4' 32W T8EE/ELEE HIGH PWR	218					
6F32EEE	6L4' 32W T8EE/ELEE	168					
6F32EEL	6L4' 32W T8EE/ELEE LOW PWR	146					
	Eight Foot T8 Systems						
1F59SSE	1L8' T8/ELIG	60					
1F80SSE	1L8' T8 HO/ELIG	85					
2F59SSE	2L8' T8/ELIG	109					
2F59SSL	2L8' T8/ELIG LOW PWR	100					
2F80SSE	2L8' T8 HO/ELIG	160					
11.002	LED Lighting Fixtures	2					
1L002	2 WATT LED	2					
1L003	3 WATT LED	3					
1L004	4 WATT LED	4					
1L005	5 WATT LED	5					
1L006	6 WATT LED	6					
1L007	7 WATT LED	7					
1L008	8 WATT LED	8					
1L009	9 WATT LED	9					
1L010	10 WATT LED	10					
1L011	11 WATT LED	11					
1L012	12 WATT LED	12					
1L013	13 WATT LED	13					
1L014	14 WATT LED	14					
1L015	15 WATT LED	15					
1L016	16 WATT LED	16					
1L017	17 WATT LED	17					
1L018	18 WATT LED	18					
1L019	19 WATT LED	19					
1L020	20 WATT LED	20					
1L021	21 WATT LED	21					
1L022	22 WATT LED	22					
1L023	23 WATT LED	23					

During Code	Daria Darairtia	Rated					
Device Code	<b>Device Description</b>	<u>Watts</u>					
LED Lighting Fixtures (cont.)							
1L024	24 WATT LED	24					
1L025	25 WATT LED	25					
1L026	26 WATT LED	26					
1L027	27 WATT LED	27					
1L028	28 WATT LED	28					
1L029	29 WATT LED	29					
1L030	30 WATT LED	30					
1L031	31 WATT LED	31					
1L032	32 WATT LED	32					
1L033	33 WATT LED	33					
1L034	34 WATT LED	34					
1L035	35 WATT LED	35					
1L036	36 WATT LED	36					
1L037	37 WATT LED	37					
1L038	38 WATT LED	38					
1L039	39 WATT LED	39					
1L040	40 WATT LED	40					
1L041	41 WATT LED	41					
1L042	42 WATT LED	42					
1L043	43 WATT LED	43					
1L044	44 WATT LED	44					
1L045	45 WATT LED	45					
1L046	46 WATT LED	46					
1L047	47 WATT LED	47					
1L048	48 WATT LED	48					
1L049	49 WATT LED	49					
1L050	50 WATT LED	50					
1L055	55 WATT LED	55					
1L060	60 WATT LED	60					
1L070	70 WATT LED	70					
1L073	73 WATT LED	73					
1L075	75 WATT LED	75					
1L080	90 WATT LED	90					
1L085	85 WATT LED	85					
1L090	90 WATT LED	90					
1L095	95 WATT LED	95					
1L100	100 WATT LED	100					
1L106	106 WATT LED	106					
1L107	107 WATT LED	107					
1L116	116 WATT LED	116					
1L120	120 WATT LED	120					

Device Code	Device Code Device Description					
LED Lighting Fixtures (cont.)						
1L125	125 WATT LED	125				
1L130	130 WATT LED	130				
1L135	135 WATT LED	135				
1L140	140 WATT LED	140				
1L145	145 WATT LED	145				
1L150	150 WATT LED	150				
1L155	155 WATT LED	155				
1L160	160 WATT LED	160				
1L165	165 WATT LED	165				
1L170	170 WATT LED	170				
1L175	175 WATT LED	175				
1L180	180 WATT LED	180				
1L185	185 WATT LED	185				
1L190	190 WATT LED	190				
1L200	200 WATT LED	200				
1L210	210 WATT LED	210				
1L220	220 WATT LED	220				
1L240	240 WATT LED	240				
	Electronic Metal Halide Lamps					
1M0150E	150W METAL HALIDE EB	160				
1M0200E	200W METAL HALIDE EB	215				
1M0250E	250W METAL HALIDE EB	270				
1M0320E	320W METAL HALIDE EB	345				
1M0350E	350W METAL HALIDE EB	375				
1M0400E	400W METAL HALIDE EB	430				
1M0450E	400W METAL HALIDE EB	480				
	MH Track Lighting					
1M0020E	20W MH SPOT	25				
1M0025E	25W MH SPOT	25				
1M0035E	35W MH SPOT	44				
1M0039E	39W MH SPOT	47				
1M0050E	50W MH SPOT	60				
1M0070E	70W MH SPOT	80				
1M0100E	100W MH SPOT	111				
1M0150E	150W MH SPOT	162				

#### Table 6: Upstream Lighting Savings and Measure Lives

Product type	Annual Savings, kWh	Watts saved	Measure Life	kWh Impact Factor	Summer & Winter kW Factor	Summer Coincident (On-Peak)	Winter Coincident (On-Peak)	Summer Coincident (Seasonal)	Winter Coincident (Seasonal)	RI Annual HOU
Т8	13.0	3.5	10	91.6%	85.3%	76.2%	50.6%	68.2%	45.4%	3,684
T5HO	14.7	4.0	10	91.6%	85.3%	76.2%	50.6%	68.2%	45.4%	3,684
T8 - 28	13.0	3.5	10	91.6%	85.3%	76.2%	50.6%	68.2%	45.4%	3,684
T8 - 25	22.7	6.2	10	91.6%	85.3%	76.2%	50.6%	68.2%	45.4%	3,684
U-Bend T8 - 28	13.0	3.5	7	91.6%	85.3%	76.2%	50.6%	68.2%	45.4%	3,684
U-Bend T8 - 25	22.7	6.2	7	91.6%	85.3%	76.2%	50.6%	68.2%	45.4%	3,684
PAR20	115.3	29.8	11	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
PAR30	156.3	40.4	11	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
PAR38	181.1	46.8	11	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
MR16	90.6	23.4	11	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
A-line, 40/60w	129.8	33.5	6	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
A-line, 75/100w	182.3	47.1	6	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
Decoratives	81.5	21.1	5	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
TLED, 4ft	31.4	8.5	12	91.6%	85.3%	76.2%	<b>50.6%</b>	<b>68.2%</b>	45.4%	3,684
TLED, 2ft	15.7	4.3	12	91.6%	85.3%	76.2%	<b>50.6%</b>	<b>68.2%</b>	45.4%	3,684
G24 LED	50.1	12.8	13	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
LED Retrofit kit, <25W	157.4	40.7	11	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
LED Retrofit kit, >25W	232.0	60.0	12	119.3%	113.0%	72.0%	52.6%	66.8%	48.8%	3,870
Stairwell Kit, 2ft w/sensor	467.8	53.4	7	100.0%	100.0%	77.6%	85.6%	77.6%	85.6%	8,760
Stairwell Kit, 4ft w/sensor	403.0	46.0	7	100.0%	100.0%	77.6%	85.6%	77.6%	85.6%	8,760

Equipment Type	Size Category	Subcategory or Rating Condition	Baseline Efficiency After 1/2014
Air conditioners, air cooled	<65,000 Btu/h <sup>b</sup>	Split system	13.0 SEER
		Single package	13.0 SEER
	≥65,000 Btu/h and	· ·	11.2 EER <sup>a</sup>
	<135,000 Btu/h	single package	11.4 IEER <sup>a</sup>
	$\geq$ 135,000 Btu/n and <240,000	Split system and	11.0 EER <sup>a</sup>
	Btu/h ≥240,000 Btu/h	single package	11.2 IEER <sup>a</sup>
	$\geq 240,000$ Btu/n and $< 760,000$	Split system and	10.0 EER <sup>a</sup>
	Rtu/h	single package	10.1 IEER <sup>a</sup>
	≥760,000 Btu/h	Split system and	9.7 EER <sup>a</sup>
	_/00,000 Btu/ii	single package	9.8 IEER <sup>a</sup>
Air conditioners, Water cooled	<65,000 Btu/h	Split system and	12.1 EER
	(00,000 200/11	single package	12.3 IEER
	≥65,000 Btu/h and	· ·	12.1 EER <sup>a</sup>
	<135,000 Btu/h ≥135,000 Btu/n	single package	12.3 IEER <sup>a</sup>
	$\ge 135,000$ Btu/II and $< 240,000$	Split system and	12.5 EER <sup>a</sup>
	Btu/h	single package	12.7 IEER <sup>a</sup>
	≥240,000 Btu/h	Split system and	12.4 EER <sup>a</sup>
		single package	12.6 IEER <sup>a</sup>
Air conditioners, evaporatively	<65,000 Btu/h	Split system and	12.1 EER
cooled		single package	12.3 IEER
	≥65,000 Btu/h and	· ·	12.1 EER <sup>a</sup>
	<135,000 Btu/h ≥135,000 Btu/n	single package	12.3 IEER <sup>a</sup>
	$\ge 135,000$ Btu/II and $< 240,000$	Split system and	12.0 EER <sup>a</sup>
	Btu/h	single package	12.2 IEER <sup>a</sup>
	≥240,000 Btu/h	Split system and	11.9 EER <sup>a</sup>
		single package	12.1 IEER <sup>a</sup>

#### Table 7: Baseline Efficiency Requirements for C&I Unitary Air Conditioners<sup>c</sup>

a. Deduct 0.2 from the required EERs for units with a heating section other than electric heat.[1]

b. Single-phase air-cooled air conditioners <65,000 Btu/h are regulated by the National Appliance Energy Conservation Act of 1987 (NAECA); SEER values are those set by NAECA.

c. Baseline determined by International Code Council (2012). *2012 International Energy Conservation Code;* Page C-38, Table C403.2.3(1)

Baseline determined by International Code Council (2012). 2012 International Energy Conservation Code; Page C-38, Table C403.2.3(1)

The Program does not differentiate units by heating section types, therefore the highest baseline efficiency is assumed for all heating section types in each equipment category

#### Table 8: Baseline Efficiency Requirements for C&I Heat Pumps

	Size Cotegomy		Baseline Efficiency After 1/1/2014[i]		
Equipment Type	Size Category (Cooling Capacity)	Subcategory or Rating Condition			
	(Cooming Capacity)		<b>Cooling Mode</b>	Heating Mode	
	<65,000 Btu/h <sup>b</sup>	Split system	13.0 SEER	7.7 HSPF	
	<65,000 Btu/h	Single package	13.0 SEER	7.7 HSPF	
	≥65,000 Btu/h and	Split system and single package / 47°F	11.0 EER <sup>a</sup>	2 2 COP	
A	<135,000 Btu/h			3.3 COP	
Air cooled	≥135,000 Btu/h and	Split system and single package / 47°F	10.6 EER <sup>a</sup>	3.2 COP	
	<240,000 Btu/h	db/43°F wb outdoor air	10.7 IEER <sup>a</sup>		
	≥240,000 Btu/h Split system and single package / db/43°F wb outdoor air	Split system and single package / 47°F	9.5 EER <sup>a</sup>	3.2 COP	
		db/43°F wb outdoor air	9.6 IEER <sup>a</sup>	3.2 COP	
Water source	<17,000 Btu/h	86°F entering water (Cooling Mode) / 68°F entering water (Heating Mode)	11.2 EER	4.2 COP	
water source	≥17,000 Btu/h and <135,000 Btu/h	86°F entering water / 68°F entering water (Heating Mode)	12.0 EER	4.2 COP	
Groundwater source	<135,000 Btu/h	59°F entering water (Cooling Mode) / 50°F entering water (Heating Mode)	16.2 EER	3.6 COP	
Ground source	<135,000 Btu/h	77°F entering water / 32°F entering water (Heating Mode)	13.4 EER	3.1 COP	

db = dry-bulb temperature, °F; wb = wet-bulb temperature, °F.

a. Deduct 0.2 from the required EERs for units with a heating section other than electric heat[1].

b. Single-phase air-cooled air conditioners <65,000 Btu/h are regulated by the National Appliance Energy Conservation Act of 1987 (NAECA); SEER values are those set by NAECA.

[i] International Code Council (2012). 2012 International Energy Conservation Code. Page C-40, Table C403.2.3(2) The Program does not differentiate units by heating section types, therefore the highest baseline efficiency is assumed for all heating section types in each equipment category

#### Rhode Island TRM

#### Table 9: Water Chilling Packages - Minimum Efficiency Requirements

Equipment Type	Size Category (Tons)	Units	Path A		Path B	
	Sile eurogery (10iis)	c mus	Full Load	IPLV	Full Load	IPLV
Air-cooled chillers	< 150	EER	9.562	12.5	NA	NA
All-cooled chillers	≥ 150	EER	9.562	12.75	NA	NA
Water cooled, electrically	< 75	kW/ton	0.78	0.63	0.8	0.6
operated, positive	$\geq$ 75 and < 150	kW/ton	0.775	0.615	0.79	0.586
displacement (rotary screw	$\geq$ 150 and < 300	kW/ton	0.68	0.58	0.718	0.54
and scroll)	$\geq 300$	kW/ton	0.62	0.54	0.639	0.49
	< 150	kW/ton	0.634	0.596	0.639	0.45
Water cooled, electrically	$\geq$ 150 and < 300	kW/ton	0.634	0.596	0.639	0.45
operated, centrifugal	$\geq$ 300 and < 600	kW/ton	0.576	0.549	0.6	0.4
	$\geq 600$	kW/ton	0.57	0.539	0.59	0.4

Note: Compliance with this standard may be obtained by meeting the minimum requirements of Path A or B, however, both the Full Load and IPLV must be met to fulfill the requirements of Path A or B.

Table 10: Chiller Load Factors

Equipment Type	Full Load	IPLV
Air-cooled chillers	0.715	0.715
Water cooled chillers <300 Tons	0.882	0.823
Water cooled chillers >300 Tons	0.762	0.765

National Grid load factors based on a 1994 study.

Table 11: Cooling and Heating Equivalent Full Load Hours

Building (or Space) Type	Cooling Full Load Hours (EFLH <sub>cool</sub> )	Heating Full Load Hours (EFLH <sub>heat</sub> )
National Grid RI	817	1137
(NE – South Coastal)	017	1157

Average Cooling EFLHs from the 2010 NEEP HVAC Loadshape study.[1]

Average Heating EFLHs derived from 2010 NEEP HVAC Loadshape study<sup>[2]</sup> and the Connecticut Program

[1] KEMA (2011). C&I Unitary AC LoadShape Project – Final Report. Prepared for the Regional Evaluation, Measurement & Verification Forum.

[2] Ibid.

[3] United Illuminating Company, Connecticut Light & Power Company (2010). UI and CL&P Program Savings Documentation for 2011 Program Year.

### Table 12: Savings Factors for ECM HVAC Fan Motors

Factor	Box Size	Value	Units
Box Size Factor	< 1000 CFM	0.32	Watts/CFM
Box Size Factor	≥ 1000 CFM	0.21	Watts/CFM
%Flow <sub>annual</sub>	ALL	0.52	-
%Flow <sub>sp</sub>	ALL	0.63	-
%Flow <sub>wP</sub>	ALL	0.33	-

Factors based on engineering analyses developed at National Grid

Table 13: Savings Factors for Cooler Night Covers

Cooler Case Temperature	Savings Factor (∆kW/foot)
Low Temperature (-35 F to -5 F)	0.03
Medium Temperature (0 F to 30 F)	0.02
High Temperature (35 F to 55F)	0.01

CL&P Program Savings Documentation for 2011 Program Year (2010). Factors based on Southern California *Effects of the Low Emissive Shields on Performance and Power Use of a Refrigerated Display Case.* 

#### Table 14: Savings Factors for C&I VSDs (kWh/HP and kW/HP)

	Building Exhaust Fan	Cooling Tower Fan	Chilled Water Pump	Boiler Feed Water Pump	Hot Water Circulating. Pump	MAF - Make- up Air Fan	Return Fan	Supply Fan	WS Heat Pump Circulating Loop
Annual Energy Savings	, ,	,							
University/College	3,641	449	745	2,316	2,344	3,220	1,067	1,023	3,061
Elm/H School	3,563	365	628	1,933	1,957	3,402	879	840	2,561
Multi-Family	3,202	889	1,374	2,340	2,400	3,082	1,374	1,319	3,713
Hotel/Motel	3,151	809	1,239	2,195	2,239	3,368	1,334	1,290	3,433
Health	3,375	1,705	2,427	2,349	2,406	3,002	1,577	1,487	3,670
Warehouse	3,310	455	816	2,002	2,087	3,229	1,253	1,205	2,818
Restaurant	3,440	993	1,566	1,977	2,047	2,628	1,425	1,363	3,542
Retail	3,092	633	1,049	1,949	2,000	2,392	1,206	1,146	2,998
Grocery	3,126	918	1,632	1,653	1,681	2,230	1,408	1,297	3,285
Offices	3,332	950	1,370	1,866	1,896	3,346	1,135	1,076	3,235
Summer Demand Saving	gs Factors (k	KW/HP <sub>SP</sub> )							
University/College	0.109	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.056
Elm/H School	0.377	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.275
Multi-Family	0.109	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.056
Hotel/Motel	0.109	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.056
Health	0.109	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.056
Warehouse	0.109	-0.023	0.056	0.457	0.457	0.261	0.102	0.064	0.056
Restaurant	0.261	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.178
Retail	0.109	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.056
Grocery	0.261	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.178
Offices	0.109	-0.023	0.056	0.457	0.457	0.109	0.102	0.064	0.056
Winter Demand Savings	s Factors (kV	W/HP <sub>WP</sub> )							
University/College	0.377	-0.006	0.457	0.457	0.457	0.109	0.113	0.113	0.457
Elementary/High School	0.457	-0.006	0.457	0.457	0.457	0.109	0.113	0.113	0.457
Multi-Family	0.109	-0.006	0.457	0.355	0.384	0.109	0.113	0.113	0.355
Hotel/Motel	0.109	-0.006	0.457	0.418	0.444	0.109	0.113	0.113	0.418
Health	0.377	-0.006	0.457	0.275	0.298	0.109	0.113	0.113	0.275
Warehouse	0.377	-0.006	0.457	0.178	0.193	0.261	0.113	0.113	0.178
Restaurant	0.109	-0.006	0.457	0.355	0.384	0.109	0.113	0.113	0.355
Retail	0.109	-0.006	0.457	0.275	0.298	0.109	0.113	0.113	0.275
Grocery	0.457	-0.006	0.457	0.418	0.444	0.109	0.113	0.113	0.418
Offices	0.457	-0.006	0.457	0.418	0.444	0.109	0.113	0.113	0.418

Chan, Tumin (2010). Formulation of a Prescriptive Incentive for the VFD and Motors & VFD impact tables at NSTAR. Prepared for NSTAR.

Table 15: Baseline Efficiency Requirements for Gas and Electric Commercial Ovens

Equipment Type	Baseline Efficiency	Efficiency Requirement
Gas-Fired Convection Oven	30%	>=44%
Gas-Fired Combination Oven	35%	>=44%
Gas-Fired Conveyor Oven	20% Heavy Load	>=44%
Gas-Fired Rack Oven	30%	>=50%
Commercial Electric Oven	Convection Cooking: 65% at 80lb/hr, 3.0 kW idle mode, 3.0 kW preheat Steam Cooking: 40% at 100lb/hr, 10.0 kW idle mode, 3.0kW preheat	

## Table 16: HVAC Interactive Effects for C&I Lighting

Program	Lighting Type	Gas Impact (MMBtu/∆kWh)[i]	Oil Impact (MMBtu/∆kWh)[ii]
	Lighting Systems	-0.00043	-0.00083
	Lighting Controls	-0.00028	-0.00055
C&I New Construction	Upstream Lighting - LEDs	-0.0003	-0.0006
	Upstream Lighting - Fluorescents	-0.00039	-0.00077
C&I Retrofit	Lighting Systems	-0.00043	-0.00083
Carketront	Lighting Controls	-0.00028	-0.00055

[i] C&I Lighting Interactive Effects 2015

[ii] C&I Lighting Interactive Effects 2015

Table 17: Default kW Reduction per CFM by CAIR Dryer Capacity

Dryer Capacity (CFM <sub>DRYE</sub> R)	kW Reduction per CFM [1]
<100	0.00474
≥100 and <200	0.00359
≥200 <300	0.00316
≥300 <400	0.0029
≥400	0.00272

[1] From NSTAR analysis based on metering data. The location of the original data and analysis is unknown; however, these values are supported by multipled 3rd party impact evaluations.

#### Table 18: CAIR Compressor kW Reduction per Horsepower

		kW Reduction per Horsepower [1]		
Control Type	Nominal Horsepower (HP)	New Construction	Retrofit	
Load/No Load	≥15 and <25	0.076	0.102	
Load/No Load	≥25 and <75	0.114	0.102	
VSD	≥15 and <25	0.159	0.207	
VSD	≥25 and <75	0.228	0.206	
Variable Displacement	≥50 and <75	0.11	0.116	

[1] From NSTAR Analysis based on metering data. The location of original data and analysis is unknown; however, these values are supported by multiple 3rd party impact evaluations.

Table 19: Baseline Efficiency Requirements for C&I Gas-Fired Boilers

Equipment Type	Subcategory	Size Category (Input)	Minimum Efficiency <sup>a</sup>	Test Procedure
		<300,000 Btu/h	80% AFUE	10 CFR Part 430
Boilers, hot water	Gas-fired	>=300,000 Btu/h and <=2,500,000 Btu/h <sup>b</sup>	80% E <sub>t</sub>	10 CFR Part 431
		>2,500,000 Btu/h <sup>c</sup>	82% E <sub>c</sub>	10 CFR Part 430

a. Annual Fuel Utilization Efficiency (AFUE), Thermal efficiency (Et), Combustion efficiency (Ec)

b. Maximum capacity - min. and max. ratings as provided for and allowed by the units controls

c. These requirements apply to boilers with rated input of 8 MMBtu/h or less that are not packaged boilers and to all packaged boilers. Minimum efficiency requirements for boilers cover all capacities of packaged boilers

Adapted from 2012 International Energy Conservation Code; Table 6.8.1F

# **Appendix B: Non-Energy Impacts**

#### Per Measure Residential Non-Energy Impacts for Electric and Gas Programs

End Use	TRM Measures	NEI	Description	Value or Algorithm	Basis	Duration
	Indoor Fixture Outdoor Fixture	Lighting Quality and Lifetime	O&M savings due to more efficient fixtures	\$3.50	per measure	One Time
Lighting	LED Fixture CFL Bulb LED Bulb	Lighting Quality and Lifetime	O&M savings due to more efficient bulbs	\$3.00	per measure	One Time
Products	Refrigerator/Freez er Recycling	Refrigerator/Freeze r Turn-in	Non-energy benefits of turning in a refrigerator and/or freezer as part of the MA turn-in program. The total benefit is comprised of 3 parts: \$1.06 for avoided landfill space, \$1.25 for recycling of plastics and glass, and \$170.22 for incineration insulating foam.	\$172.53	per measure	One Time
HVAC	Heating System (Retrofit and Rebate)	Improved Safety	Reduced incidence of fire and carbon monoxide exposure as a result of installing a new heating system	\$45.05	per measure	Annual
	Window AC (Retrofit)	Window Air Conditioner Replacement	Non-energy benefits associated with installing a new room air conditioner replacement	\$49.50	per measure	Annual

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End Use	<b>TRM Measures</b>	NEI	Description	Value or Algorithm	Basis	Duration
	All Measures with oil savings	National Security	Reducing the need for foreign energy imports thereby increasing national security	MMBTU Oil Savings * \$1.83	per measure	Annual
Various	All electric measures with kWh savings and all gas measures with MMBTU savings.	Rate Discounts	Financial savings to utility as a result of a smaller portion of energy being sold at the low income rate	Elec: (kwh savings per measure)*(A16-A60) Gas: (therms savings per measure)*(R12- R13)	per measure	Annual

(1) The NEIs in this table represent impacts that accrue specifically measures in the 2016 RI portfolio of programs.

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End Use	TRM Measures	NEI	Description	Value	Basis	Туре
	Large Retrofit Prescriptive Lighting	Varies (1)	A compiled value representing a number of NEI categories studied in the referenced evaluation.	\$0.027	Net kWh Saved	Annual
	New Construction CFL O&M	O&M Savings (2)	Operation & Maintenance savings from fewer replacements over the life of the more efficient measure	\$17.93	Unit	Annual
Lighting	New Construction LED Traffic Light O&M	O&M Savings (2)	Operation & Maintenance savings from fewer replacements over the life of the more efficient measure	\$30.02	Unit	Annual
	New Construction Control/Sensor O&M	O&M Savings (2)	Operation & Maintanence savings from fewer replacements over the life of the more efficient measure	\$6.69	kW Saved	Annual
Electric HVAC	Large Retrofit Prescriptive HVAC	Multiple (1)	A compiled value representing a number of NEI categories studied in the referenced evaluation.	\$0.097	Net kWh Saved	Annual
Electric Custom	Large Retrofit Custom Electric	Multiple (1)	A compiled value representing a number of NEI categories studied in the referenced evaluation.	\$0.037	Net kWh Saved	Annual

#### Per Measure Commercial and Industrial Non-Energy Impacts for Electric and Gas Programs

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End Use	TRM Measures	NEI	Description	Value	Basis	Туре
			Economic development			
			benefits, as required by the			
			amendment to the Least			
			Cost Procurement law,			One-Time
	Large Retrofit		R.I.G.L. § 39-1-		Net	
CHP	CHP	Economic	27.7(c)(6)(ii) – (iv)		kWh	
	CHr	development	enacted in June 2012	\$0.39	Saved	
			A compiled value			
			representing a number of		Net	A
			NEI categories studied in		kWh	Annual
		Multiple (1)	the referenced evaluation.	-\$0.015	Saved	
	Retrofit Boiler,		A compiled value			
Gas HVAC	Reset Controls,		representing a number of		Net	A mmuo1
Gas HVAC	Retrofit		NEI categories studied in		kWh	Annual
	Thermostat	Multiple (1)	the referenced evaluation.	\$0.135	Saved	
			A compiled value			
Gas Custom			representing a number of		Net	Annual
	Large Retrofit		NEI categories studied in		kWh	Annual
	Custom Gas	Multiple (1)	the referenced evaluation.	\$0.250	Saved	

(1) Source is Tetra Tech Inc. "Massachusetts Program Administrators Final Report - Commercial & Industrial Non-Energy Impacts Study, 6/29/2012

(2) (2) Source is Optimal Energy, Inc. MEMO "Non-Electric Benefits Analysis Update" 11/7/2008

Program	NEI	Description	Measure Category	Value	Duration	
	Thermal Comfort	Greater participant-perceived comfort in home		\$77.00	Annual	
Residential New Construction	Noise Reduction	Less participant-perceived noise in the home	N/A	\$40.00	Annual	
construction	Property Value Increase	Increased value of property and expected ease of selling home		\$72.00	Annual	
			Heating System	\$48.63		
	Thermal Comfort	Greater participant-perceived comfort in home	Cooling System	\$3.92	Annual	
			Heating and Cooling System	\$5.05		
	Noise Reduction	Less participant-perceived noise in the home	Cooling System	\$2.83	Annual	
	Noise Reduction	Less participant-perceived noise in the nome	Heating and Cooling System	\$1.42	Annual	
		Increased home durability from better quality heating, cooling and structural materials	Heating System	\$17.42		
			Cooling System	\$1.54	Annual	
			Heating and Cooling System	\$1.98		
			Heating System	\$102.40		
Residential Cooling and	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Cooling System	\$7.54	Annual	
Heating Equipment		and/or more efficient appnance equipment	Heating and Cooling System	\$9.42		
		Fewer colds and viruses, improved indoor air	Heating System	\$1.56		
	Health Benefits	quality and ease of maintaining healthy relative	Cooling System	\$0.13	Annual	
		humidity from weatherization	Heating and Cooling System	\$0.16		
			Heating System	\$678.52		
			Cooling System	\$62.65		
	Property Value Increase	Increased value of property and expected ease of	Heating and Cooling System	\$80.69	One Time	
		selling home	Air Sealing	\$0.32	One Time	
			Air Sealing	\$135.83		

#### Per Participant Non-Energy Impacts for Residential Electric Measures

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Program	NEI	Description	Measure Category	Value	Duration
	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay their lower bills		\$2.61	Annual
	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		\$3.74	Annual
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills	N/A	\$0.43	Annual
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		\$0.58	Annual
Single Family - Income Eligible Services	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and terminations		\$0.34	Annual
Services			Insulation	\$25.38	
	Thermal Comfort	Greater participant-perceived comfort in home	Air Sealing	\$30.23	Annual
			Heating System	\$28.01	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	\$13.56	Annual
			Air Sealing	\$16.39	
		Increased home durability from better quality	Insulation	\$8.76	A 1
	Home Durability	heating, cooling and structural materials	Air Sealing	\$10.61	Annual
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Heating System Heating System	\$9.72 \$27.43	Annual
		Fewer colds and viruses, improved indoor air	Insulation	\$4.77	
	Health Benefits	quality and ease of maintaining healthy relative	Air Sealing	\$5.69	Annual
		humidity from weatherization	Heating System	\$5.27	

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Program	NEI	Description	Measure Category	Value	Duration	
	Property Value Increase	Increased value of property and expected ease of selling home	Insulation Air Sealing Heating System	\$223.63 \$144.93 \$249.20	Annual	
Single Family - Income Eligible Services	Safety-Related Emergency Calls	Financial savings to the utility as a result of fewer safety related emergency calls being made	Heating System	\$8.43	Annual	
	Thermal Comfort	Greater participant-perceived comfort in home	Insulation Air Sealing	\$25.15 \$10.13	Annual	
	Noise Reduction	Less participant-perceived noise in the home	Insulation	\$11.54	Annual	
			Air Sealing	\$4.88		
EnergyWise	Home Durability	Increased home durability in terms of maintenance requirements because of better	Insulation	\$9.82	Annual	
Single Family and Multifamily		quality heating, cooling and structural materials	Air Sealing	\$3.95		
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative	Insulation	\$0.80	Annual	
		humidity as a result of weatherization in home	Air Sealing	\$0.32		
	Property Value Increase	Increased value of property and expected ease	Insulation	\$378.05	One Time	
		of selling home	Air Sealing	\$135.83	5	

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Program	NEI	Description	Measure Category	Value	Duration
	Rental Units Marketability	Financial savings to owners of LI rental housing as a result of increased marketability of the more efficient housing.	_	\$0.96	Annual
	Property Durability	Financial savings to owners of LI rental housing as a result of more durable and efficient materials being installed.		\$36.85	Annual
	Reduced Tenant Complaints	Savings to owners of LI rental housing in terms of staff time and materials as a result of fewer tenant complaints with the more efficient measures.		\$19.61	Annual
	Rental Unit Increased Property Value	Owner-perceived increased property value due to more energy efficient measures		\$17.03	One Time
EnergyWise Income Eligible	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay lower bills	N/A	\$2.61	Annual
Multifamily Retrofit	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		\$3.74	Annual
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills		\$0.43	Annual
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		\$0.58	Annual
	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and terminations		\$0.34	Annual

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Program	NEI	Description	Measure Category	Value	Duration
	Thermal Comfort	Greater participant-perceived comfort in home	Insulation	\$25.38	Annual
		Greater participant-perceived connort in nome	Air Sealing	\$30.23	Allilual
	Noise Reduction	Less participant-perceived noise in the home	Insulation	\$13.56	Annual
	Noise Reduction	Less participant-perceived noise in the nome	Air Sealing	\$16.39	Allilual
EnergyWise	Home Durability	Increased home durability in terms of maintenance	Insulation	\$8.76	
Income Eligible		J 1 J U	Air Sealing	\$10.61	Annual
Multifamily		cooling and structural materials			
Retrofit		Fewer colds and viruses, improved indoor air	Insulation	\$4.77	
Renont	Health Benefits	quality and ease of maintaining healthy relative humidity as a result of weatherization in home	Air Sealing	\$5.69	Annual
	Dromorty Value In analogo	Increased value of property and expected ease of	Insulation	\$223.63	A mmu a1
	Property Value Increase	selling home	Air Sealing	\$144.93	Annual

1) Source of NEIs is "Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation," NMR Group, Inc., Tetra Tech. 8.15.2011

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Program	NEI	Description	Measure Category	Value	Duration
	Thermal Comfort	Greater participant-perceived comfort in	Heating System	\$48.63	Annual
		home	Heating and Hot Water System	\$1.83	Ainuai
		Increased home durability in terms of	Heating System	\$17.42	
	Home Durability	maintenance requirements because of	Hot Water System	\$2.13	Annual
		better quality heating, cooling and structural materials	Heating and Hot Water System	\$0.72	
Residential Heating and		Reduced maintenance costs of owning	Heating System	\$102.40	
Hot Water	Equipment Maintenance	newer and/or more efficient appliance equipment	Heating and Hot Water System	\$3.41	Annual
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy	Heating System	\$1.56	Annual
		relative humidity from weatherization	Heating and Hot Water System	\$0.06	
	Property Value Increase	Increased value of property and expected	Heating System	\$678.52	
		Increased value of property and expected ease of selling home	Hot Water System	\$82.56	One Time
			Heating and Hot Water System	\$29.17	
	Thermal Comfort	Greater participant-perceived comfort in home		\$25.00	Annual
	Noise Reduction	Less participant-perceived noise in the home		\$11.22	Annual
EnergyWise Single Family	Home Durability	Increased home durability from better quality heating, cooling and structural materials	N/A	\$9.57	Annual
	Health Benefits	Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity from weatherization		\$0.79	Annual
	Property Value Increase	Increased value of property and expected ease of selling home		\$381.28	One Time

#### Per Participant Non-Energy Impacts for Residential Gas Programs

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Program	NEI	Description	Measure Category	Value	Duration
	Thermal Comfort	Greater participant-perceived comfort	Insulation	\$25.15	Annual
		in home	Air Sealing	\$10.13	Annual
	Noise Reduction	Less participant-perceived noise in the	Insulation	\$11.54	Annual
	NOISE REDUCTION	home	Air Sealing	\$4.88	Annuar
	Home Durability	Increased home durability in terms of	Insulation	\$9.82	
EnergyWise Multi Family		maintenance requirements because of better quality heating, cooling and structural materials	Air Sealing	\$3.95	Annual
		Fewer colds and viruses, improved indoor air quality and ease of maintaining healthy relative humidity as a result of weatherization in home	Insulation	\$0.80	
	nealth Benefits n		Air Sealing	\$0.32	Annual
	Droporty Value Increase	Increased value of property and	Insulation	\$378.05	One
	Property Value Increase	expected ease of selling home	Air Sealing	\$135.83	Time

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Program	NEI	Description	Measure Category	Value	Duration
	Safety-Related Emergency Calls	Financial savings to the utility as a result of fewer safety related emergency calls being made	Heating System	\$8.43	Annual
		Greater participant paracived comfort in	Insulation	\$25.38	
	Thermal Comfort	Greater participant-perceived comfort in home	Air Sealing	\$30.23	Annual
			Heating System	\$28.01	
Cinada	Noise Reduction	Less participant-perceived noise in the	Insulation	\$13.56	Annual
Single Family -		home	Air Sealing	\$16.39	74111441
Income		Increased home durability in terms of	Insulation	\$8.76	
Eligible	Home Durability	maintenance requirements because of	Air Sealing	\$10.61	Annual
Services		better quality heating, cooling and structural materials	Heating System	\$9.72	
	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Heating System	\$27.43	Annual
		Fewer colds and viruses, improved indoor	Insulation	\$4.77	
	Health Benefits	air quality and ease of maintaining healthy	Air Sealing	\$5.69	Annual
		relative humidity as a result of weatherization in home	Heating System	\$5.27	
	Property Value	Increased value of property and expected	Insulation	\$223.63	
	Increase	ease of selling home	Air Sealing	\$144.93	One Time
	morease		Heating System	\$249.20	

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Program	NEI	Description	Measure Category	Value	Duration
Single Family - Income Eligible Services	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay their lower bills	N/A	\$2.61	Annually
	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		\$3.74	Annually
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills		\$0.43	Annually
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		\$0.58	Annually
	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and terminations		\$0.34	Annually

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Program	NEI	Description	Measure Category	Value	Duration
	Rental Units Marketability	Financial savings to owners of LI rental housing as a result of increased marketability of the more efficient housing.	Air Sealing	\$0.07	Annual
	Property Durability	Financial savings to owners of LI rental housing as a result of more durable and efficient materials being installed.	Air Sealing	\$2.58	Annual
	Reduced Tenant Complaints	Savings to owners of LI rental housing in terms of staff time and materials as a result of fewer tenant complaints with the more efficient measures.	Air Sealing	\$1.37	Annual
	Rental Unit Increased Property Value	Owner-perceived increased property value due to more energy efficient measures	Air Sealing	\$1.19	One Time
EnergyWise Income Eligible	Arrearages	Reduced arrearage carrying costs as a result of customers being more able to pay their lower bills		\$2.61	Annual
Multifamily Retrofit	Bad Debt Write-offs	Reduced costs to utility of uncollectable, unpaid balances as a result of customers being more able to pay their lower bills		\$3.74	Annual
	Terminations and Reconnections	Reduced costs associated with terminations and reconnections to utility due to nonpayment as a result of customers being more able to pay their lower bills	N/A	\$0.43	Annual
	Customer Calls and Collections	Utility savings in staff time and materials for fewer customer calls as a result of more timely bill payments		\$0.58	Annual
	Notices	Financial savings to utility as a result of fewer notices sent to customers for late payments and terminations		\$0.34	Annual

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Program	NEI	Description	Measure Category	Value	Duration
	Safety-Related Emergency Calls	Financial savings to the utility as a result of fewer safety related emergency calls being made	Heating System	\$8.43	Annual
	Thermal Comfort		Insulation	\$25.38	
		Greater participant-perceived comfort in home	Air Sealing	\$30.23	Annual
		nome	Heating System	\$28.01	
	Noise Reduction	Less participant-perceived noise in the	Insulation	\$13.56	Annual
		home	Air Sealing	\$16.39	
	Home Durability	Increased home durability in terms of	Insulation	\$8.76 \$10.61 \$9.72	
EnergyWise Income		maintenance requirements because of better quality heating, cooling and	Air Sealing		Annual
Eligible Multifamily		structural materials	Heating System		
Retrofit	Equipment Maintenance	Reduced maintenance costs of owning newer and/or more efficient appliance equipment	Heating System	\$27.43	Annual
	Health Benefits	Fewer colds and viruses, improved indoor	Insulation	\$4.77	
		air quality and ease of maintaining healthy relative humidity as a result of	Air Sealing	\$5.69	Annual
		weatherization in home	Heating System	\$5.27	
	Property Value Increase		Insulation	\$223.63	
		Increased value of property and expected ease of selling home	Air Sealing	\$144.93	One Time
			Heating System	\$249.20	

(1) Source of NEIs is "Massachusetts Program Administrators: Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation," NMR Group, Inc., Tetra Tech. 8.15.2011

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## **Appendix C: Acronyms**

#### ACRONYM DESCRIPTION

ACRONYM	DESCRIPTION
AC	Air Conditioning
AFUE	Annual Fuel Utilization Efficiency (see the Glossary)
AHU	Air Handling Unit
Btu	British Thermal Unit (see the Glossary)
CF	Coincidence Factor (see the Glossary)
CFL	Compact Fluorescent Lamp
CHP	Combined Heat and Power
COP	Coefficient of Performance (see the Glossary)
DCV	Demand Controlled Ventillation
DHW	Domestic Hot Water
DOER	Department of Energy Resources
DSM	Demand Side Management (see the Glossary)
ECM	Electrically Commutated Motor
EER	Energy Efficiency Ratio (see the Glossary)
EF	Efficiency Factor
EFLH	Equivalent Full Load Hours (see the Glossary)
ES	ENERGY STAR® (see the Glossary)
FCM	Forward Capacity Market
FR	Free-Ridership (see the Glossary)
HE	High-Efficiency
HID	High-Intensity Discharge (a lighting technology)
HP	Horse Power (see the Glossary)
HSPF	Heating Seasonal Performance Factor (see the Glossary)
HVAC	Heating, Ventilating, and Air Conditioning
ISO	Independent System Operator
ISR	In-Service Rate (see the Glossary)
kW	Kilo-Watt, a unit of electric demand equal to 1,000 watts
kWh	Kilowatt-Hour, a unit of energy (1 kilowatt of power supplied for one hour)
LED	Light-Emitting Diode (one type of solid-state lighting)
LCD	Liquid Crystal Display (a technology used for computer monitors and similar displays)
MMBtu	One million British Thermal Units (see "Btu" in the Glossary)
MW	Megawatt – a measure of electric demand equal to 1,000 kilowatts
MWh	Megawatt-hour – a measure of energy equal to 1,000 kilowatt-hours
NEB	Non-Electric Benefit (see the Glossary)
NEI	Non-Energy Impact
NE-ISO	New England Independent System Operator
NTG	Net-to-Gross (see the Glossary)
O&M	Operations and Maintenance
PA	Program Administrator (see the Glossary)
PC	Personal Computer
RR	Realization Rate (see the Glossary)
SEER	Seasonal Energy Efficiency Ratio (see the Glossary)
SO	Spillover (see the Glossary)
SPF	Savings Persistence Factor (see the Glossary)
SSL	Solid-State Lighting (e.g., LED lighting)
VSD	Variable-Speed Drive

### **Appendix D: Glossary**

This glossary provides definitions as they are applied in this TRM for Rhode Island' energy efficiency programs. Alternate definitions may be used for some terms in other contexts.

TERM	DESCRIPTION
Adjusted Gross Savings	Gross savings (as calculated by the measure savings algorithms) that have been subsequently adjusted by the application of all impact factors except the net-to-gross factors (free-ridership and spillover). For more detail, see the section on <b>Error! Reference</b> <b>source not found.</b>
AFUE	Annual Fuel Utilization Efficiency. The measure of seasonal or annual efficiency of a furnace or boiler. AFUE takes into account the cyclic on/off operation and associated energy losses of the heating unit as it responds to changes in the load, which in turn is affected by changes in weather and occupant controls.
Baseline Efficiency	The level of efficiency of the equipment that would have been installed without any influence from the program or, for retrofit cases where site-specific information is available, the actual efficiency of the existing equipment.
Btu	British thermal unit. A Btu is approximately the amount of energy needed to heat one pound of water by one degree Fahrenheit.
Coefficient of Performance (COP)	Coefficient of Performance is a measure of the efficiency of a heat pump, air conditioner, or refrigeration system. A COP value is given as the Btu output of a device divided by the Btu input of the device. The input and output are determined at AHRI testing standards conditions designed to reflect peak load operation.
Coincidence Factor (CF)	Coincidence Factors represent the fraction of connected load expected to occur concurrent to a particular system peak period; separate CF are found for summer and winter peaks. The CF given in the TRM includes both coincidence and diversity factors multiplied into one number. Coincidence factors are provided for peak periods defined by the NE-ISO for FCM purposes and calculated consistent with the FCM methodology.
Connected Load kW Savings	The connected load kW savings is the power saved by the equipment while in use. In some cases the savings reflect the maximum power draw of equipment at full load. In other cases the connected load may be variable, which must be accounted for in the savings algorithm.
Deemed Savings	Savings values (electric, fossil fuel and/or non-energy benefits) determined from savings algorithms with assumed values for all algorithm parameters. Alternatively, deemed savings values may be determined from evaluation studies. A measure with deemed savings will have the same savings per unit since all measure assumptions are the same. Deemed savings are used by program administrators to report savings for measures with well-defined performance characteristics relative to baseline efficiency cases. Deemed savings can simplify program planning and design, but may lead to over- or under-estimation of savings depending on product performance.
Deemed Calculated Savings	Savings values (electric, fossil fuel and/or non-energy benefits) that depend on a standard savings algorithm and for which at least one of the algorithm parameters (e.g., hours of operation) is project specific.
Demand Savings	The reduction in demand due to installation of an energy efficiency measure, usually expressed as kW and measured at the customer's meter (see Connected Load kW Savings).
Demand Side Management (DSM)	Strategies used to manage energy demand including energy efficiency, load management, fuel substitution, and load building.
Diversity	A characteristic of a variety of electric loads whereby individual maximum demands occur at different times. For example, 50 efficient light fixtures may be installed, but they are not necessarily all on at the same time. See Coincidence Factor.

TERM	DESCRIPTION		
Diversity Factor	This TRM uses coincidence factors that incorporate diversity (See Coincidence Factor), thus this TRM has no separate diversity factors. A diversity factor is typically calculated as: 1) the percent of maximum demand savings from energy efficiency measures available at the time of the company's peak demand, or 2) the ratio of the sum of the demands of a group of users to their coincident maximum demand.		
End Use	Refers to the category of end use or service provided by a measure or technology (e.g.,lighting, cooling, etc.). For the purpose of this manual, the list of end-uses include:LightingHVACRefrigerationHot WaterFood ServiceBehaviorCompressed AirMotors & DrivesProductsCustom		
Energy Efficiency Ratio (EER)	The Energy Efficiency Ratio is a measure of the efficiency of a cooling system at a specified peak, design temperature, or outdoor temperature. In technical terms, EER is the steady-state rate of heat energy removal (i.e. cooling capacity) of a product measured in Btuh output divided by watts input.		
ENERGY STAR® (ES)	Brand name for the voluntary energy efficiency labeling initiative sponsored by the U.S. Environmental Protection Agency.		
Energy Costing Period	<ul> <li>A period of relatively high or low system energy cost, by season. The energy periods defined by ISO-NE are:</li> <li>Summer Peak: 6am–10pm, Monday–Friday (except ISO holidays), June–September</li> <li>Summer Off-Peak: Summer hours not included in the summer peak hours: 10pm–6am, Monday–Friday, all day on Saturday and Sunday, and ISO holidays, June–September</li> <li>Winter Peak: 6am–10pm, Monday–Friday (except ISO holidays), January–May and October–December</li> <li>Winter Off-Peak: Winter hours not included in the sinter peak hours: 10pm–6am, Monday–Friday, all day on Saturday and Sunday, and ISO holidays, January–May and October–December</li> </ul>		
Equivalent Full Load Hours (EFLH)	The equivalent hours that equipment would need to operate at its peak capacity in order to consume its estimated annual kWh consumption (annual kWh/connected kW).		
Free Rider	A customer who participates in an energy efficiency program, but would have installed some or all of the same measure(s) on their own, with no change in timing of the installation, if the program had not been available.		
Free-Ridership Rate	The percentage of savings attributable to participants who would have installed the measures in the absence of program intervention.		
Gross kW	Expected demand reduction based on a comparison of standard or replaced equipment and equipment installed through an energy efficiency program.		
Gross kWh	Expected kWh reduction based on a comparison of standard or replaced equipment and equipment installed through an energy efficiency program.		
Gross Savings	A saving estimate calculated from objective technical factors. In this TRM, "gross savings" are calculated with the measure algorithms and do not include any application of impact factors. Once impact factors are applied, the savings are called "Adjusted Gross Savings". For more detail, see the section on <b>Error! Reference source not found.</b>		
High Efficiency (HE)	Refers to the efficiency measures that are installed and promoted by the energy efficiency programs.		
Horsepower (HP)	A unit for measuring the rate of doing work. One horsepower equals about three-fourths of a kilowatt (745.7 watts).		

TERM	DESCRIPTION
Heating Seasonal Performance Factor (HSPF)	A measure of the seasonal heating mode efficiencies of heat pumps expressed as the ratio of the total heating output to the total seasonal input energy.
Impact Factor	Generic term for a value used to adjust the gross savings estimated by the savings algorithms in order to reflect the actual savings attributable to the efficiency program. In this TRM, impact factors include realization rates, in-service rates, savings persistence, peak demand coincidence factors, free-ridership, spillover and net-to-gross factors. See the section on Impact Factors for more detail.
In-Service Rate	The percentage of units that are actually installed. For example, efficient lamps may have an in-service rate less than 100% since some lamps are purchased as replacement units and are not immediately installed. The in-service rate for most measures is 100%.
Measure Life	The number of years that an efficiency measure is expected to garner savings. These are generally based on engineering lives, but sometimes adjusted based on observations of market conditions.
Lost Opportunity	Refers to a measure being installed at the time of planned investment in new equipment or systems. Often this reflects either new construction, renovation, remodeling, planned expansion or replacement, or replacement of failure.
Measure	A product (a piece of equipment), combination of products, or process designed to provide energy and/or demand savings. Measure can also refer to a service or a practice that provides savings. Measure can also refer to a specific combination of technology and market/customer/practice/strategy (e.g., direct install low income CFL).
Net Savings	The final value of savings that is attributable to a program or measure. Net savings differs from gross savings (or adjusted gross savings) because it includes adjustments due to free-ridership and/or spillover. Net savings is sometimes referred to as "verified" or "final" savings. For more detail see the section on <b>Error! Reference source not found.</b> .
Net-to-Gross Ratio	The ratio of net savings to the adjusted gross savings (for a measure or program). The adjusted gross savings include any adjustment by the impact factors other than free-ridership or spillover. Net-to-gross is usually expressed as a percent.
Non-Electric Benefits (NEBs)	Quantifiable benefits (beyond electric savings) that are the result of the installation of a measure. Fossil fuel, water, and maintenance are examples of non-electric benefits. Non-electric benefits can be negative (i.e. increased maintenance or increased fossil fuel usage which results from a measure) and therefore are sometimes referred to as "non-electric impacts".
Non-Participant	A customer who is eligible to participate in a program, but does not. A non-participant may install a measure because of a program, but the installation of the measure is not through regular program channels; as a result, their actions are normally only detected through evaluations.
On-Peak kW	See Summer/Winter On-peak kW
Operating Hours	Hours that a piece of equipment is expected to be in operation, not necessarily at full load (typically expressed per year).
Participant	A customer who installs a measure through regular program channels and receives any benefit (i.e. incentive) that is available through the program because of their participation. Free-riders are a subset of this group.
Prescriptive Measure	A prescriptive measure is generally offered by use of a prescriptive form with a prescribed incentive based on the parameters of the efficient equipment or practice.
Realization Rate (RR)	The ratio of measure savings developed from impact evaluations to the estimated measure savings derived from the TRM savings algorithms. This factor is used to adjust the estimated savings when significant justification for such adjustment exists. The components of the realization rate are described in detail in the section on Impact Factors.

TERM	DESCRIPTION
Retrofit	The replacement of a piece of equipment or device before the end of its useful or planned life for the purpose of achieving energy savings. "Retrofit" measures are sometimes referred to as "early retirement" when the removal of the old equipment is aggressively pursued.
Savings Persistence Factor (SPF)	Percentage of first-year energy or demand savings expected to persist over the life of the installed energy efficiency equipment. The SPF is developed by conducting surveys of installed equipment several years after installation to determine the operational capability of the equipment. In contrast, <i>measure persistence</i> takes into account business turnover, early retirement of installed equipment, and other reasons the installed equipment might be removed or discontinued. Measure persistence is generally incorporated as part of the measure life, and therefore is not included as a separate impact factor.
Seasonal Energy Efficiency Ratio (SEER)	A measurement of the efficiency of a central air conditioner over an entire season. In technical terms, SEER is a measure of equipment the total cooling of a central air conditioner or heat pump (in Btu) during the normal cooling season as compared to the total electric energy input (in watt-hours) consumed during the same period.
Sector	A system for grouping customers with similar characteristics. For the purpose of this manual, the sectors are Commercial and Industrial (C&I), Small Business, Residential, and Low Income.
Spillover Rate	The percentage of savings attributable to the program, but additional to the gross (tracked) savings of a program. Spillover includes the effects of (a) participants in the program who install additional energy efficient measures outside of the program as a result of hearing about the program and (b) non-participants who install or influence the installation of energy efficient measures as a result of being aware of the program.
Summer/Winter On-Peak kW	The average demand reduction during the summer/winter on-peak period. The summer on- peak period is 1pm-5pm on non-holiday weekdays in June, July and August; the winter on- peak period is 5pm-7pm on non-holiday weekdays in December and January.
Ton	Unit of measure for determining cooling capacity. One ton equals 12,000 Btu.
Watt	A unit of electrical power. Equal to 1/1000 of a kilowatt.

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