Supplement to Specifications for Electrical Installations

Requirements for Parallel Generation Connected to a National Grid Owned EPS

Electric System Bulletin No. 756

May 2007 version 1.1
(Supersedes all previous versions of ESB 756)
PREFACE

NOTICE:

1. ESB 756-2007 references all requirements for parallel generation connected to National Grid facilities located in New York, Massachusetts, Rhode Island and New Hampshire.

2. ESB 756-2007 supersedes all previous versions of ESB 756A and 756B issued by Niagara Mohawk Power Corp. d/b/a National Grid.

This supplement and its appendices are available from the Company’s web site and may be obtained:

- From the Internet at http://www.nationalgridus.com/electricalspecifications,
- Or in printed form by contacting either of the Call Centers in Massachusetts or New York (see inside cover of ESB 750). However, printed copies are not document controlled, so for the latest authorized version please refer to the Company’s website.
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## 1.0 INTRODUCTION

### 1.1 PURPOSE

The purpose of this National Grid Electric System Bulletin (ESB) is to:

1. Provide general requirements and recommendations for all generators connected in parallel with the electric power system (EPS) operated by National Grid (Company). Stand alone generators serving isolated load, which can never be connected in parallel with the Company EPS, are not subject to these requirements.

2. Ensure compliance with NERC Standard FAC-001-0 – Facility Connection Requirements, effective April 1, 2005. Along with all of the Company’s Electric System Bulletins, the most current version of ESB 756 is available electronically on its Niagara Mohawk Power Corp. d/b/a National Grid web page at: [www.nationalgridus.com/electricalspecifications](http://www.nationalgridus.com/electricalspecifications).

3. Ensure that the electrical reliability and security of the Company EPS and the larger power system grid is maintained following connection of the parallel generator to the utility supply.

4. Refer generator owners to the applicable FERC or state-specific tariff regulations pertaining to parallel generators.

### 1.2 SCOPE

1. This ESB addresses FERC-jurisdictional interconnections, where the generator wishes to interconnect to:
   - A transmission system owned by National Grid that is administratively controlled by a Regional ISO;
   - A distribution or sub-transmission line owned by National Grid (which is presently interconnected to a third party energy supplier or generating facility selling power into the wholesale market) for the purpose of selling power into the wholesale market.

For the latest authorized version please refer to the Company’s website at [http://www.nationalgridus.com/electricalspecifications](http://www.nationalgridus.com/electricalspecifications).
2. This ESB also addresses state-specific requirements pertaining to parallel generators. These are contained in individual appendices at the end of this document.

1.3 GENERAL RULES, AND CODES, STANDARDS AND REFERENCES

1. All parallel generator installations require an interconnection study, done at customer expense, to determine site-specific requirements (i.e. supply voltage, service arrangement, location, and generation intent). Generation intent, in this context, refers to its end use being either: (1) total generator output energy for internal use, i.e. peak shaving, (2) sale, or (3) a combination.

2. For electrical specifications not covered by this document, the Customer shall refer to the Company’s other Electric System Bulletins: www.nationalgridus.com/electricalspecifications.

3. Load customers (end-user facilities) wishing to connect to the Company’s transmission supply system should consult the National Grid ESB 750 Series for Upstate New York, Massachusetts, New Hampshire and Rhode Island. In addition, consult the Company for any questions not addressed by those documents.

4. Those wishing to establish “transmission facility interconnections” with National Grid’s transmission supply system should consult the Company’s Transmission Planning Department.

5. The Generator-owner’s facility shall conform to the latest revision of all local, state and federal codes and national standards that apply; individual state Independent System Operator; Northeast Power Coordinating Council (NPCC), and North American Electric Reliability Council (NERC), Federal Energy Regulatory Commission (FERC), or successor organizations associated with the operation of such systems or entities.

6. The Generator-owner’s facility shall also conform to any applicable requirements of state public utility regulatory commissions and any local, state, federal and/or other agencies from which a review, approval, or a permit is required.

7. These requirements govern the operation of generation in parallel with the Company EPS. They concern only those points in which the Generator-owner and the Company have a mutual interest to ensure safety to Company employees and the public and satisfactory operation and compatibility with the electrical supply to others served by the Company EPS.

8. Regarding coordinated joint studies of new facilities and their impacts on the Company’s interconnected transmission systems, the NY or NE ISO shall coordinate the conduct of any studies required to determine the impact of the Interconnection Request on Affected Systems with Affected System operators and, if possible, include those results (if available) in its applicable interconnection study within the time frame specified in these procedures. The regional ISO will include such Affected System operators in all meetings held with the Interconnection Customer as required. Notification of new or modified facilities to those parties responsible for the reliability of the interconnected transmission systems will occur as soon as feasible.

9. The voltage level, and MW and MVAR capacity or demand at the point of connection shall be addressed in a System Impact Study, which shall:
   a. Consist of a short circuit analysis; a stability analysis; a power flow analysis; voltage drop and flicker studies; protection and set point coordination studies; and grounding reviews, as necessary.
   b. State the assumptions upon which it is based, state the results of the analyses, and provide the requirement or potential impediments to providing the requested interconnection service, including a preliminary indication of the cost and length of time that would be necessary to correct any problems identified in those analyses and implement the interconnection.
   c. Provide a list of facilities that are required as a result of the Interconnection Request and non-binding good faith estimates of cost responsibility and time to construct.
10. Distribution System impact studies shall incorporate a distribution load flow study, an analysis of equipment interrupting ratings, protection coordination study, voltage drop and flicker studies, protection and set point coordination studies, grounding reviews, and the impact on electric system operation, as necessary.

11. Maintenance coordination and operational issues such as abnormal frequency and voltages shall be addressed by the regional ISO.

12. Inspection requirements for existing or new facilities, and communications and procedures during normal and emergency operating conditions are addressed in ESB 755, “O&M Requirements”.

13. Any subsequent sale of generation ownership, which separates it from the remainder of a Customer’s facility, requires the new Generator-owner to establish a separate interconnection for the generation.

14. Applicable national standards may include:
   - IEEE 519 “Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems”
   - IEEE 929 “IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems”
   - IEEE 1094 “IEEE Recommended Practice for the Electrical Design and Operation of Windfarm Generating Stations”
   - IEEE 1547 “Standard for Interconnecting Distributed Resources with Electric Power Systems”
   - NFPA 850 “Recommended Practice for Fire Protection for Electrical Generating Plants and High Voltage Direct Current Converter Stations”

1.4 DEFINITIONS

Company is National Grid

Company EPS refers to the electric power system owned, controlled, or operated by the Company used to provide transmission or distribution services to its customers.

FERC is Federal Energy Regulatory Commission.

Generator interface point is the point of electrical connection of the parallel generator to the premise wiring.

Generator-owner refers to any Non-Utility Generator even though they may also actually take electric service from the Company.

Interconnection Facility refers to those facilities necessary to affect the transfer of electricity from the parallel generator at the service point into the Company EPS.

Interconnection Point is where the interconnection facility connects to the Company EPS.

Interconnection System is the collection of all interconnection equipment and functions, taken as a group, used to interconnect a DR unit(s) to the Company EPS.

Islanding is generation serving utility load (or lines) without a synchronizing utility source connected.

ISO is Independent System Operator

ISO secured transmission system refers to delivery voltage systems as defined by the NPCC and controlled by a Regional ISO.

Isolation is where separation of electrical points of contact where interconnection may occur is at least 100 feet apart.

NERC is North American Electric Reliability Council.

NPCC is Northeast Power Coordinating Council
Parallel generator is defined as generation connected to a bus common with the Company EPS.

Production Facility refers to the generator owners’ (producers’) parallel generator facilities. It shall include all facilities and equipment up to and including the Production Facility’s high voltage side generator transformer disconnect or switches.

Wholesale Delivery Point shall mean the point on the Company EPS where the interconnecting customer makes capacity and energy available, as indicated in the interconnection agreement.

2.0 REVISION HISTORY

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APPENDIX A: Requirements For Parallel Generation Connected to National Grid Facilities in New York

APPENDIX B: Distributed Generation Connected To National Grid Distribution Facilities Per The New York Standardized Interconnection Requirements

APPENDIX C: Requirements For Parallel Generation Connected to National Grid Facilities in Massachusetts

APPENDIX D: Requirements For Parallel Generation Connected to National Grid Facilities in Rhode Island

APPENDIX E: Requirements For Parallel Generation Connected to National Grid Facilities in New Hampshire
Electric System Bulletin No. 756 Appendix A:

Requirements For Parallel Generation
Connected to National Grid Facilities in New York

May 2007 version 1.1

ESB 756 Appendix A is part of the ESB 750 series
PREFACE

Electric System Bulletin 756 APPENDIX A provides requirements for interconnecting generation facilities, connected in parallel with the Company EPS, not covered by the New York Standard Interconnection Requirements (NYSIR) for 2MW and less aggregated parallel generation.

This is an appendix to ESB 756 and is available from the Company’s web site and may be obtained:

- From the Internet at http://www.nationalgridus.com/electricalspecifications,

- Or in printed form by contacting either of the Call Centers in Massachusetts or New York (see inside cover of ESB 750). However, printed copies are not document controlled, so for the latest authorized version please refer to the Company’s website.

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1.0 GENERAL

1.1 Permitted Connections

Certain interconnections are eliminated by the Company on the basis of the available systems without resort to the study of a specific instance. The Company shall determine the suitability of a given generator connection and its interconnection voltage.

Small parallel generation installations on distribution secondary network systems require study to ensure the electric source does not degrade the reliability, power quality, safety, or operation of the network system.

The Company will allow connection of parallel generation to spot networks under the following conditions:

1. When the aggregate parallel generation installed on a spot network does not exceed 5% of the spot network’s maximum load; or,

2. If all of the following conditions are met:
   - Network protectors shall not be used to separate, switch, serve as breaker failure backup or in any manner isolate a network or network primary feeder to which the parallel generator is connected from the remainder of the Company EPS, unless the protectors are rated and tested per applicable standards for such an application.
   - Any parallel generator installation connected to a spot network shall not cause operation or prevent reclosing of any network protectors installed on the spot network. This coordination shall be accomplished without requiring any changes to prevailing network protector clearing time practices of the Company.
   - Connection of the parallel generator to the Company EPS is only permitted if the spot network bus is already energized by more than 50% of the installed network protectors.
   - The parallel generator output shall not cause any cycling of network protectors.
   - The network equipment loading and fault interrupting capacity shall not be exceeded with the addition of the parallel generator.

1.1.1 Phase Balance

The Generator-owner’s facility shall maintain equal current in each phase conductor at the service point. Voltage unbalance resulting from unbalanced currents shall not
exceed 2% or shall not cause objectionable effects upon or interference with the operation of the Company EPS and service to others. This criterion shall be met with and without generation.

1.2 Access and Contacts
1. Authorized Company employees, equipment, and vehicles shall have access to the Generator-owner facilities and Company’s metering equipment at any time without delay.
2. The Generator-owner shall provide information identifying their contact person(s), addresses and their associated telephone number(s) to the Company.
3. Changes to phone numbers, points of contact, etc., shall be communicated in advance of the actual change, the effective date of change shall be provided as well.
4. The Company will provide the Generator-owner with phone numbers for the appropriate Company contact(s). (Customer Service Center for less than 15kV and the division Regional Control Center for greater than 15kV interconnections.)

1.3 Design Requirements
1.3.1 General Electrical Issues
1. The interconnection of all parallel generators requires safeguards for synchronization and back-feed situations. And, from the electric system perspective, the challenges posed by any given parallel generator connection do not diminish significantly with reduction in generator size. For this reason, each specific connection must be studied with respect to its size, its type, and the nature of the electric system at the interconnection point.
2. All parallel generation shall be designed to ensure:
   • Capability to synchronize with the Company EPS,
   • Capability to separate from the Company EPS upon loss of Company source, and
   • All energy supplied to the Company’s electrical system shall meet the Company’s power quality and transmission system operator requirements.
3. The Generator-owner shall be responsible for on-going compliance to regulatory, code, and system design and operating changes pertaining to their installation. This work will be performed at the cost of the Generator-owner. The Company requires all electrical and physical design documents and submittals in this and related Company bulletins relative to interconnections above 600 volts to be prepared and sealed by a single State-licensed Professional Engineer in the state where the installation is made, who is retained by the Generator-owner for that purpose.

1.3.2 Specific Electrical Issues
The Company will determine the interconnect voltage and method of interconnection with the system by specifically considering items R2.1.1 through R2.1.16 of NERC Standard FAC-001-0, as addressed in various portions of this ESB 756 and the Company’s other published ESB’s.
In general:
1. The preferred interconnection at 230kV and 345kV is a radial line(s) to ISO-secured transmission system station(s). Refer to Figures 1 through 4 for typical arrangements.
2. The preferred interconnection at 23kV up to 115kV is a radial line(s) to a station. Other interconnection alternatives may require installation of a Company three breaker station. Refer to Figures 1 through 4 for typical arrangements.
3. Company transmission system required to accommodate the generation interconnection shall be designed and installed to Company standards and practices, under the review and approval of the Company.

4. Regardless of interconnection voltage, protection schemes and connection arrangements shall be designed to prevent islanding of the generation with a portion of the Company's supply to other customers.

5. The Company reserves the right to review and approve the ratings and parameters of major electrical equipment supplied by the Generator-owner, such as, but not limited to: generator step-up (GSU) transformers, interrupting devices, relays, and the generator with its associated systems.

6. The Generator-owner is solely responsible for the protection of their plant equipment. The Generator-owner is required to provide electrical equipment and relays with ranges and ratings that will allow proper Generator-owner relay system coordination with Company relay systems. Coordination margins and parameters will be determined by the Company.

7. The Generator-owner is responsible for the coordination of any Generator-owner applied over and under frequency or over and under voltage generator tripping with Company specified requirements. The generator is expected to remain on line and fully operational following a system excursion within specified parameters. The correct performance of the generator frequency protection relays is critical to system security. Consequently each Generator-owner will be required to both recalibrate their frequency protection and provide the Company this relay performance documentation.

Figure No. 1

![Diagram of Company's Transmission Station, Company's Radial Line, and Radial Connected Customer/Generator-owner with specific connection to a breaker(s) in Company's station facility.]

For the latest authorized version please refer to the Company's website at [http://www.nationalgridus.com/electricalspecifications](http://www.nationalgridus.com/electricalspecifications).
Figure No. 2

Company's Transmission Line

Ring Bus

Company's Ring Bus Station

Company's Radial Line

Radial Connected Customer/Generator-owner to Company Ring Bus Station

Company Customer
1.4 Types of Generators

1.4.1 Induction

1. Reactive power supply for induction generators poses difficult design problems, depending on the generator size.

2. Induction generation over 50kVA require capacitors to be installed by the Generator-owner. The installation of capacitors at or near an induction generator can cause it to become self-excited, if disconnected from the Company EPS. The additional expense for special protective equipment may favor the use synchronous machines.

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
3. Starting or rapid load fluctuations on induction generators can adversely impact the Company’s system voltage. Corrective step-switched capacitors or other techniques may be necessary. These measures can, in turn, cause ferroresonance. Induction starting will be permitted only where inrush current and voltage will not exceed allowable limits.

4. Otherwise, protection for induction generation is similar to synchronous generation. Synchronizing relays may not be required, but a contact-making tachometer set at synchronous speed may be required.

1.4.2 Synchronous

For synchronous generators, sufficient generator reactive power capability shall be provided to withstand normal voltage changes on the Company EPS. The generator voltage-var schedule, voltage regulator, and transformer ratio settings will be jointly determined by the Company and the Generator-owner to ensure proper coordination of voltages and regulator action.

1.4.3 Inverter Systems

Direct current generators can only be paralleled with the Company EPS using a synchronous inverter. The design shall be such as to remove this synchronous inverter upon a utility system interruption. Proper harmonic filtering is necessary for inverter systems to minimize harmonic distortion from being introduced into the electric system.

1.5 Limitations

1.5.1 All Generation

1. The Company permits the operation of generating equipment in parallel with the Company EPS, whenever this can be done without adverse effects on the general public, Company equipment, or personnel, in accordance with all applicable laws and regulations. Certain protective devices (relays, circuit breakers, etc.), specified by the Company, shall be installed at any location where the Generator-owner desires to operate generation in parallel with the Company EPS. These devices promptly disconnect the Generator-owner’s generating equipment from the Company EPS whenever faults or abnormal conditions occur.

2. The following are some of the issues considered before accepting generation:
   - Proximity to the Company’s circuits.
   - Generation capacity and the load on the Company’s circuits during light load conditions.
   - Review of voltage profiles and system thermal limitations provided by the Company’s system electric studies.
   - System protection coordination with the proposed generation and prevention of the generator from “islanding.”
   - Impact of prime mover.
   - Generator-owner’s facility ratio of generation to light load.

3. From the above, the Company will determine the voltage, interrupting ratings, type of equipment and controls needed for proper protection coordination. The Company reserves the right to determine the Generator-owner’s interconnection voltage.

4. The Company reserves the right to have the Generator-owner remove their generation from the EPS at any time upon the Company’s request. Normally, such requests result from the need to facilitate maintenance, test, repair, and emergency restoration or safety concerns related to the Company EPS.
1.5.2 Special Situations

Under this bulletin, the Company restricts Generator-owner connection for the following situations.

1.5.2.1 Net Generation Output

The Company reserves the right to limit generation to its facilities operating to that level which will not compromise safety, reliability, or protection margins. Due to the many variable parameters involved, special requirements for any proposed net generation levels will be determined by the Company on a site specific basis.

1.5.2.2 Peak Shaving Generation

1. Arrangements for standby or supplemental energy needs are addressed by the Company’s filed tariffs and shall be made prior to actual need to ensure its availability.

2. Peak shaving parallel generator installations shall not be allowed to supply any net generation into the Company EPS. The application of reverse power relays is an accepted method to accomplish the requirement. Where the Company is requested to supply demand pulse information (either analog or digital), its use is not intended for generator control.

2.0 PROJECT MANAGEMENT

2.1 Responsibilities

2.1.1 Generator-Owner

1. No generation, no matter its intent, shall be installed or operated in parallel with the Company EPS without prior notification to and approval by the Company.

2. This responsibility applies to an initial facility, as well as to subsequent additions and/or modifications of Generator-owner equipment or change of ownership through sale. The Generator-owner is responsible for modifying their system to comply with any future mandate of the Regional ISO; NPCC; and NERC or successor organizations including cost incurred.

3. If the Generator-owner makes significant changes in the design or scheduling of the project, then any previous information furnished by the Company to the Generator-owner shall be subject to review and possible change. Failure to communicate such changes to the Company may result in delay of service or termination of service by the Company.

4. The Generator-owner is responsible for performing all operating functions associated with their equipment and for maintaining all equipment under their ownership. The Generator-owner shall arrange to have trained personnel available for the proper and safe operation of their equipment.

5. The Generator-owner shall provide proper and continuous maintenance of all plant facilities; refer to NFPA 70B (and NFPA 73 where applicable) and other nationally recognized industry standards for guidance on electric equipment maintenance.

6. The Company will specify telecommunication services as required for the installation. See Exhibit 1 for data submittal in letterform to the Company.

7. For the RTU installation, the Generator-owner shall arrange through the Company to provide the necessary telecommunication service. As this process typically takes four months, the Generator Owner is responsible for submitting the information in Exhibit 1 in a timely fashion. The Company will not be liable for the results of any delays.

8. The Generator-owner’s telephone number(s) shall allow for 24-hour per day contact of either a staffed control room or delegated operating agent.
9. The Generator-owner’s backup service requirements from the Company EPS shall be requested using the prescribed forms in the Company’s tariff.

10. **Form G**

1. Notice to the Company to install parallel generation shall be in the form of a completed Form G from the Company’s tariff, PSC No. 220, signed by the Company and the Generator-owner. This form shall include:
   1) Complete generator data sheets,
   2) The generation’s intended purpose, i.e. peak shaving or sale,
   3) Geographic location,
   4) Service point location i.e. circuit name and number, pole number, etc.,
   5) Contact information, name and telephone number of individual to be contacted regarding generator operation, and
   6) A provision stating that it is the responsibility of the Generator-owner to notify the Company, in writing, to obtain a new Form G whenever information changes.

2. A Letter of Commitment shall accompany the completed Form G and including:
   1) Result(s) of the Company’s electric study,
   2) Written authorization from the Generator-owner for the Company to proceed with engineering and construction of the interconnection including initial payment.

11. **Contributions**

1. All costs incurred by the Company as a result of a Generator-owner’s facility, over the life of that facility, shall be reimbursed to the Company by the Generator-owner. The Company will advise the Generator-owner concerning any charges and payment schedules required.

2. For net generation above 2MW, all costs incurred by the Company for supply system changes, metering upgrades, and telemetering circuit changes associated with the Generator-owner’s installation shall be reimbursed to the Company by the Generator-owner. The Company will notify the Generator-owner when these situations arise along with their associated charges and execute terms and conditions for payment.

2.1.2 **Required Interconnection Study for Projects less than 115kV**

This study identifies the items of major cost to the interconnection. The scope of work is dependent upon the size and electrical location of the project. The study’s primary function is to assess the impact the proposed project has upon the operation of the existing Electric Power System (EPS) and addresses the following principle areas:

2.1.2.1 **Thermal margins**
An assessment is made to ensure that the proposed project will not overload lines or impose operational constraints on the existing system.

2.1.2.2 **Voltage performance**
An assessment is made to ensure the proposed project can operate within voltage guidelines. For voltages 115kV and below, the guidelines are +5/-10% of nominal.

2.1.2.3 **Stability**
An assessment is made to ensure that local clearing times are such that unit stability is maintained and regional stability is not negatively impacted. Power system stabilizers shall be installed when such controls are required to dampen system oscillations.

2.1.2.4 **Short Circuit Studies**
A study is performed to ensure that circuit breaker duties remain within nameplate ratings with the addition of the project.

2.1.2.5 Protection
In this study phase an initial assessment is made to define required changes to local protection.

2.1.2.6 REGIONAL ISO/NPCC/NERC
Compliance with the planning standards of Regional ISO/NPCC/NERC will be required for ISO-controlled interconnections.

2.1.3 Required Interconnection Study for Projects 115kV or Greater
For 115kV or greater connections, the Generator-owner shall contact and obtain from the Regional ISO the requirements for an approved interconnection study. In this study phase an assessment will be made to ensure generation connected to the state jurisdictional secured transmission system complies with Regional ISO/NPCC/NERC or successor organization’s planning standards in force at the time of energization of the Generator-owner’s facilities.

2.1.4 No Agreement for Power Sales
Generator-owners who generate in parallel for the purpose of reducing their energy and demand utilization from the Company EPS (i.e. peak shaving generation) are not required to have a power purchase agreement with the Company. However, they still shall comply with the requirements of this bulletin and the Company’s tariff, as determined by the Company. The Company on a case-by-case basis shall determine additional protective devices. The Generator-owner is required to complete all tariff forms relating to generators. The Company will advise the Generator-owner of any change of service class.

2.1.5 Purchase of Generator-owner’s Power
1. Company’s Tariff Service Option: The Company will advise the Generator-owner concerning a Service Class contract for any power purchased from the Generator-owner by the Company in accordance with the Company’s state-applicable filed tariffs.
2. Direct Sale to the Regional ISO: The Generator-owner shall enter into an agreement with a Regional ISO for the sale of energy. This arrangement requires a separate agreement with the Company for the interconnection of the generating facility.

2.1.6 Interconnection Agreement
1. A signed Interconnection Agreement along with any other completed generator related tariff forms is required between a Generator-owner and the Company, and, if necessary, the ISO.
2. In general, the Interconnection Agreement will address the mutual acceptance of an interconnection study, which outlines any required electric system modifications and overall project capabilities, specifically:
   1) The amount of the generation, by unit and/or in total,
   2) The interconnection point voltage,
   3) The generation’s intended purpose, i.e. peak shaving or sale,
   4) Its geographic and electrical location,
   5) Electrical arrangement and protection requirements,
   6) Electric study results of project generation impact,
7) Estimated cost, funding schedule, and timeline required to implement any needed Company EPS modifications to accept generation from the Generator-owner,

8) Reimbursement to the Company for the operation and maintenance (O&M) to be performed by the Company on the interconnection facility,

9) Additional agreements deemed necessary for project acceptance,

10) Contact information, name and telephone number of individual to be contacted regarding Generator(s) operation, and

11) Responsibility of the Generator-owner to notify the Company in writing whenever any change in the above information is contemplated, changes are subject to the approval of the Company.

3. A signed Interconnection Agreement is required between the Generator-owner and the Company before the Company will order major equipment or proceed with the project.

2.2 Cooperation

2.2.1 Overall Project

1. Any generating facility intending to operate with an interconnection to the Company EPS shall have the approval of the Company. Generator connections for the purpose of selling to the system require approval of the appropriate Regional Independent System Operator. This approval shall be in the form of a signed Interconnection Agreement. An Interconnection Agreement will not only identify changes to the existing EPS, but will specify Generator-owner plant performance requirements that may impact the specification major electrical components within the plant itself.

2. The Company will own, operate and maintain all electric lines and stations to the service point. There will be many occasions where the close cooperation between the Company and the Generator-owner during the design, license, right-of-way acquisition, and/or construction of Company facilities will be necessary.

2.2.2 Notification and Initial Documentation

1. The Generator-owner shall contact the Company regarding their desire to operate generation in parallel with the Company EPS and negotiate necessary agreement(s). In some cases, the Company will meet with the Generator-owner to mutually establish the arrangement and location of the proposed facilities.

2. Upon notification by a Generator-owner of their intention to operate generation in parallel with the Company EPS, in writing, the Generator-owner shall define their vision of the proposed project; providing the proposed site location, overall plant capabilities, the number, and size of equipment proposed, and proposed timing of project milestones. The Generator-owner shall develop and provide a functional single line diagram, complete with voltage and current interrupting ratings, type of equipment proposed, and all controls, complete with trip schemes, required by system protection parameters for proper protection and coordination with the EPS for Company acceptance. In addition, the specific project documentation indicated in this bulletin is also required. Three copies of each document, stamped by a State-registered professional engineer, are required unless noted otherwise.

3. Subsequent to this notification, the Company will review the project proposal and provide to the Generator-owner the estimated cost and time table for delivering the results of an electric study. The Company will respond with review comments on the concepts of the service arrangement, protective relaying, metering, and any special requirements that may be needed for an electric study (see Sections 4 and 5). Data requirements for an interconnection study of projects are:
2.2.2.1 Study Phase:

Three copies of the following are necessary to begin the Company’s study:

1. Exact physical location of the plant identified on USGS maps
2. Overall operational output (in MW) of the plant
3. Proposed single line diagram of the station showing the interconnection of major electrical components within the plant itself. This single line indicating proposed equipment ratings clearly needs to indicate:
   i. Number, individual ratings & type of units comprising the above rating
   ii. Number and Size of Generator step up transformers
   iii. General high voltage bus configuration and relay functions
4. General operational constraints such as the ability to run various combinations of units.
5. The following is a list of Electrical Data Requirements:
   i. Proposed generator step-up (GSU) transformer MVA ratings, impedances, tap settings and winding voltage ratings.
   ii. Proposed machine electrical parameters noted on Form G data sheets which include:
      iii. Machine nameplate data and reactive capability curves.
   iv. Impedances:
      • Direct axis and quadrature axis synchronous reactance;
      • Transient and subtransient components of positive sequence reactance data;
      • Negative sequence and zero sequence values.
   v. Time constants for both field open circuit and short circuit and armature short circuit quantities.
   vi. Turbine inertia constant.
   vii. Generator inertia constant: Appropriate IEEE system model including block diagram and parameter values for excitation and governor systems.
6. The proposed location and arrangement of Company metering equipment will be furnished by the Company and shall be included on the Generator-owner’s drawings when submitted for acceptance.

2.2.2.2 Equipment Procurement Phase:

Either before an order is placed for electrical equipment or while in equipment manufacture scheduling prior to delivery, six (6) copies of equipment specifications, Protective Relay Device List, and a Bill of Material List shall be furnished to the Company for review and acceptance. Review and acceptance by the Company shall not be construed to be an approval of the Generator-owner’s installation in regard to its overall safety or adequacy, but shall simply signify that the proposed arrangement and equipment meets the Company’s interconnection requirements for connection to the Company EPS.

2.2.2.3 Final Design Start Phase:

The documents needed to be submitted to the Company prior to beginning the final design shall include a proposed time schedule to be mutually agreed upon, a plot plan and functional single line diagram showing protection, a protective relaying scheme and revenue metering. The relay types selected to provide these functions must be acceptable to the Company. The Company will respond with the review comments on the concepts of protective relaying, metering and telemetry. This single-line diagram must be approved before final design is undertaken.

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
2.3 Development of an Interconnection Arrangement

2.3.1 Initial

Parallel generation will be accepted on the Company EPS at various voltage levels depending upon the generation installed and the capability of the circuit(s) to accept the electric power generated. The system will be studied in each case.

2.3.1.1 Funding:

Generator-owners are required to establish an account with the Company. This account shall hold sufficient funds to cover the Company’s estimated cost of the development of an interconnection arrangement and, upon its acceptance, scheduled payments for project installation. Once sufficient funds and required data have been received, the Company will start work on the interconnection arrangement as directed by the ISO.

2.3.1.2 Presentation:

A meeting will be scheduled with the Generator-owner to formally convey, explain, and answer questions regarding its content. This meeting also provides an opportunity to update information, if necessary, for the installation phase of the project.

2.3.1.3 Acceptance:

The Generator-owner shall signify acceptance of the interconnection arrangement by providing a signed Interconnection Agreement and any necessary completed generator-related tariff forms and payment of any scheduled funding. The Company will not proceed with any work until these items are received.

2.3.2 Project Scheduling

Upon acceptance of the interconnection arrangement, the Generator-owner shall submit their project schedule. This schedule and subsequent changes will be mutually agreed upon.

2.3.3 Generation Scheduling

1. Generators selling into a Regional ISO market will submit bids as required by that ISO. Testing and outages will also be scheduled per the ISO requirements.

   1) In addition, for generation 10,000kVA and larger:
      
      (1) To report the expected duration of a forced outage within 48 hours.
      
      (2) To report non-scheduled maintenance or forced outages upon occurrence.
      
      (3) To report 3-year planned maintenance outage requirements (expected duration, desired date and time) quarterly or as changed. The Generator-owner shall agree to an overall coordinated schedule to be provided by the Company.

   2) The Company, at its discretion, may extend the above requirements to installations of smaller size than indicated.

2. The Generator-owner shall be required to supply reactive power support when directed by the Company’s transmission system operator or Regional ISO up to the agreed specified limit.

2.4 Compliance

The Company’s rights to confirm and verify the compliance of the generator installation are described in ESB 750 or 752 as applicable and ESB 755. This includes energization and synchronization prerequisites, periodic checks and tests, and as-built documentation. In addition, an executed interconnection agreement shall be submitted four weeks in advance of energization.
3.0 SERVICE INSTALLATION

3.1 Service Equipment
The Generator-owner shall provide service entrance equipment as a part of their installation. The Generator-owner’s service equipment shall be rated, at a minimum, for the maximum fault current available from the Company EPS and their own contribution from the generator(s), motors, etc.

3.2 Grounding
As a minimum, the Generator-owner’s generation equipment shall be grounded in accordance with the latest requirements of the National Electrical Code (NEC) or the National Electrical Safety Code (NESC) where the Generator-owner is under state utility regulation status. For specific installations, refer to the applicable sections of this document.

3.3 Metering
The Company reserves the right to determine that all metering schemes allow for the proper administration of all contracts and rates. Additional metering requirements are specified in the appropriate sections of this bulletin and the Company’s various state tariffs, as filed.

3.3.1 Metering Location and Arrangement
1. Proposed location and arrangement of Company metering equipment will be furnished by the Company and included on the Generator-owner’s drawings when submitted for approval. Where energy will be sold to the Company, a credit metering system will be installed.

2. Normally, for installations with credit metering the connection of the Company’s PT metering transformers is on the generator side of the CTs. The instantaneous relative polarity of metering transformers is critical to proper operation. CTs are polarized such that the polarity dot or marking is on the Company side.

3.3.2 Billing and Credit Metering
1. The Company will specify the quantity, type, rating, connections, location and arrangement of all equipment required for the metering of the Generator-owner’s service inclusive of the sale and/or purchase of energy as well as the monitoring of compliance with all applicable laws, regulations and contracts. Individual kWh meters either will be equipped with a detent to prevent reverse registration, or will be capable of bi-directional measurement.

2. A metering system will be installed to continuously record kilowatt-hours (kWH) on a time-differentiated basis. (To and From Company), and depending on magnitude of Generator-owner’s load and/or generation, kilowatt demand (kW) (From Company), and kilovar demand (kVAR) (From Company). For those installations having a “Buy All-Sell All” purchase agreement contract in effect, additional kilowatt-hour (kWH) meters will also be installed on the output of the generator(s). Also, a recorder will be installed.

3. At the Generator-owner’s request and cost, the Company will furnish equipment for demand pulse signals (analog or digital) at the point of the metering, which will represent the kW demand for operation of Generator-owner equipment. These signals are for information only and the Company shall not be liable for distorted or missing pulses. The Company will not provide time pulses.

4. Details of the installation requirements are covered in ESB 750 and the appropriate Electric System Bulletin Supplement.
3.3.3 **Non Residential On-Site Generation**

Non-Residential Customers with on-site generation (OSG) are subject to billing adjustments per the Company’s Tariff. Additional metering will be installed at the Customer’s expense in order to measure the appropriate adjustment.

3.3.4 **Remote Acquisition of Meter Data**

1. A dedicated, voice grade communication circuit is required to be installed at the Company’s meter board. This circuit shall be furnished and maintained by the Generator-owner.

2. The Customer is responsible for arranging the installation and paying all costs associated with dedicated analog dial phone lines, or other types of automatic meter reading being employed by the Company, to both the OSG and billing meters.

4.0 **PLANT REQUIREMENTS**

4.1 **Telemetering**

4.1.1 **Telemetering Criteria**

1. The Company reserves the right to determine all telemetering and supervisory control schemes to allow reliable operation of the electric system and for the proper administration of all contracts.

2. For all installations 5,000kW or larger, telemetering of data, control and/or status of devices as specified by the Company is required. The Company also reserves the right to extend the need for telemetering to less than 5,000kW generators or where Merchant Plants desire this equipment for their Regional ISO requirements. This information is for the Company’s Energy Management System (EMS) and will require the installation of Remote Terminal Unit (RTU) equipment in the Generator-owner’s facilities.

3. The Company will furnish the telemetering RTU for the installation. The Company will specify the transducers, sensors or other components that the Generator-owner will purchase and acquire. Equipment furnished by the Company will remain Company property and will be maintained by the Company.

4.1.2 **Telemetering Specifications**

1. The RTU cabinet is typically 42" H x 30" W x 26" D shall be wall-mounted with the bottom edge 36" above the floor. A 5-foot clear working space shall be maintained in front of the mounting panel.

2. A dedicated 20A, 120VAC, single phase 60 hertz power circuit is required for the RTU cabinet. All conduit and wiring (minimum of No. 10 AWG copper) to the telemetry cabinet for this circuit shall enter the cabinet from the bottom. A three (3) foot length of all conductors shall be provided for final Company connection.

3. A dedicated 10A, 48VDC or 125VDC input is required to the Remote Terminal Unit (RTU) directly from the station battery.

4. The Generator-owner will be responsible for mounting this equipment in their installation, subject to Company approval. The Generator-owner will provide space, power and all input connections for this package, in the same area with the metering equipment (see ESB No. 752).

5. The following guidelines shall be adhered to:

   1) The RTU shall be located indoors within 15 feet of the billing meters to facilitate testing and calibration.

   2) The RTU shall be remote from heavy traffic areas, work areas and loading areas.
3) The RTU shall be remote from heat producing or high electrostatic or electromagnetic field producing equipment.
4) The RTU shall be remote from station batteries.
5) The analog inputs to the RTU shall be +1.0mA DC at rated input, +2mA DC maximum. The analog metered inputs required as metered at delivery point are as follows:
   - Net kW (+) - To the Company EPS
   - Net kW (-) - From the Company EPS
   - Net kVAR (+) - To the Company EPS
   - Net kVAR (-) - From the Company EPS
6. Where the Generator-owner’s system includes generation and plant load, the metered values shall be the net sum of power from the Company’s System, and the generation minus any internal plant load, which may be connected to the generator output circuits.
7. The Accumulator inputs to the RTU shall be:
   - Net kWh (+) - To the Company EPS
   - Net kWh (-) - From the Company EPS
8. The bi-directional metering equipment for telemetering shall be capable of providing instantaneous power and a pulse output that is proportional to integrated energy.
9. Additional inputs that normally will be required are:
   - Voltage (kV) - measured at the interconnection bus (service voltage)
   - Circuit breaker(s) control and/or status
   - Motor operated disconnect(s) status
   - Instantaneous value of frequency (Hz) - if so specified
   - Ring bus station voltage, current, active and reactive power at several locations.
   Note: The Company will provide an EMS-RTU point list for inputs required at the Generator-owner facility.

4.2 Telecommunications

4.2.1 Installation
1. The telephone equipment shall be located as close to the RTU cabinet as feasible.
2. A voice telephone dedicated for Company use, furnished and maintained by the Generator-owner, is required in the Control House for the Company’s Traveling Operators.
3. The Generator-owner shall incur all costs for the telecommunications services.

EXHIBIT 1: COMMUNICATIONS DATA
The following information is needed for the telephone requirements of the installation at the Generator-owner’s site:
A. SITE INFORMATION
   1. Location name.
   2. Location address.
   3. Location telephone number.
   4. Geographic location for circuit termination (bldg., floor, and room).
   5. Contact person’s name, address and telephone number for engineering and access at the location.
6. As-built copy of substation ground grid and equipment grounding drawing. (Ground grid area - extent of ground potential rise zone of influence.) *

7. Results of ground grid resistance test. (Ground grid impedance in ohms.) *

8. Maximum line to ground fault including Generator-owner contribution. (Ground-return fault current, which produces ground potential rise {GPR} - steady state RMS volts).

9. Nominal System Voltage (kV)

10. X/R ratio at worst fault condition.

11. Ground potential rise (GPR) under worst case single phase to ground fault (steady state RMS volts) at the station and at the 300 volt zone of influence (ZOI) point.

12. Circuit required due date.

* For new installations, a ground grid analysis prepared by the Generator-owner’s state-licensed design professional shall be provided.

B. BILLING INFORMATION

1. Billing contact for the invoicing of circuit.

2. Contact person's name, address and telephone number for billing purposes.

NOTE: The Generator-owner should forward the above information in writing to the Company as soon as possible. The Company will order telephone circuits. Circuit orders require approximately four months for installation.

4.2.2 Specifications

1. A plywood panel 3/4" x 48" x 48" is required for the telephone equipment. A four (4) foot clear working space shall be maintained in front of this panel. The Generator-owner will install terminal blocks directly adjacent to the telephone equipment for interconnection of the EMS-RTU.

2. A dedicated 20A, 120VAC, 60 hertz power circuit is required for the telephone equipment. The Generator-owner shall provide all conduit and wiring for the circuit and install one 20A, 120VAC, single phase convenience receptacle at the telephone equipment location.

3. Telecommunication’s specifications are as follows:

<table>
<thead>
<tr>
<th>Use</th>
<th>Circuit Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voice</td>
<td>1 A</td>
<td>Voice grade</td>
</tr>
<tr>
<td>Metering</td>
<td>1 A</td>
<td>Voice grade</td>
</tr>
<tr>
<td>RTU</td>
<td>3 A</td>
<td>Dedicated, voice grade data @ 2400bps, 4-wire ½ duplex, equipped with a passive loopback termination.</td>
</tr>
<tr>
<td>Protective Relaying</td>
<td>4 A</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Power Quality

Utility lines are subject to many natural and man-made hazards. The Company does not assume any responsibility for protection of generation or other electrical equipment. The generator-owner is fully responsible for protecting all of their equipment from damage due to faults and other disturbances, irrespective of the condition of the Company EPS. The Generator-owner shall not impact the Company’s power quality characteristics.

4.4 Performance/Design

4.4.1 Generator Criteria

1. The Generator-owner shall provide generator controls to maintain proper voltage, frequency, and line current balance and permit synchronizing with the Company EPS. The generator facility’s electrical output shall meet the performance requirements of the latest IEEE Standard 519 and ANSI C84.1 at the time it goes into service.
2. All generation projects operating in parallel with the Company EPS shall not adversely impact the existing system operation. Transmission lines shall remain within thermal ratings for normal and contingency conditions and the proposed project shall be capable of operation at full output over the range of system operating voltages. This range includes the normal nominal voltage range of 1.05p.u. to 0.95p.u. and the emergency range, which can extend to 0.90p.u. for short periods of time.

3. Projects utilizing synchronous and doubly-fed asynchronous machines are required to have excitation systems capable of automatic terminal voltage control. In general, long term operation with constant excitation (manual mode) is not acceptable. If power factor control is available it must be automatically disabled following a system disturbance to ensure sustained reactive support after an event. Power factor control and automatic voltage control schemes shall be mutually agreed between the Generator-owner and the Company. These requirements may typically lead to operational power factors at the Wholesale Delivery Point ranging between 0.9 lagging (vars to the power system) and 0.95 leading (vars from the power system). (Retail electric load customers with on-site generation shall provide reactive power support such that the retail load power factor is not degraded at the Retail Delivery Point.)

4. Projects utilizing induction machines will be required to utilize switched shunt compensation within their facility to minimize system voltage impacts over a wide range of the entire power output. Local power system requirements may lead to operational power factors at the Wholesale Delivery Point or Retail Delivery Point ranging between 0.9 lagging (vars to the power system) and unity. These facilities will also be required to meet the latest Regional ISO, NPCC, or local regional planning criteria. The overall project power factor requirements shall be mutually agreed between the Generator-owner and the Company.

5. Power plant auxiliary equipment shall not trip or stall for momentary under voltage or over voltage excursions anticipated by planning criteria.

6. Exhibit 2 summarizes plant under frequency and over frequency requirements parallel generation connected greater than 15kV by depicting a time frame just after the occurrence of a major system disturbance. Plant equipment is required to remain on line and fully operational throughout this recovery period.
EXHIBIT 2: PLANT ABNORMAL FREQUENCY REQUIREMENTS FOR PARALLEL GENERATION INTERCONNECTED GREATER THAN 15 kV

4.4.2 Step-up Transformer Specification
1. Generator step-up transformer connections and winding configurations shall be reviewed and approved by the Company before procurement by the Generator-owner. Acceptable equipment parameters are often determined by the location on the electrical system. The winding arrangement shall be such that the Company EPS remains effectively grounded.
2. Generator step-up transformer and auxiliary transformers shall have no-load tap settings and impedances coordinated with power system voltage control requirements and unit capabilities.

4.5 Plant Protection
4.5.1 Plant Protection Criteria
1. Excitation equipment shall have an over excitation limiter coordinated with the thermal capability of the generator field winding. Longer over excitation time shall allow less overcurrent. The over excitation limiter shall also be coordinated with over excitation protection so that over excitation protection only operates for failure of the voltage regulator/limiter. Return to automatic voltage control after an over excitation event shall be automatic.
2. Under excitation limiters shall coordinate with generator capability (stator end-region heating) and power system stability limits. These settings shall also coordinate with loss of excitation protection.
3. Volts/hertz limiter equipment shall coordinate with volts/hertz protection.
4. Prime mover control (governors) shall operate freely to regulate frequency. Droop setting shall be in accordance with Regional ISO/NPCC/NERC standards. Prime movers operated with main valves or gates wide open shall control for over speed/over frequency. Boiler or nuclear reactor control and protection shall
coordinate to meet the economic and safety requirements of the plant while maintaining the capability of the generator to aid in the control of system frequency during a power system disturbance.

5. Prime mover over speed controls shall be designed and adjusted to prevent boiler upsets and trips during partial load rejection characterized by abnormally high system frequency.

6. Recording of performance during disturbances shall include generator terminal voltage and real and reactive power. Monitoring of other quantities such as field voltage and current, power system stability (PSS) output frequency or speed is best practice. These event recorders shall have adequate resolution and bandwidth to fully capture dynamic response of the generator.

7. Protection shall allow temporary excursions in speed and system frequency anticipated by planning models without tripping. Such protection shall include over/under frequency relays as well as boiler safeguards. Under frequency protection shall be coordinated with the Regional ISO/NPCC/NERC under frequency load shedding program.

8. Generator protection shall allow temporary voltage excursions anticipated by planning models without tripping. This protection shall include volts per hertz relays, generator auxiliary equipment under voltage relays, loss of excitation relays, backup distance relays, generator and transformer overcurrent relays, and out-of-step relays. These protection characteristics and settings shall be available to the Company upon request.

9. For parallel generation interconnected greater than 15kV, frequency protection employed on all rotating apparatus shall allow the system time to recover by keeping units on-line during short term frequency excursions. With reference to Exhibit 2, a region is indicated during which the system frequency is recovering. Generation shall remain on line during this period. The lower bound is established by Regional ISO/NPCC/NERC criteria. The upper bound, although not yet part of these criteria, has been established for uniformity among projects taking into consideration equipment capabilities and the characteristics of the system response. All generation shall be capable of operating within this region.

4.5.2 Automatic Switching and Protective Devices

1. The generation facility shall employ the use of a properly applied interrupting device capable of automatic operation to interrupt the generation facility from the Company EPS. The device to be used shall be reviewed and approved by the Company before procurement by the Generator-owner. The Generator-owner shall provide protection as determined by the Company on a site specific basis.

2. The Company shall review and approve the protective relay devices provided by the Generator-owner for protection schemes required by the Company to protect its system. The use of utility grade relays and relay redundancy is a normal Company requirement. See Exhibit 3 for a reference list of most device nomenclature.

3. For interconnections on the Company’s transmission system, frequency relays, where used, shall have ranges to meet the requirements of the Plant Abnormal Frequency Requirements Curve, see Exhibit 2. Voltage relays, where used, shall have ranges to meet the Company’s transmission planning criteria of ±5% from nominal voltage and −10% for emergencies.

4. Protective relay devices provided by the Generator-owner for Company required protection schemes shall meet Company test device requirements.

5. Exclusion of Current Transformer Selector Switches: Meter selector switches shall not be connected into the secondary circuits of current transformers used with
protective relays specified by the Company. Metering shall not be connected in protective relay circuits.

6. It is Company practice to automatically reclose line circuit breakers, without employing synchronism check protection, within a few seconds after they have automatically been opened. The Generator-owner must take this fact into account in the design of their generator protection systems.

7. Following a generator disconnection as a result of Company source loss, the generation shall remain disconnected until such time as the Company source has recovered to Company acceptable voltage and frequency limits for a minimum of ten (10) minutes.

8. The following applies to parallel generation 2MW to 10MVA interconnected under 15kV to the Company EPS:

1) Interconnection systems with integrated relay protection shall meet the surge withstand requirements of IEEE 1547. Relays and control circuits associated with interconnection systems greater than 1000V shall meet the surge withstand requirements of IEEE C37.90.1.

2) Neutral Stabilization - Where the Generator-owner is served from a Company four-wire multi-ground neutral distribution circuit, adequate grounding must be provided to ensure neutral stability during accidental isolation of the line from the main system. This may require an additional ground source. Adequate grounding can be provided either by the use of wye-delta main power transformer or by installing an appropriate grounding transformer. To limit the effects of such grounding on the Company’s ground-relay sensitivity, the Company may require that the grounding impedance be limited to the highest value suitable for neutral stabilization.

3) Frequency and voltage relays shall have ranges shown in the following table. The final time delay settings shall be approved by the Company.

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>PICKUP RANGE</th>
<th>TIME DELAY RANGE (sec)</th>
<th>DEFAULT TIME DELAY (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under Frequency (81U)</td>
<td>&lt; 57.0 Hz</td>
<td>0.1 – 300.0</td>
<td>0.16</td>
</tr>
<tr>
<td>Under Frequency (81U)</td>
<td>&lt; (59.8 – 57.0) Hz adjustable</td>
<td>0.1 – 300.0</td>
<td>0.16</td>
</tr>
<tr>
<td>Over Frequency (81O)</td>
<td>&gt; 60.5 Hz</td>
<td>0.1 – 300.0</td>
<td>0.16</td>
</tr>
<tr>
<td>Under Voltage (27)</td>
<td>&lt; 50% of Nominal</td>
<td>0.1 – 30.0</td>
<td>0.16</td>
</tr>
<tr>
<td>Under Voltage (27)</td>
<td>50% ≤ V &lt; 88% of Nominal</td>
<td>0.1 – 30.0</td>
<td>2</td>
</tr>
<tr>
<td>Over Voltage (59)</td>
<td>110% ≤ V &lt; 120% of Nominal</td>
<td>0.1 – 30.0</td>
<td>1</td>
</tr>
<tr>
<td>Over Voltage (59I)</td>
<td>≥ 120% of Nominal</td>
<td>0.1 – 30.0</td>
<td>0.16</td>
</tr>
</tbody>
</table>

4) Following a generator disconnection as a result of Company source loss, the generation shall remain disconnected until such time as the Company source has recovered to acceptable voltage and frequency limits for a minimum of five (5) minutes.

5) Synchronization Requirements:
   - Synchronous interconnection with the Company EPS
     The following parameters shall be within tolerances prior to closing the paralleling device:

<table>
<thead>
<tr>
<th>Aggregate rating of parallel generator (kW)</th>
<th>Frequency Difference (Hz)</th>
<th>Voltage Difference (V)</th>
<th>Phase Angle Difference (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-500</td>
<td>0.3</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Aggregate rating of parallel generator (kW)</td>
<td>Frequency Difference (Hz)</td>
<td>Voltage Difference (V)</td>
<td>Phase Angle Difference (degrees)</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>---------------------------</td>
<td>------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>&gt; 500 – 1,500</td>
<td>0.2</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>&gt; 1,500 – 10,000</td>
<td>0.1</td>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>

- **Induction interconnection with the Company EPS**
  
  Self-excited induction generators shall meet the same requirements as synchronous machines.
  
  For induction machines that are started as a motor, the Generator-owner shall provide the maximum starting inrush current that can be developed by the unit. This information shall be used in the Company’s study to verify that the unit does not cause a voltage fluctuation greater than ±5% on the Company EPS or create visibly objectionable flicker as defined by IEEE 519. It is the Generator-owner’s responsibility to maintain the unit within these voltage fluctuation and flicker limits at the interconnection point.

- **Inverter Interconnection with the Company EPS**
  
  An inverter system that creates fundamental voltage prior before the paralleling device is closed shall meet the requirements of synchronous generators.
  
  For all other inverter systems, the Generator-owner shall provide the maximum starting inrush current that can be developed by the unit. This information shall be used in the Company’s study to verify that the unit does not cause a voltage fluctuation greater than ±5% on the Company’s system or create visibly objectionable flicker as defined by IEEE 519. It is the Generator-owner’s responsibility to maintain the unit within these voltage fluctuation and flicker limits at the interconnection point.
4.5.3 **Relay Settings and Testing**

1. Protection shall be provided by the Generator-owner such that abnormal conditions on the Company EPS will not cause damage to Generator-owner equipment. Protection also shall be provided by the Generator-owner such that abnormal conditions in the Generator-owner equipment will not cause equipment damage or abnormal conditions on the Company’s system.

2. **Company Required Relay Settings**: The Company will review for acceptance the Generator-owner’s proposed settings of those relays that the Company’s System Protection Engineering Dept. designates as being required to satisfy the Company protection practices. Any relay setting issued by the Company shall not be changed or modified at any time without the prior written consent of the Company.

3. **Company-designated Relay Calibration and Testing**: Upon initial installation or modification, the Company will calibrate, test, and seal the devices for which Company relay settings have been issued, verify accuracy of associated circuit wiring and perform or at the Company’s sole option, witness a functional test of the required devices, i.e., trip tests. At the Company’s sole discretion, the calibration and test by a third party with Company approval of results may be an option. Refer to ESB 755 for additional details on the Company’s policy regarding maintenance.

4. **Generator-owner Supplied Relay Settings and Testing**: The Generator-owner shall be responsible to specify the settings, calibrate, test, and maintain the balance of their equipment.

5. The NPCC has established criteria for periodically testing under frequency relays and reporting their performance used for load shedding critical to system security. Details of schedules, testing and reporting methods will be made available prior to synchronization.

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For the latest authorized version please refer to the Company’s website at [http://www.nationalgridus.com/electricalspecifications](http://www.nationalgridus.com/electricalspecifications).
5.0 OPERATING

5.1 Manual Disconnect Switch
The Generator-owner shall furnish and install an electrical load break disconnect switch accessible at all times to the Company. This disconnect shall be connected between the Generator-owner’s facility and the connection point to the Company EPS. The visible disconnecting means may consist of a group-operated load air break switch and fuse, or group operated air break switch and circuit breaker. It shall be capable of being locked in the open position and have provisions for both Company and Generator-owner padlocks. This disconnect device shall be identified by a permanent sign as designated by the Company. Operation of this switch for any change in its status shall be immediately reported to the Company.

5.2 Disconnection by the Company
5.2.1 The Company reserves the right to open or order open the connection to the Generator-owner via circuit breaker, switches, etc., to isolate the Generator-owner’s equipment without prior notice for the following reasons:

5.2.1.1 System emergency operations require such action. Emergencies include but are not limited to:

- Voltage excursions in excess of ±5% of nominal.
- Transmission system elements subjected to loading in excess of Long Time Emergency (LTE) ratings where disconnection alleviates the problem.
- Situations involving restoration of service.
- Excess generation on the Company EPS.

Note: When reduced generation output alleviates the problem, it may be ordered by the Company.

5.2.1.2 When the Company’s periodic check of Generator-owner’s equipment reveals a hazardous condition, a lack of necessary maintenance, or a lack of maintenance records for equipment necessary to protect the Company EPS.

5.2.1.3 When generating equipment interferes with other Generator-owners, other customers or with the operation of the Company’s equipment. See Section 4.4.1 of this bulletin for Generation Criteria.

5.2.1.4 When required protective relaying is altered, inoperable, or missing.

5.2.1.5 When required special equipment necessary for operating control on the Company EPS is inoperable or missing.

5.2.2 Only the Company may permit the Generator-owner to energize a de-energized Company circuit for system restoration.

5.3 Other
1. In some instances, it may be required for Company operation of circuit protective devices and switches integral to the Company EPS within the Generator-owner’s facility.

2. Sequence of events recorders shall be installed to log events such as limiter operation and protective trips (target logs) and generator performance during severe disturbances.

3. The Company or Regional ISO may, during emergency situations, implement voltage reduction as a load relief measure. The Generator-owner is responsible for any additional equipment necessary to remain on-line during such voltage reductions, refer to Section 4.0 of this bulletin.
### 6.0 REVISION HISTORY

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description of Revision</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>06/01/07</td>
<td>Initial version of new document superseding all previous revisions of ESB 756.</td>
</tr>
<tr>
<td>1.1</td>
<td>09/06/11</td>
<td>Permit study of DG on area networks in Section 1.1, no other technical changes, only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>formatting and general editing based on September 2010 ESB 750 Series Errata changes.</td>
</tr>
</tbody>
</table>
Electric System Bulletin No. 756 Appendix B:

Distributed Generation Connected To National Grid Distribution Facilities Per The New York Standardized Interconnection Requirements

August 2011 version 2.0

ESB 756 Appendix B is part of the ESB 750 series
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EXHIBITS ATTACHED

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1.0 Purpose

1. National Grid strongly believes that promoting the installation of Distributed Generation (DG) facilities, in accordance with the New York State Standardized Interconnection Requirements (NY SIR or SIR), is sound public policy. This belief includes DG facilities on network systems to the extent technically feasible.

2. The purpose of this Electric System Bulletin (ESB) is to assist customers desiring to interconnect DG projects to National Grid’s upstate NY distribution system.

3. This ESB supplements ESB 750 and the NY SIR and provides general requirements, recommendations, and assistance to customers regarding DG facilities, having an aggregate nameplate rating of 2MW or less, connected in parallel to the Company’s distribution electric power system (Company Distribution EPS).

2.0 Scope

1. All generating interfacing equipment must be designed, installed, interconnected, tested, and operated in accordance with applicable government, industry, and Company standards. These requirements only pertain to those types of parallel generation covered by the NY SIR connected to the Company Distribution EPS that are net metered generation sources (Net Metered Classes) or non-net metered generation sources with a nameplate rating of 2MW or less. The SIR does not apply to DG units larger than 2MW.

2. These requirements are limited to only those points in which the Customer and the Company have a mutual interest to ensure safety to Company employees and the public and satisfactory operation and compatibility with the electrical supply to others served by the Company distribution EPS. The provisions of this bulletin are applicable to Net Metered Classes and non-net metered generation sources covered under the NY SIR.

3. Technical requirements for parallel operated on-site generators (OSG) not covered by this document, such as DG larger than 2MW and up to 20MW (Over 2MW Class), may be found in ESB 756 Appendix A.

3.0 Customer Interface Procedures

3.1 Application Process Overview

This section outlines the process for a Customer to receive National Grid approval to interconnect DG facilities to the Company Distribution EPS. This process is intended for the following:

1. New DG facilities with a nameplate rating of 2MW or less (as aggregated on the Customer side of the point of common coupling (PCC)), that are eligible under the NY SIR process and;

2. Review of any modifications affecting the Company Distribution EPS and service connection interface at the PCC of existing Customer DG facilities that: (i) have a nameplate rating of 2MW or less as aggregated on the Customer side of the PCC; (ii) are eligible under the SIR process; and (iii) have been interconnected to the Company Distribution EPS where an existing interconnection agreement and/or power purchase agreement between the Customer and the Company is in place and;

3. New DG facilities or modifications to existing DG facilities over 2MW and up to 20MW as aggregated on the Customer side of the PCC. Generation in this size range does not fall under the NY SIR. However, for larger Customer generation (i.e., over 2MVA and up to 9MVA connected to the Company Distribution EPS), the Company will generally follow the approval process timeline set forth in the SIR as a guide for the Customer’s application.
made on Form G of the Company’s tariff, PSC No. 220. In all other cases, the Company will, where possible, use a similar application and approval process as outlined in the SIR for DG types of facilities. However, the time frames of the application process and level of requirements may be extended compared to those DG units under the SIR guidelines due to the larger size of these generators and resulting increase in complexity of interconnection issues.

This application process and its requirements do not apply to generation equipment that will never be allowed to operate in parallel with the Company Distribution EPS. For example, this process does not apply to emergency standby generators with break-before-make transfer switches and any other generation sources that operate independently of any connection to the Company Distribution EPS and have no provision for such connection (even for a short period of time).

As stated above, this application process is mandated by the New York State Public Service Commission (PSC) for customer generation equipment up to 2MW that will be connected to the Company Distribution EPS on a full or part time basis; see NY SIR at http://www.dps.state.ny.us/Modified_SIR-Dec2010-Final.pdf. These requirements are also contained in National Grid’s New York electricity tariff, PSC No. 220 Electricity (https://www2.dps.state.ny.us/ETS/jobs/display/download/4912540.pdf), at Rule 53: Standardized Interconnection Requirements and Application Process for New Distributed Generators 2 MW or Less Connected in Parallel to Utility Distribution Systems.

3.2 Objectives in the Application Process

1. Parallel operation of a generator becomes a part of the Company Distribution EPS and where the Customer and the Company have a mutual interest the interconnection is required to meet the electrical reliability and security of the Company Distribution EPS. This is necessary to ensure safety to the public and to Company employees and satisfactory operation and compatibility with the electrical supply to others. The steps and timing requirements of the application process are identified within the NY SIR. The time required to complete the application process, however, may depend on the characteristics of the generator, the size class (as specified above), its intended operating modes, and the characteristics of the Company Distribution EPS at the point of interconnection (POI). It is the Company’s objective that the application process should be completed in a timely manner that affords the lowest cost to the Customer while preserving the safety, reliability, power quality, and operational efficiency needs of the Company Distribution EPS.

2. Additional site-specific requirements may be indicated once the supply voltage, service arrangement, location, and generation purpose is determined, where such purpose can be either:
   - peak shaving*,
   - net energy metering, or
   - export energy with an agreement for sales** according to the Company’s tariff provisions.

* Peak shaving generation is Customer-owned generation operated in parallel with the Company to reduce a Customer’s electrical demand. Unlike net metering, peak shaving generation is not permitted to flow into the utility supply system upstream of the billing meter and will require the installation of protection devices. The Company’s revenue metering is detented in this case to prevent reverse billing meter registration.

** An Agreement for Sales of Export Energy under a NY SIR application may be made per the Company’s PSC No. 220 Electricity Tariff, Service Classification No. 6, and is a Power Purchase Agreement.

3. For new electric service or modifications to electric service to accommodate the Customer’s parallel generator, refer to the Company’s latest revision of ESB No. 750, Specifications for Electrical Installations. The Customer will be responsible for any permitting and
conformance to the latest revision of all local, state and federal codes and national standards that apply. For example, under local and NY State building code requirements the Customer will need to provide evidence of electrical inspection approval from their local code enforcement agency, or their assigned inspection agency qualified to perform such electrical inspections.

4. When considering a DG interconnection arrangement, a Form K application is submitted to the Company’s Distributed Generation Services department. For non-residential and non-net metered applications, a Form G, “General Information for Connection of On-Site Generators Application for Electric Standby Service,” will also need to be submitted to the Company.

5. Any subsequent sale of an On-Site Generator (OSG) facility covered by the requirements of the NY SIR of the original retail Customer’s facility will require the new owner to establish a separate interconnection agreement (Form K) for the generation.

6. Refer to:
   - The steps to install distributed generation in NYS as specified in the NY SIR (http://www.dps.state.ny.us/Modified_SIR-Dec2010-Final.pdf),
   - Attached Exhibit 1 for the Company’s electricity tariff, PSC No. 220 (https://www2.dps.state.ny.us/ETS/jobs/display/download/4912540.pdf), Rule 53 application process,
   - Attached Exhibit 2 for Company milestone requirements for greater than 200kW and up to 2 MW Customer project schedule,
   - The Company’s Distributed Generation Services department’s electronic mail address as follows for inquiries: DistributedGenerationServices-NY@us.ngrid.com, and
   - The Company's (www.nationalgridus.com) “Distributed Generation” web site at https://www.nationalgridus.com/niagaramohawk/business/energyeff/4_interconnection.asp for information and forms listed below when making an application with the Company:
     - Form K: https://www.nationalgridus.com/niagaramohawk/non_html/Form_K.pdf
     - Appendix B: https://www.nationalgridus.com/niagaramohawk/non_html/Appendix_B.pdf
     - Appendix C: https://www.nationalgridus.com/niagaramohawk/non_html/Appendix_C.pdf
     - Form G: https://www.nationalgridus.com/niagaramohawk/non_html/Form_G.pdf

7. The application process and attendant services are offered by the Company on a non-discriminatory basis to any customer. As part of the process, the Company may identify the need for detailed engineering studies (Coordinated Electric System Interconnection Review (CESIR)), distribution system upgrades and additional protection requirements. As allowed by the PSC, the costs of the detailed study and upgrades are the responsibility of the Customer. If the Customer makes significant changes in the design or scheduling of their DG project, then any previous information furnished by the Company to the Customer is subject to review and possible change, which may cause a delay in service.

8. The application process is structured to allow the Customer to review each cost in advance so that the Customer may choose whether or not to continue moving forward with the process prior to committing to these costs. This avoids unnecessary expenditure of resources by either party and is for the benefit of both the Customer and the Company. Where a service upgrade is necessary and is above the base interconnection cost limits in the SIR, refer to the Company’s tariff, PSC No. 220 (https://www2.dps.state.ny.us/ETS/jobs/display/download/4912540.pdf) and ESB 750 (http://www.nationalgridus.com/niagaramohawk/non_html/constr_esb750.pdf).

9. The table at the following website summarizes the Company’s application of the NY SIR net metering rules: https://www.nationalgridus.com/niagaramohawk/business/energyeff/4_net-mtrg.asp.
3.3 Considerations During the Application Process

1. When applying for a DG interconnection within the Company’s secondary area network and secondary spot network EPS located in the downtown districts of Albany, Buffalo, Cortland, Glens Falls, Niagara Falls, Schenectady, Syracuse, Troy, Utica, or Watertown, DG installations on distribution secondary network systems may require a study to be undertaken by the Company to ensure the DG facility does not degrade the reliability, power quality, safety, or operation of the Company’s network system. Therefore, customers in the downtown districts of Albany, Buffalo, Cortland, Glens Falls, Niagara Falls, Schenectady, Syracuse, Troy, Utica, or Watertown should contact National Grid’s Distributed Generation Services (DGS) department (DistributedGenerationServices-NY@us.ngrid.com) to determine if the proposed location is served by a distribution secondary network system. This should be done while the project is still in the planning stage, and certainly before purchasing equipment or beginning installation. National Grid’s DGS will review the Customer’s plans and discuss options with the Customer. Refer to attached Exhibit 3 for area maps locating the Company’s secondary network service areas.

Unlike radial distribution systems that deliver power to each customer in a single path from source to load, underground secondary area network systems deliver power to each customer through a complex and integrated system of multiple transformers and underground cables that are connected and operate in parallel; refer to attached Exhibit 4 for more information. The connection of customer DG facilities on networks is an emerging topic, which (i) poses some issues for the Company to maintain adequate voltage and worker safety and (ii) has the potential to cause the power flow on network feeders to shift (i.e., reverse) causing network protectors within the network grid to trip open. Therefore, to ensure network safety and reliability additional information will be required for the Company’s engineering analysis such as:

- Customer’s existing* or proposed electric demand profile showing minimum load during peak generation time,
- Customer’s expected generation profile shown for a 24-hour period and typical 7-day duration, and
- Customer’s complete electric service single-line diagram showing the configuration of the proposed generation and other metered tenants, if any, up to the service point supplied by the Company’s secondary network EPS.

* In addition, the Company may need to install recording equipment at all metered electricity users to determine the total demand of the building’s network service when obtaining the service connection’s electric demand profile. The cost to the Customer will be according to the Company’s electric customer load survey flat rate and charged in accordance with the terms of the Company’s electricity tariff and NY SIR.

2. For more technical information on parallel generator installations, please refer to this bulletin’s remaining sections.

3.4 Interconnection Charges

Customers shall be subject to charges for interconnection costs. To permit interconnected operations with a customer, the Company may incur costs which are in excess of those would have incurred had the customer taken firm service. These excess costs, called interconnection costs, are directly related to the installation of those facilities the Company deems necessary for interconnection. They include initial engineering evaluations, purchase and installation of additional switching, transmission and distribution equipment at Company’s facilities, safety provisions, engineering and administration. These costs shall be paid in full by the Customer prior to commencement of service in accordance with the Company’s electricity tariff, PSC No. 220, and the NY SIR. For typical Company interconnection cost items expected in DG projects greater than 200kW and less than or equal to 2MW that will be defined in a CESIR, see the following two tables. Costs will be determined according to the Company’s electricity tariff and the NY SIR.
### Table 3.4-1: DG Projects >200kW and < 2MW where no EPS upgrades are expected

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Typical Company Support Activities Attributed to DG Customer's Project</th>
<th>Common PSC No. 220 Tariff Rule References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engineering acceptance review of DG Customer’s construction design submittals where the Company has mutual interest such as service connection facilities, meter mounting provisions, Company-designated protective devices and control schemes according to the Company’s ESB 750 series.</td>
<td>24, 28, 36, 37, 53</td>
</tr>
<tr>
<td>2</td>
<td>Revenue metering equipment changes/additions.</td>
<td>25, 28, 36, 37, 53</td>
</tr>
<tr>
<td>3</td>
<td>Field audit of DG Customer installation to accepted design.</td>
<td>24, 28, 36, 37, 53</td>
</tr>
<tr>
<td>4</td>
<td>Field compliance verification - witness tests of DG Customer protective devices coordinating with the Company Distribution EPS.</td>
<td>24, 28, 36, 37, 53</td>
</tr>
<tr>
<td>5</td>
<td>DGS Project Management</td>
<td>53</td>
</tr>
</tbody>
</table>

### Table 3.4-2: Complex DG Projects >200kW and < 2MW

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Typical Company Support Activities Attributed to DG Customer’s Project</th>
<th>Common PSC No. 220 Tariff Rule References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distribution EPS upgrades (e.g., Current Limiting Fuses, Primary Conductors, Line Reclosers, Switches, Voltage Regulators, Capacitors, etc.) as a result of DG impact.</td>
<td>15-18, 28, 36, 37, 53</td>
</tr>
<tr>
<td>2</td>
<td>Where Local EPS anti-islanding protection is required, DTT transmit addition to Distribution EPS substation feeder breaker (and/or Line Recloser) for DG impact on distribution feeder.</td>
<td>28, 36, 37, 53</td>
</tr>
<tr>
<td>3</td>
<td>Where Company-provided Radio Communications can be applied, additions to support DTT equipment at Distribution EPS substation feeder breaker (and/or Line Recloser) for DG impact on distribution feeder.</td>
<td>28, 36, 37, 53</td>
</tr>
<tr>
<td>4</td>
<td>Where Local EPS feeder selectivity may require prompt control measures for DG impact on distribution feeder operations, EMS-RTU (status &amp; control) addition at Generation Facility.</td>
<td>28, 36, 37, 53</td>
</tr>
<tr>
<td>5</td>
<td>Service Connection modifications and additions for DG impact on the Company Distribution EPS.</td>
<td>19-23, 28, 36, 37, 53</td>
</tr>
<tr>
<td>6</td>
<td>Revenue metering equipment changes/additions.</td>
<td>25, 28, 36, 37, 53</td>
</tr>
<tr>
<td>7</td>
<td>Engineering acceptance review of DG Customer’s construction design submittals where the Company has mutual interest such as service connection facilities, meter mounting provisions, Company-designated protective devices and control schemes (e.g., DTT receive package installation at DG) according to the Company’s ESB 750 series.</td>
<td>24, 28, 36, 37, 53</td>
</tr>
<tr>
<td>8</td>
<td>Field audit of DG Customer installation to accepted design.</td>
<td>24, 28, 36, 37, 53</td>
</tr>
<tr>
<td>9</td>
<td>Field compliance verification - witness tests of DG Customer protective devices coordinating with the Company Distribution EPS.</td>
<td>24, 28, 36, 37, 53</td>
</tr>
<tr>
<td>10</td>
<td>Project Management (DGS, Distr. Line, Distr. Station, etc.)</td>
<td>28, 53</td>
</tr>
</tbody>
</table>

### 4.0 Overview of Potential Issues Related to Interconnection

1. Customer generation connected to the distribution system can cause a variety of system impacts including steady state and transient voltage changes, harmonic distortion, and increased fault current levels. Parallel generation systems of 2MW or less, which located individually on higher capacity feeders may not cause very serious impacts, can, on weaker circuits, in aggregation or in special cases (such as lightly loaded networks), significantly impact the Company Distribution EPS.

2. A CESIR in some cases is needed to identify the severity of system impacts and the upgrades needed to avoid problems on the Company Distribution EPS. Typically, a CESIR will be performed by the utility to determine if the proposed generation on the circuit results in any relay coordination, fault current, and/or voltage regulation problems.

3. There is a wide range of potential issues associated with the interconnection of DG facilities to the Company Distribution EPS including, but not limited to:
   - Impact on step voltage regulation equipment
   - Increased fault duty on Company circuit breakers
   - Interference with the operation of protection systems
   - Harmonic distortion contributions
• Voltage flicker
• Ground fault overvoltages
• Islanding
• System restoration
• Power system stability
• System reinforcement
• Metering

4. It is important to scrutinize the interconnection of Customer DG facilities to the Company Distribution EPS so that any negative impacts can be avoided and assure that the Customer generation will have only a positive or, at least, neutral impact on the EPS performance. It is the intent of any Company study in accordance with SIR requirements, when applicable, to avoid negative power system impacts by identifying the particular type of impact that will occur and determining the required equipment upgrades that can be installed to mitigate the issue(s).

5. Anywhere within the Company's service territory that where customers plan to interconnect generation, they will be interfacing to one of two main types of distribution systems. These will be either radial systems or network systems. The interface voltage levels will be either low voltage (less than 600 volts) or medium voltage (greater than 600 volts and less than 15,000 volts) depending on the location on the Company's system and size of the generator.

6. In general, DG facilities connected to various locations on the radial distribution EPS are limited as listed in the below Table 4.6-1. This table provides an upper limit that represents the maximum possible DG capacity under ideal situations and assumes that on the Company Distribution EPS there are no additional limitations as indicated by site specific system studies (e.g., available short circuit current contributions, minimum network loading in light loading seasons, voltage regulator interactions, etc.). When a DG facility (or aggregate DG facility) on a feeder or local EPS of a feeder is above the limits in Table 4.6-1, these warrant further study by the Company to determine feasibility and remedial action.

Illustration 4.6-1: Typical DG Installation Areas on Radial Distribution Feeders

“O” - DG Interconnection Location Point on Feeder
1. Express (dedicated) radial feeder
2. Feeder Main
3. Feeder Branch protected by fuse
4. Sectionalized Feeder Main
5. Feeder Branch protected by fuse with ratio transformer

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
Table 4.6-1:  Typical Planning Limits for DG Connection to Radial Distribution Feeder

<table>
<thead>
<tr>
<th>Typical Gross Generation Capacity Limit (see notes below)</th>
<th>3-phase Radial Distribution Voltage Class System</th>
</tr>
</thead>
<tbody>
<tr>
<td>DG Location on Feeder</td>
<td>4 or 5kV</td>
</tr>
<tr>
<td></td>
<td>2.8MVA</td>
</tr>
<tr>
<td>1. Express (dedicated) Radial Feeder</td>
<td>0.75MVA</td>
</tr>
<tr>
<td>2. Feeder Main</td>
<td>75kVA</td>
</tr>
<tr>
<td>3. Feeder Branch protected by Fuse</td>
<td>100kVA</td>
</tr>
<tr>
<td>4. Sectionalized Feeder Main</td>
<td>50kVA</td>
</tr>
</tbody>
</table>

Notes to Table 4.6-1:

a. These generation capacities are on a per-generator basis on full nameplate ratings and at unity power factor. It should be noted, however, that the aggregate generation (sum of the total gross generation of all DG systems connected to a particular segment of the National Grid system) is considered for all points along the distribution feeder. National Grid will evaluate each application before deciding on the maximum MVA allowed onto the National Grid system at a given point.

b. Limits apply to synchronous and induction rotating generator machines. The DG facility shall maintain power factor at the PCC in accordance with the NY SIR; at 0.90 Power Factor leading or lagging (for Var or voltage support can also be considered within machine ratings). See ESB 750 regarding disturbances and capacitor installation.

c. Inverter-based systems such as Photovoltaic (PV) Systems are limited in aggregate to 500kVA on 4 or 5kV and 3.0MVA on 15kV class systems.

7. Connecting customer generation to the low voltage network poses some issues for the Company; see Section 3.0 above. The generation can cause the power flow on network feeders to shift (i.e., reverse) causing network protectors within the network system to trip open. No synchronous generators are permitted for interconnection to the Company’s secondary voltage network systems. Small induction and inverter-based generators are considered on the secondary voltage network systems on a case-by-case basis.

8. Connection of distributed generators on the spot networks are only permitted if the secondary bus is energized by more than 50% of the installed network protectors as required by the Institute of Electrical and Electronics Engineers (IEEE) Std. 1547-2003.

9. From Table 4.6-1, DG facilities ranging in size from 750kVA to 2.8MVA at 4 or 5kV class or from 2.5MVA to 9.0MVA at 15kV class, and installed on non-network systems are considered for connection to express radial distribution feeders since the light load condition on the existing feeders may not meet the acceptable norm to avoid islanding (i.e., one third of the feeder’s all time light load must be greater than the aggregate nameplate distributed generation MW ratings).

10. Because of the severe safety and potential equipment damage issues associated with feeding power into a de-energized distribution system, a major design consideration of any customer generator installation is that THE GENERATOR SHALL NOT ENERGIZE A DE-ENERGIZED COMPANY CIRCUIT. The protection system shall be designed with interlocks and proper protective functions to ensure that there is proper voltage, frequency and phase angle conditions between the Company’s system before the generator is permitted to parallel. Because of the potential interference with reclosing on radial and automatic sectionalizing feeders and/or restoration operations on the utility system, AUTOMATIC RECLOSEING OF THE CUSTOMER’S INTERTIE CIRCUIT BREAKER IS NOT PERMITTED. The only exceptions that allow a unit to automatically reconnect are certain inverter–based generation systems as permitted by the NY SIR.

11. The Company’s distribution substations are subject to fault duty limitations. Adding generation to the Company Distribution EPS increases the amount of fault current imposed on the substations and equipment located on the feeder(s). Exceeding the fault duties at the substations and on the feeder(s) as a result of DG facilities will not be permitted and alternate methods of interconnection shall be explored where this limit has been reached.
12. Multiple service facilities may be supplied to the Customer from a Company Distribution EPS. These service installations may be either dual primary switchgear or dual secondary transformers. To assure that the reliability and proper protection are maintained in these multiple service facilities, the Customer is not permitted to:

- Parallel secondary services from a common facility.
- Parallel secondary facilities supplied from separate locations.
- Exceed the ampacity rating of any service facility.
- Create an unbalanced loading condition in excess of 2% voltage unbalance between phases of a service.

5.0 General Design and Operating Requirements

From the perspective of interconnection, there are three main types of customer generation systems that interface to the EPS. These include:

- Induction Generators
- Static Power Converters (inverter-based)
- Synchronous Generators

Each type has its own specific characteristics regarding synchronization equipment, protective functions, starting practices, and electrical operating behavior. Whether the parallel generation is less than 2MW and covered under the SIR guidelines or larger than 2MW and covered under other requirements, there are specific common interface requirements that will always apply. There may also be additional specific requirements that may be identified as part of any CESIR that is performed for a specific location.

5.1 Applicable Codes, Standards, and Guidelines

1. The Customer’s generation facility shall conform to the latest revision of all local, state and federal codes and national standards that apply.

2. The Customer's generation facility shall also conform to any applicable requirements of the PSC and any local, state, federal and/or other agencies from which a review, approval, or a permit is required.

3. The Customer shall comply with the appropriate Company ESB or tariff requirements, which cover details for the Customer’s electric service installation. These include:

- **ESB 750** - Specifications for Electrical Installations
- **ESB 751** - General Requirements Above 600-volt Service (under development)
- **ESB 753** - Primary Meter Pole
- **ESB 754** - Outdoor Pad Mounted or Vault Enclosed Single and Three Phase Transformer
- **ESB 758** - Primary Service to Metal Enclosed Gear
- **PSC 220** - Niagara Mohawk Power Corporation’s Electricity Rate Tariff
- **PSC 220, Rule 53** - Standard Interconnection Requirements for OSG’s 2 MW or Less Connected in Parallel With Utility Distribution Systems

Refer to Exhibits 5 and 6 and Figures 1 through 4 for information when submitting single-line diagrams to the Company’s Distributed Generation Services department (electronic mail address: DistributedGenerationServices-NY@us.ngrid.com).

5.2 Definitions

See PSC 220, Rule 53 and the NY SIR for definitions of special terms.

5.3 General Criteria

The interconnection of all parallel generators requires safeguards for synchronization and back feed situations in accordance with the NY SIR. Each specific connection must be studied with respect to size, type, and the nature of the EPS at the interconnection point. Only the results of
a specific study can indicate the suitability of a given generator connection to the Company Distribution EPS and its possible economic viability. See Rule 53 in PSC No. 220 and the NY SIR for detailed requirements.

5.3.1 Single Phase

Single Phase parallel generator connections to Company Distribution EPS circuits under 600 volts present power quality and phase balance challenges. Single phase connections shall have these minimum characteristics:

- Nameplate rating of a single generator or group of generators equal to or less than 100kVA.
- Configured as a three-wire, line-to-line with neutral, or line-to-neutral with adequate load balance.
- A dedicated service lateral with a dedicated transformer, when required by the Company.

5.3.2 Three Phase

Three phase connections are required in all other instances. The aggregated nameplate rating of all parallel generation on the premise shall not exceed 2MW covered by the NY SIR. For more than 2MW, refer to ESB 756 Appendix A.

5.3.3 Phase Balance

The Customer’s DG facility shall permit equal current in each phase conductor at the service point. Voltage unbalance resulting from unbalanced currents shall not exceed 2% and shall not cause objectionable effects upon or interfere with the operation of the Company’s facilities and service to others. This criterion shall be met with and without generation.

5.3.4 Neutral Stabilization and Grounding

Where the Customer is served from a Company four-wire multi-ground neutral distribution circuit, adequate grounding must be provided to ensure neutral stability during accidental isolation of the line from the main system. This may require an additional ground source. Adequate grounding can be provided either by the use of wye-delta main power transformer or by installing an appropriate grounding transformer. To limit the effects of such grounding on the Company’s ground-relay sensitivity, the Company may require that the grounding impedance be limited to the highest value suitable for neutral stabilization.

As a minimum, the Customer’s generation equipment shall be grounded in accordance with the latest requirements of the National Electrical Code (NEC). For specific installations, refer to the applicable sections of this document and National Grid’s ESB 750. When generator tripping is needed to sense ground faults on the Company’s system:

- The winding arrangement of the Customer’s generation facility transformer shall be such that the Company’s system remains effectively grounded.
- The Company requires ground protection on any system that can be a generation source and to protect transformers that can be paralleled and supplied from two sources. In these cases, a “zero-sequence” voltage or “3V₀” scheme will be required on the primary side of a delta primary wound transformer supplying the facility; see Figure 4.
5.4 Service Equipment and Revenue Metering

1. The Customer shall provide service entrance equipment as a part of their installation. The Customer’s service equipment shall be rated, at a minimum, for the maximum fault current available from the Company Distribution EPS and their own contribution from the generator(s), motors, etc.

2. At the service entrance equipment, the Customer shall have a permanent directory plaque to indicate all electric sources and the Generator Disconnect location(s) on their premise according to the NEC.

3. The Company will specify the quantity, type, rating, connections, location, and arrangement of all equipment required for the revenue metering of the Customer’s service and DG facility as well as the monitoring of compliance with all applicable laws, regulations, interconnection agreements, and power purchase agreements. Begin with reference to the Company’s ESB 750, Section 7 for the Customer’s provisions of the Company’s metering equipment installation. The NY SIR and Rule 53 in the Company’s electricity tariff, PSC No. 220, describe qualifications for net metering. Where net metering does not apply, the Company’s revenue metering will be detented* to prevent reverse billing meter registration. When applicable, credit metering will be installed if arrangements have been made for energy sales to the Company; see PSC No. 220 electricity tariff Service Class No. 6.

* “Detented metering” is measuring and registering power flow in a single direction by either mechanical, or electronic, or programming means in a revenue meter.

5.5 Transformer

A transformer at a DG facility serves two purposes. First, it enables proper voltage matching between the generator and the utility connection. Secondly, it acts as a buffer to limit any current contribution from the DG facility in the event of a short circuit on the electric system.

The Company will determine when dedicated services and a dedicated transformer are required in order to reduce the impact on other adjacent customers. The need for a dedicated transformer(s) may be determined at any point in the generator’s life cycle. If a dedicated transformer(s) is required, the Customer will be advised by the Company in writing. The cost of the transformer(s) will be the responsibility of the Customer according to PSC No. 220 and as permitted by the NY SIR.

5.6 Manual Generator Disconnect Switch

1. According to the NY SIR, inverter-based systems 25 kW and below are not required to have a separate disconnect if the unit has a disconnecting means integrated into the design and meets the requirements of the NEC.

2. For those projects requiring a disconnect switch, these isolation devices shall meet applicable Underwriters Laboratories (UL), American National Standards Institute (ANSI), and IEEE standards, and shall be installed to meet the NEC and all applicable local, state, and federal codes.

3. The Customer’s DG facility shall have an electrical load break disconnect switch accessible at all times to the Company to electrically isolate the Company Distribution EPS from the Customer’s generator facilities.

4. In accordance with the Company’s safety rules and practices, this isolation device must be used to establish a visually open, working clearance boundary when performing maintenance and repair work. The designated generator disconnect also must be accessible and lockable in the open position and have provisions for both Company and Customer padlocks.

5. The visible generator disconnect switch must be a blade-type switch (“knife switch”) meeting the requirements of the NEC and nationally recognized product standards. Pull-out switches commonly used in air-conditioning units and spas are not permitted for this application.
6. The connection of the disconnect switch shall have the line connection (i.e., jaw side) of the switch made to the utility source.

7. Additionally, the Customer is solely responsible for the maintenance of all fuses in fused, blade-type disconnect switches.

8. This disconnect device shall be identified by a permanent sign as required by the NEC and the NY SIR.

5.7 **Protective Device Equipment**

5.7.1 **Type Tested Equipment**

Protective equipment that has been type tested and recognized by the NY SIR will be permitted. See the PSC’s list of certified interconnection equipment at: [http://www3.dps.state.ny.us/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/dcf68efca391ad6085257687006f396b/$FILE/SIRDevices.pdf](http://www3.dps.state.ny.us/W/PSCWeb.nsf/96f0fec0b45a3c6485257688006a701a/dcf68efca391ad6085257687006f396b/$FILE/SIRDevices.pdf). The Customer shall follow the testing requirements as outlined in PSC No. 220 Rule 53 and the NY SIR. **Exhibit 7** attached is a guide for the Company’s witness for verifying a type tested net-metered DG installation’s operational compliance.

5.7.2 **Non-Type Tested Equipment**

1. Protective equipment that has not been type tested per the NY SIR will be permitted with the implementation of utility grade protective devices acceptable to the Company. The use of utility grade relays and relay redundancy is acceptable subject to prior Company review and acceptance.

2. Meter selector switches shall not be connected into the secondary circuits of current transformers used with protective relays specified by the Company.

3. **Use of Microprocessor Based Relays**

   1. **Number of Relays Required:**

      Where relay performance may affect the operation of the Company Distribution EPS at service voltages less than 15kV, a single microprocessor-based relay along with a Company approved scheme, where relay failure automatically trips the associated breaker(s), is acceptable. If the Customer decides not to use redundant microprocessor-based protection systems on their other equipment, then appropriate action such as removing equipment from service shall be taken when a piece of equipment is no longer adequately protected.

   2. **Test Switches:**

      Microprocessor relays shall have ABB FT-1, or equivalent, test switches isolating all inputs and outputs of the relay.

      - **AC Inputs:** Each relay shall have its own AC test switch. DC inputs or outputs are not permitted on AC test switches.

      - **DC Inputs and Outputs:**

        - For relays designated by the Company as necessary to protect its electric system, it is required that each individual relay have its own DC test switch that isolates the positive and negative DC for each input and output.

        - For relays required to protect customer equipment, it is preferred that each relay have its own DC test switch for inputs and outputs. For ease of maintenance testing and troubleshooting, it is preferred to isolate the positive and negative DC of the input and output.

      - Groups of relays that protect the same piece of equipment, such as a transformer or a feeder, may share a DC test switch under the following conditions:

        - The individual blades of the test switch shall be grouped by relay.

        - A permanent label shall be affixed to the relay panel identifying the use of each blade.

5.7.3 **Utility Grade Protective Device Settings and Verification**

For the latest authorized version please refer to the Company’s website at [http://www.nationalgridus.com/electricalspecifications](http://www.nationalgridus.com/electricalspecifications).
5.7.3.1 Company-designated Relays and Customer Settings

The Company will review the Customer’s settings and their calibration and test results of those relays that the Company’s Protection Engineering Dept. designates as being required to satisfy the Company protection practices. Any relay setting specified by the Company shall not be changed or modified at any time without the written consent of the Company.

5.7.3.2 Company Verification of Relay Testing

The Company requires a letter from the Customer stipulating that all Company-designated protective devices shall have:

- control wiring verified against the accepted design drawings, and,
- the calibration test performed satisfactorily according to the relay setting document of the accepted design.

The Company reserves the right to witness the Customer’s functional test of the required devices, i.e., trip tests. This activity will normally be performed on a schedule as specified by the PSC No. 220 Rule 53 and the NY SIR.

The Customer shall be responsible to specify the settings, calibrate, test, and maintain the balance of their equipment.

5.7.4 Anti-islanding

The Customer’s generation facility will not be permitted to energize a de-energized Company circuit. The IEEE 1547 states that anti-islanding protection is required for parallel generation on the EPS. The Customer may propose various methods of anti-islanding protection of their own generation facility. It is the Customer’s responsibility to demonstrate comprehensively the validity of such methods and the Company reserves the right to make the final determination as to which anti-islanding protection method is suitable. The use of direct transfer trip (DTT) is a definitive protection means for anti-islanding protection under good utility practice.

Note: A Customer wishing to use a generation system as a stand-by or emergency generator shall submit details regarding an interlocking scheme, or transfer switch to prevent the energization of a de-energized Company circuit that complies with National Grid ESB 750, Section 11.

5.7.5 Power Quality Compliance Verification

If during the study a DG interconnection project is identified as having the potential to cause power quality (PQ) effects on the EPS, then PQ monitoring shall be installed by the Company or Company-accepted third party PQ testing company to verify power quality with and without generation. Third party PQ test methods and results may be submitted to the Company for review and acceptance. These verification tests shall include, at a minimum, the following in accordance with the Company’s electricity tariff, PSC No. 220, and the limits and cost responsibilities specified in the NY SIR:

- Check service point voltage for any discernible voltage fluctuation.
- Check service point frequency for any discernible frequency fluctuation.
- Check service point power factor to ensure it is no less than 90% (leading or lagging).
- Check service point harmonic distortion to ensure limits specified in ESB 750 and the NY SIR as applicable, are maintained. Current harmonic distortion shall not adversely affect voltage harmonic distortion, the Company Distribution EPS, or service to other customers.

6.0 OPERATING

6.1 Power Factor

The Customer’s overall (leading or lagging) power factor at the service point shall not be less than 90% or that which is permitted at the PCC by the NY SIR. Corrective equipment may be required; if so, refer to ESB 750.
6.2 Power Quality Monitoring

1. If disturbances on the EPS and/or to other customers are determined to originate from a Customer with DG, PQ monitoring shall be installed to verify power quality in accordance with the Company’s tariff, PSC No. 220.

2. If any power quality concerns cannot be corrected, the Customer will not be permitted to continue generation until such concerns are resolved to the Company’s satisfaction.

6.3 Isolation

The Company reserves the right to have the Customer remove their generation from the Company Distribution EPS at any time upon the Company’s request. Normally, such requests result from the need to facilitate maintenance, test, or repair of Company facilities. The Customer’s generator disconnect switch may be opened by the Company (i.e., isolating the Customer’s generating equipment), without prior notice to the Customer, for any of the following reasons:

- System emergency operations require such action.
- Company periodic checks of Customer’s interfacing equipment reveal a hazardous condition.
- Generating equipment interferes with other customers or with the operation of the Company EPS.
- Protective device tampering.
- Parallel operation, other than for NY SIR testing of type tested inverters, prior to Company approval to interconnect.
- Failure to make available records of verification tests and maintenance of the Customer’s protective devices designated by the Company.

6.4 Balance of Customer Equipment

1. The Customer is responsible for performing all operating functions associated with their equipment and for maintaining all equipment under their ownership. The Customer shall arrange to have trained personnel available for the proper and safe operation of their equipment.

2. The Customer shall provide proper and continuous maintenance of all plant facilities; refer to National Fire Protection Association (NFPA) recommended practice NFPA 70B (and NFPA 73 where applicable) and other nationally recognized industry guides for guidance on electric equipment maintenance.

3. The Customer’s backup service requirements from the Company’s system shall be requested using the prescribed forms in the Company’s tariff, PSC No. 220.

4. Where the Company is requested to supply demand pulse information (either analog or digital), its use is not intended for generator control.

7.0 REVISION HISTORY

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description of Revision</th>
</tr>
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<tbody>
<tr>
<td>1.0</td>
<td>06/01/07</td>
<td>Initial version of new document superseding all previous revisions of ESB 756.</td>
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<tr>
<td>2.0</td>
<td>09/06/11</td>
<td>Revise entire document for Dec. 2010 NY SIR.</td>
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EXHIBITS ATTACHED
**EXHIBIT 1: Niagara Mohawk Power Corp. Tariff PSC No. 220 Rule 53**

https://www2.dps.state.ny.us/ETS/jobs/display/download/4912540.pdf

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
### EXHIBIT 2: Company Milestone Requirements for Greater than 200kW and up to 2MW Customer DG Project Schedule

These are Company items to be considered in the Customer’s DG Project Schedule.

<table>
<thead>
<tr>
<th>ID</th>
<th>Activity Description</th>
<th>NY SIR §1.C or ESB ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Project Definition &amp; Conceptual Analysis Phase</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Customer Form K w/technical submittal &amp; prelim. design received</td>
<td>Steps 1 - 3</td>
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<tr>
<td>2</td>
<td>Company Preliminary Technical Assessment &amp; cost estimate for CESIR</td>
<td>Step 4</td>
</tr>
<tr>
<td>3</td>
<td>Company Form K Interconnection Agreement and Form G as needed are executed with Customer</td>
<td>Step 5</td>
</tr>
<tr>
<td>4</td>
<td>Customer commits to preliminary CESIR and provides advance payment</td>
<td>Step 5</td>
</tr>
<tr>
<td></td>
<td><strong>Final Design Review Phase</strong></td>
<td></td>
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<tr>
<td>5</td>
<td>Company CESIR and Interconnection Study/Service Plan</td>
<td>Step 6</td>
</tr>
<tr>
<td>6</td>
<td>Customer commits to utility system modifications in CESIR &amp; Interconnection Study/Service Plan and provides advance payment</td>
<td>Step 7</td>
</tr>
<tr>
<td>7</td>
<td>Customer’s project schedule and final design &amp; specifications received</td>
<td>Step 7; ESB 750 &amp; 752 or 753 or 754 or 758</td>
</tr>
<tr>
<td>8</td>
<td>Company reviews Customer’s design &amp; returns comments</td>
<td>Step 8; ESB 752 or 753 or 754 or 758</td>
</tr>
<tr>
<td></td>
<td><strong>Installation Progress Review Phase</strong></td>
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<tr>
<td>9</td>
<td>Customer’s corrected design, test reports &amp; settings received</td>
<td>Step 8; ESB 752 or 753 or 754 or 758</td>
</tr>
<tr>
<td>10</td>
<td>Company reviews Customer’s design &amp; returns comments</td>
<td>Step 8; ESB 752 or 753 or 754 or 758</td>
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<tr>
<td>11</td>
<td>Company field audit of Customer’s installation progress</td>
<td>Steps 8 &amp; 9</td>
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<td><strong>Installation Compliance Verification Phase</strong></td>
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<tr>
<td>12</td>
<td>Customer’s advance notice of functional testing received</td>
<td>Step 9; ESB 755</td>
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<td>13</td>
<td>Electrical inspection certification approval received from municipal or AHJ authorized 3rd party agency</td>
<td>Steps 9 &amp; 10; ESB 750 &amp; 752 or 753 or 754 or 758</td>
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<td>Customer’s acknowledgement of satisfactory wiring &amp; relay calibration tests received</td>
<td>Steps 9 &amp; 10; ESB 755</td>
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<tr>
<td>15</td>
<td>Company witness of Customer’s functional testing</td>
<td>Step 10; ESB 755</td>
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<tr>
<td>16</td>
<td>Company field audit of Customer’s service connection</td>
<td>Steps 8 - 10; ESB 750 &amp; 752 or 753 or 754 or 758</td>
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<td>17</td>
<td>Customer resolves open items</td>
<td>Steps 8 - 10; ESB 750 &amp; 752 or 753 or 754 or 758</td>
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<td></td>
<td><strong>Energization &amp; Synchronization Phase</strong></td>
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<tr>
<td>18</td>
<td>Verification testing satisfied</td>
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<td>Company’s metering installation complete</td>
<td>Steps 8 - 10; ESB 750 &amp; 752 or 753 or 754 or 758</td>
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<td>20</td>
<td>Company’s supply system interconnection complete</td>
<td>Steps 9 &amp; 10</td>
</tr>
<tr>
<td>21</td>
<td>Company review/acceptance of Customer’s resolved open items</td>
<td>Steps 9 &amp; 10</td>
</tr>
<tr>
<td>22</td>
<td>Customer’s energization sequence plan received for interconnections &gt;600V</td>
<td>Steps 9 &amp; 10; ESB 755</td>
</tr>
<tr>
<td>23</td>
<td>Company proceeds with energization</td>
<td>Steps 9 &amp; 10</td>
</tr>
<tr>
<td>24</td>
<td>Customer is permitted to synchronize generation facility in parallel to the Company’s supply</td>
<td>Step 10</td>
</tr>
<tr>
<td></td>
<td><strong>Project Closeout Phase</strong></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>For interconnections &gt;600V, remainder of Customer’s protective system functional testing documented in an acknowledgement letter submitted to the Company within 10 business days after energization</td>
<td>Step 11; ESB 755</td>
</tr>
<tr>
<td>26</td>
<td>Customer’s as-built design drawings received within 90 days for interconnections &gt;600V</td>
<td>Step 11; ESB 750 § 1.7</td>
</tr>
<tr>
<td>27</td>
<td>Company reconciliation of project costs with Customer</td>
<td>Step 11</td>
</tr>
</tbody>
</table>
EXHIBIT 3: Reference Maps of National Grid upstate NY Secondary Network EPS Areas

NY Central Division

NY Eastern Division

NY Western Division

National Grid customers in the downtown districts of Albany, Buffalo, Cortland, Glens Falls, Niagara Falls, Schenectady, Syracuse, Troy, Utica, or Watertown can refer to the following Internet web site to view maps of National Grid’s Secondary Networks and determine if the proposed location is served in those areas.

https://www.nationalgridus.com/niagaramohawk/home/energyeff/network/5_networkmap.asp
EXHIBIT 4: Distribution Secondary Grid Network Description

In Upstate New York, National Grid generally has two types of electrical distribution systems: radial and distribution secondary network systems. While the vast majority of customers are served from radial power systems, some customers in the downtown districts of Albany, Buffalo, Cortland, Glens Falls, Niagara Falls, Schenectady, Syracuse, Troy, Utica, or Watertown are served by distribution secondary network systems; see Exhibit 3 for area maps. These systems are designed to meet the higher reliability needs, dense load levels, and limited space commonly encountered in urban areas.

A distribution secondary network system delivers electricity through a complex and integrated system of transformers and underground cables that are connected and operate in parallel. Power can flow in either direction on the secondary service delivery lines, commonly called secondary distribution lines. The loss of a single line or transformer in a secondary network system does not cause an interruption of power, unlike radial systems where there is only one line and one path for power to flow from the distribution substation to the customer’s point of service. If a radial system experiences an outage, service is interrupted to the customers until repairs are completed; this is less likely to be the case in a distribution secondary network system.

In distribution secondary network systems, devices called “network protectors” are usually arranged to automatically connect its associated transformer to the network system when conditions are such that the transformer when connected will supply power to the network and to automatically disconnect the transformer from the network when power flows from the network to the transformer. The integration of DG into a distribution secondary network system may result in network protectors exceeding their original design criteria or nameplate ratings.

Example Distribution Secondary Grid Network Diagram
EXHIBIT 5: Recommended Guidelines for Residential and Commercial Single-line Diagram Submittals

Refer to Figures 1 and 2 for typical illustrations.

1. Identify the project, Company’s electric service order (ESO) number, location and submitter’s name and address.

2. Indicate standard and any non-standard system voltages, number of phases, and frequency of the incoming circuit. Indicate wye and delta systems; show whether grounded or ungrounded.

3. Identify cable, conductors and conduit, the type and number. The Company is interested in how the power is getting from the service point to the protective equipment.

4. Identify wiring troughs and/or junction boxes where used.

5. Use standard symbols. See NFPA 70B or IEEE Standard 141 for symbols in typical electrical single-line diagram development.

6. Identify the service equipment’s switch and fuse or circuit breaker as to manufacturer, type, rating, catalog number, etc. Catalog cuts are not required for most major manufacturers. Service equipment must be able to safely interrupt the maximum available fault current from the supply; refer to NEC Articles 110 and 230.

7. Show billing meter trough or instrument transformers’ cabinet (C.T. cabinet) in circuitry. Indicate source and load for the circuit. Refer to Section 7 in the Company’s ESB 750 for acceptable metering configurations.

8. Identify other protective devices and ratings. Include ratings in volts and amps, the interruption rating, and type and number of trip coils on circuit breakers. Also, note any special features of fuses (current limiting, dual element, etc.).

9. Identify ratios of current and potential transformers, taps to be used on multi-ratio transformers, and connection of dual ratio current transformers if used.

10. Identify any relays, if used, and their functions.

11. Show connections and ratings of power transformer windings for any to be used.

12. Identify Generator Disconnect and its ratings.
FIGURE 1: Sample Residential Photovoltaic Distributed Generator Installation – Single Phase, Net Metering

COMPANY's RADIAL DISTRIBUTION SYSTEM

UNDERGROUND

Service Point → Company Line Pole (No.) or Pad Mtd. Transformer (No.)

Company Line Pole (No.)

Customer

Company Line Pole (No.)

Service Point

Customer's Service Head

OVERHEAD

Service Conductors (Underground)

Service Conductors (Overhead)

Outside

Wh

Inside

Main Circuit Breaker

Main Service Equipment

停止信号

Residential Loads

A

A

V

W

kA

A

kW

VAC

Type-tested Inverter

Output

DC Overcurrent Protective Device

OSG Control Cabinet

Generator Lead Conductors

Generator Lead Disconnect (lockable)

A, VAC

A

A

A

A

PV Array on roof

VDC, Arrays X Amps per Array = Total Amps

PARALLEL ELECTRIC SOURCE

PV Array Disconnect

For the latest authorized version please refer to the Company's website at http://www.nationalgridus.com/electricalspecifications.
**FIGURE 2: Sample Commercial Distributed Generator Installation**

COMPANY’s RADIAL DISTRIBUTION SYSTEM

- **Service Point**
  - Company Line Pole (No.) or Pad Mtd. Transformer (No.)
  - Service Conductors (Underground)

- **Customer**
  - Company Line Pole (No.)
  - Service Conductors (Overhead)

- **Outside**
  - Wh
  - Main Circuit Breaker
  - Company Billing Meter

- **Inside**
  - Main Service Equipment
  - Generator Disconnect (accessible & lockable)
  - Wh
  - Generator Lead Conductors
  - Control

- **Parallel Electric Source**
  - Generators
  - Inverter & Control
  - Type-tested
  - Output
  - Kw, Vac

---

* Control equipment to assure generator separation from utility system when system develops problems. Examples of equipment:

<table>
<thead>
<tr>
<th>Device No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>81 O/U</td>
<td>Over/Under Frequency</td>
</tr>
<tr>
<td>59</td>
<td>Overvoltage</td>
</tr>
<tr>
<td>27</td>
<td>Undervoltage</td>
</tr>
<tr>
<td>52</td>
<td>Circuit breaker</td>
</tr>
<tr>
<td>32</td>
<td>Reverse Power</td>
</tr>
</tbody>
</table>

(Reverse Power function required for peak shaving.)
### EXHIBIT 6: Recommended Guidelines for Functional Single-line Diagram Submittals

Refer to Figures 3 and 4 for typical illustrations.

In addition to Exhibit 5:

13. On functional single-line diagram submittals, industry standard device numbers are necessary. Refer to the following List of Standard Device Numbers (See latest edition of ANSI C 37.2):

<table>
<thead>
<tr>
<th>Device Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Synchronizing Device</td>
</tr>
<tr>
<td>27</td>
<td>Undervoltage Relay</td>
</tr>
<tr>
<td>32</td>
<td>Directional Power Relay</td>
</tr>
<tr>
<td>46</td>
<td>Negative Sequence Voltage</td>
</tr>
<tr>
<td>50</td>
<td>Instantaneous Overcurrent Relay</td>
</tr>
<tr>
<td>51</td>
<td>Phase Overcurrent Relay</td>
</tr>
<tr>
<td>51N</td>
<td>Neutral Overcurrent Relay</td>
</tr>
<tr>
<td>51V</td>
<td>Overcurrent Relay, voltage restraint</td>
</tr>
<tr>
<td>52</td>
<td>Breaker</td>
</tr>
<tr>
<td>52R</td>
<td>Recloser</td>
</tr>
<tr>
<td>59</td>
<td>Overvoltage Relay</td>
</tr>
<tr>
<td>59G</td>
<td>Neutral Voltage Relay</td>
</tr>
<tr>
<td>59N</td>
<td>Zero Sequence Voltage Relay</td>
</tr>
<tr>
<td>62</td>
<td>Time-delay Stopping or Opening Relay</td>
</tr>
<tr>
<td>64</td>
<td>Ground Protective Relay</td>
</tr>
<tr>
<td>81</td>
<td>Over and Under Frequency Relay</td>
</tr>
<tr>
<td>86</td>
<td>Locking - Out Relay</td>
</tr>
<tr>
<td>87</td>
<td>Differential Relay</td>
</tr>
</tbody>
</table>
FIGURE 3: Sample Functional Single-Line Diagram

NOTES:

a. A fused interrupter switch may also be used instead of the breaker.
   If fused interrupter is used, relaying associated with the transformer is not used.
b. In-plant generator for partial plant load and back-up.
c. Devices 67 and 32 are directional. Polarity of CTs and PTs must be verified.
d. Overcurrent and bus differential protection should be provided for the main, generator, and tie breakers, but protection is not shown here. See IEEE Std. C37.95 and C37.97.

Trip function lines not shown.
See IEEE Std. 242 Buff Book “Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems” for more information.

[TYPICAL ONLY]
**FIGURE 4: Typical 3V₀ Requirements for Local EPS Ground Fault Detection**

The Company requires ground protection on any system that can be a generation source and to protect transformers that can be paralleled and supplied from two sources. In these cases, a “zero-sequence” voltage or “3V₀” scheme will be required on the primary side of a delta primary wound transformer supplying the facility. Typically, the added relaying on the primary side of the transformer is a ground overvoltage device function 59N or 59G relay that can detect the presence of the single line-to-ground fault on the Local EPS. This is implemented by installing potential transformers (PTs) on the primary system and then placing a voltage relay in the corner of the delta winding on the instrumentation transformer.
EXHIBIT 7: Net Metering Compliance Verification Checklist

Account Number: ________________________________

Customer Name: ____________________________________________  Phone  #__________________

Service Address: ____________________________________________

Billing Address: ____________________________________________

Qualified Installer: ____________________________________________  Phone  #__________________

Address: ______________________________________________________

☑ Verify One-Line Diagram (installed equipment)
   ______ Inverter Model ___________________________ or Intertie Multifunction Relay Model ___________________________
   ______ Software version ___________________________
   ______ Company billing meter s/n ___________________________ Net-meter One Meter Option: YES____NO____
   ______ Inspection received? YES____Number__________________________ (attach copy of approval certificate)
   ______ NO____, then stop and await inspection approval.

☑ Verify Plot Plan (equipment’s location)
   ______ “Generator Disconnect Switch” is at agreed location: YES____NO____.
   ______ “Generator Disconnect Switch” is labeled as such: YES____NO____.
   ______ Label is at meter location to identify location of Generator Disconnect: YES____NO____.

☑ Verify DG System Is Operating (producing power)
   ______ Verify “Generator Disconnect Switch” is Open.
   ______ Verify voltage is zero volts on DG side of open “Generator Disconnect Switch”: YES____NO____.
   ______ Close “Generator Disconnect Switch”.
   ______ Verify DG Inverter or Intertie Multifunction Relay alarms and voltage present on utility side of “Generator Disconnect Switch”: YES____NO____.

☑ Restoration of Utility Power Test
   ______ Open “Generator Disconnect Switch”, pause at least 1 to 2 minutes, then Close “Generator Disconnect Switch”. Record time when “Generator Disconnect Switch” is closed: _______
   ______ Record time when DG starts producing power: ____________. Is the time between the “Generator Disconnect Switch” closure and when DG Inverter or Intertie Multifunction Relay permits synchronization to utility source greater than 5 minutes? YES____NO____.

☑ 24 Hour Telephone Number Contact

Name: ____________________________  Number (____) - ______________

Performed by: ____________________________ signature: ____________________________ Date: ____________

Name (Customer’s qualified installer.)

Witnessed by: ____________________________ signature: ____________________________ Date: ____________

Name (Company witness.)
Electric System Bulletin No. 756 Appendix C:

Requirements for Parallel Generation Connected To National Grid Facilities in Massachusetts

May 2007 version 1.1

ESB 76 Appendix C is part of the ESB 750 series
PREFACE


* This document is also available electronically at:
  https://www.nationalgridus.com/masselectric/non_html/rates_tariff.pdf#nameddest=interconnection

This is an appendix to ESB 756 and is available from the Company’s web site and may be obtained:

- From the Internet at http://www.nationalgridus.com/electricalspecifications,
- Or in printed form by contacting either of the Call Centers in Massachusetts or New York (see inside cover of ESB 750). However, printed copies are not document controlled, so for the latest authorized version please refer to the Company’s website.
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1.0 INTRODUCTION

1.1 Applicability
This document ("Interconnection Tariff") describes the process and requirements for an Interconnecting Customer to connect a power-generating facility to the Company’s Electric Power System (“Company EPS”), including discussion of technical and operating requirements, metering and billing options, and other matters, except as provided under the applicable ISO-NE tariff and/or under the Qualifying Facility regulations in 220 CMR 8.04.

The procedure for momentary paralleling to the Company EPS with back-up generation is described within Section 4.0 Interconnection Requirements.

If the Facility will always be isolated from the Company’s EPS, (i.e., it will never operate in parallel to the Company’s EPS), then this Interconnection Tariff does not apply.

1.2 Definitions
The following words and terms shall be understood to have the following meanings when used in this Interconnection Tariff:

**Affected System:** Any neighboring EPS not under the control of the Company (i.e., a municipal electric light company or other regulated utility).

**Affiliate:** A person or entity controlling, controlled by or under common control with a Party.

**Anti-islanding:** Describes the ability of a Facility to avoid unintentional islanding through some form of active control technique.
**Application:** The notice (which will serve as the Notice of Intent to Interconnect under 220 C.M.R. §§ 8.0 et seq. when required) provided by the Interconnecting Customer to the Company in the form shown in Exhibits A and B, which initiates the interconnection process.

**Area EPS:** The Company EPS. This term is used in the Institute of Electrical and Electronics Engineers (IEEE) Standard 1547-2003, “IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems” (“IEEE Standard 1547-2003”).

**Company:** Massachusetts Electric Company and Nantucket Electric Company, as applicable.

**Company EPS:** The electric power system owned, controlled or operated by the Company used to provide distribution service to its Customers.

**Customer:** Company’s retail customer; host site or premises, may be the same as Interconnecting Customer.

**Department:** The Massachusetts Department of Telecommunications and Energy.

**Detailed Study:** The final phase of engineering study, if necessary, conducted by the Company to determine substantial System Modifications to its EPS, resulting in project cost estimates for such modifications that will be required to provide the requested interconnection service.

**DG:** Distributed Generation.

**DR:** The Facility. This term is used in IEEE Standard 1547-2003.

**Expedited Process:** As described in Section 3.2, process steps for Listed Facilities from initial application to final written authorization, using a set of technical screens to determine grid impact.

**Facility:** A source of electricity owned and/or operated by the Interconnecting Customer that is located on the Customer’s side of the PCC, and all facilities ancillary and appurtenant thereto, including interconnection equipment, which the Interconnecting Customer requests to interconnect to the Company EPS.

**FERC:** Federal Energy Regulatory Commission.

**Good Utility Practice:** Any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in the region.

**Impact Study:** The engineering study conducted by the Company under the Standard Process to determine the scope of the required modifications to its EPS and/or the Facility to provide the requested interconnection service.

**In-Service Date:** The date on which the Facility and System Modifications (if applicable) are complete and ready for service, even if the Facility is not placed in service on or by that date.

**Interconnecting Customer:** Entity that owns and/or operates the Facility interconnected to the Company EPS, with legal authority to enter into agreements regarding the construction or operation of the Facility. ¹

**Interconnection Service Agreement:** An agreement for interconnection service, the form of which is provided in Exhibit F, between the Interconnecting Customer and the Company. The

---

¹ An entity which owns the Facility interconnected to the Company EPS solely as part of a financing arrangement, which could include the acquisition of the tax credits related to the Facility, but is neither the Customer nor the operator of that Facility, shall not be considered the Interconnecting Customer hereunder.
agreement also includes any amendments or supplements thereto entered into by the Interconnecting Customer and the Company.

Islanding: A situation where electrical power remains in a portion of an electrical power system when the Company’s transmission or distribution system has ceased providing power for whatever reason (emergency conditions, maintenance, etc.) Islanding may be intentional, such as when certain segregated loads in a Customer’s premises are provided power by a Facility after being isolated from the Company EPS after a power failure. Unintentional Islanding, especially past the PCC, is to be strictly avoided.

ISO-New England, Inc (“ISO-NE”): The Independent System Operator established in accordance with the NEPOOL Agreement and applicable FERC approvals, which is responsible for managing the bulk power generation and transmission systems in New England.

Isolated: The state of operating the Facility when electrically disconnected from the Company EPS on the Interconnecting Customer’s side of the PCC.

Local EPS: The customer premises within which are contained the Facility. This term is used in the IEEE Standard 1547-2003.

Listed: A Facility that has successfully passed all pertinent tests to conform with IEEE 1547.1.

Metering Point: For meters that do not use instrument transformers, the point at which the billing meter is connected. For meters that use instrument transformers, the point at which the instrument transformers are connected.


Net Metering: A customer of the Company with an on-site Facility of 60 kilowatts (“kW”) or less in size exercising the option to run the meter backward and thus choosing to receive a credit from the Company equal to the average monthly market price of generation per kilowatt hour, as determined by the Department, in any month during which there was a positive net difference between kilowatt hours generated and consumed. (See 220 C.M.R. § 11.04(7)(c)).

Network Distribution System (Area or Spot): Electrical service from an EPS consisting of one or more primary circuits from one or more substations or transmission supply points arranged such that they collectively feed secondary circuits serving one (a spot network) or more (an area network) Interconnecting Customers.

Non-Islanding: Describes the ability of a Facility to avoid unintentional islanding through the operation of its interconnection equipment.


On-Site Generating Facility: A class of Interconnecting Customer-owned generating Facilities with peak capacity of 60 kW or less, as defined in 220 C.M.R. § 8.00.

Parallel: The state of operating the Facility when electrically connected to the Company EPS (sometimes known as grid-parallel).


Point of Common Coupling (PCC): The point where the Interconnecting Customer’s local electric power system connects to the Company EPS, such as the electric power revenue meter or premises service transformer. See the Company for the location at a particular Interconnecting Customer site.

Point of Delivery: A point on the Company EPS where the Interconnecting Customer makes capacity and energy available to the Company. The Point of Delivery shall be specified in the Interconnection Service Agreement.

Point of Receipt: A point on the Company EPS where the Company delivers capacity and energy to the Interconnecting Customer. The Point of Receipt shall be specified in the Interconnection Service Agreement.

Qualifying Facility: A generation Facility that has received certification as a Qualifying Facility from the FERC in accordance with the Federal Power Act, as amended by the Public Utility Regulatory Policies Act of 1978, as defined in 220 C.M.R. § 11.04.
Radial Distribution Circuit: Electrical service from an EPS consisting of one primary circuit extending from a single substation or transmission supply point arranged such that the primary circuit serves Interconnecting Customers in a particular local area.

Screen(s): Criteria by which the Company will determine if a proposed Facility’s installation will adversely impact the Company EPS in the Simplified and Expedited Processes as set forth in Section 3.0.

Simplified Process: As described in Section 3.1, process steps from initial application to final written authorization for certain inverter-based Facilities of limited scale and minimal apparent grid impact.

Standard Process: As described in Section 3.3, process steps from initial application to final written authorization for Facilities that do not qualify for Simplified or Expedited treatment.

Supplemental Review: Additional engineering study to evaluate the potential impact of the Facility on the Company EPS so as to determine any requirements for processing the application through the Expedited Process.

System Modification: Modifications or additions to distribution-related Company facilities that are integrated with the Company EPS for the benefit of the Interconnecting Customer.

Unintentional Islanding: A situation where the electrical power from the Facility continues to supply a portion of the Company EPS past the PCC when the Company’s transmission or distribution system has ceased providing power for whatever reason (emergency conditions, maintenance, etc.).

Witness Test: The Company’s right to witness the commissioning testing. Commissioning testing is defined in IEEE Standard 1547-2003.

1.3 Forms and Agreements

The following documents for the interconnection process are included as Exhibits:

1. Interconnection Service Agreement for Expedited and Standard Process (Exhibit F) referencing Attachments 1 – 6 (Attachments 1 – 5 to be developed and included as appropriate for each specific Interconnection Service Agreement) as follows:
   - Attachment 1: Definitions (Section 1.2)
   - Attachment 2: Description of Facilities, including demarcation of PCC
   - Attachment 3: Description of System Modifications
   - Attachment 4: Costs of System Modifications and Payment Terms
   - Attachment 5: Special Operating Requirements, if any
   - Attachment 6: Agreement between the Company and the Company's Retail Customer (to be signed by the Company's retail customer where DG installation and interconnection will be placed, when retail customer is not the owner and/or operator of the distributed generation facility -- Exhibit G)

2. Application forms:
   a. Simplified Process (Facilities meeting the requirements of Section 3.1) application form and service agreement (Exhibit A)
   b. Expedited and Standard Process application form (Exhibit B)

3. Supplemental Review Agreement for those projects which have failed one or more screens in the Expedited Process (Exhibit C)

4. Impact Study Agreement under the Standard Process (Exhibit D)

5. Detailed Study Agreement for the more detailed study under the Standard Process which requires substantial System Modifications (Exhibit E)
2.0 BASIC UNDERSTANDINGS

Interconnecting Customer intends to install a Facility on the Customer’s side of the PCC that will be connected electrically to the Company EPS and operate in parallel, synchronized with the voltage and frequency maintained by the Company during all operating conditions. It is the responsibility of the Interconnecting Customer to design, procure, install, operate, and maintain all necessary equipment on its property for connection to the Company EPS. The Interconnecting Customer and the Company shall enter into an Interconnection Service Agreement to provide for parallel operation of an Interconnecting Customer’s Facility with Company EPS. A form of this agreement is attached as Exhibit F to this Interconnection Tariff. If the Interconnecting Customer is not the Customer, an Agreement between the Company and the Company’s Customer must be signed and included as an attachment to the Interconnection Service Agreement; a form of this agreement is attached as Exhibit G.

The interconnection of the Facility with the Company EPS must be reviewed for potential impact on the Company EPS under the process described in Section 3.0 and meet the technical requirements in Section 4.0, and must be operated as described under Section 6.0. In order to meet these requirements, an upgrade or other modifications to the Company EPS may be necessary. Subject to the requirements contained in this Interconnection Tariff, the Company or its Affiliate shall modify the Company EPS accordingly. Unless otherwise specified, the Company will build and own, as part of the Company EPS, all facilities necessary to interconnect the Company EPS with the Facility up to and including terminations at the PCC. The Interconnecting Customer shall pay all System Modification costs as set forth in Section 5.0.

The Interconnecting Customer should consult the Company before designing, purchasing and installing any generation equipment, in order to verify the nominal utilization voltages, frequency, and phase characteristics of the service to be supplied, the capacity available, and the suitability of the proposed equipment for operation at the intended location. Attempting to operate a generator at other than its nameplate characteristics may result in unsatisfactory performance or, in certain instances, injury to personnel and/or damage to equipment. The Interconnecting Customer will be responsible for ascertaining from the Company, and the Company will diligently cooperate in providing, the service characteristics of the Company EPS at the proposed PCC. The Company will in no way be responsible for damages sustained as a result of the Interconnecting Customer’s failure to ascertain the service characteristics at the proposed PCC.

The Facility should operate in such a manner that does not compromise, or conflict with, the safety or reliability of the Company EPS. The Interconnecting Customer should design its equipment in such a manner that faults or other disturbances on the Company EPS do not cause damage to the Interconnecting Customer's equipment.

Authorization to interconnect will be provided once the Interconnecting Customer has met all terms of the interconnection process as outlined below.

This Interconnection Tariff does not cover general distribution service needed to serve the Interconnecting Customer. Please refer to the Company’s Terms and Conditions for Distribution Service. This Interconnection Tariff does not cover the use of the distribution system to export power, or the purchase of excess power unless covered under 220 C.M.R. §§ 8.00 et seq.

3.0 PROCESS OVERVIEW

There are three basic paths for interconnection of the Interconnecting Customer’s Facility in Massachusetts. They are described below and detailed in Figures 1 and 2 with their accompanying notes. Tables 1 and 2, respectively, describe the timelines and fees for these
paths. Unless otherwise noted, all times in the Interconnection Tariff reference Company business days under normal work conditions.

1. Simplified – This is for Listed inverter-based Facilities with a power rating of 10 kW or less single phase or 25 kW or less three-phase depending on the service configuration, and located on radial EPS's under certain conditions. A Listed inverter-based Facility with a power rating of 15 kW or less single phase located on a spot network EPS under certain conditions would also be eligible.

2. Expedited – This is for Listed Facilities that pass certain pre-specified screens on a radial EPS.

3. Standard – This is for all facilities not qualifying for either the Simplified or Expedited interconnection processes on radial and spot network EPS's, and for all Facilities on area network EPS's.

All proposed new sources of electric power without respect to generator ownership, dispatch control, or prime mover that plan to operate in parallel with the Company EPS must submit a completed application and pay the appropriate application fee to the Company with which it wishes to interconnect. The application will be acknowledged by the Company, and the Interconnecting Customer will be notified of the application’s completeness. Interconnecting Customers who are not likely to qualify for Simplified or Expedited Process may opt to go directly into the Standard Process path. Interconnecting Customers proposing to interconnect on area networks will also go directly to the Standard Process. All other Interconnecting Customers must proceed through a series of screens to determine their ultimate interconnection path. (Interconnecting Customers not sure whether a particular location is on a radial circuit, spot network, or area network should check with the Company serving the proposed Facility location prior to filing and the Company will verify the circuit type upon filing.)

If the Interconnecting Customer has not yet selected the generation equipment, the Interconnecting Customer may submit an interconnection application to the Company with generator data for up to three different suppliers for review and acceptance for interconnection by the Company. Upon completion of the initial review of such an application, Company may increase the cost to screen each option submitted and, if an increase is warranted, Company will notify the applicant in writing of the Company's additional cost for reviewing all options submitted by the applicant. Interconnecting Customer's application will be on hold until applicant responds with written authorization to either proceed with the original application submittal for the additional quoted cost or to proceed with reviewing only the "worst case" option at no additional cost for which the Company will provide "worst case" interconnection requirements and associated costs that apply to all the generators included in the application. For the multiple generator review, the Company will screen each generator and provide the Interconnecting Customer with the interconnection requirements and associated cost for interconnecting each generator included in the application. Prior to the Company preparing a final Interconnection Agreement, the Interconnecting Customer will provide the Company written confirmation of which generator the Interconnecting Customer will install at the Interconnecting Customer's Facility and, if the "worst case" option was not selected by the applicant, the interconnection requirements previously determined for that specific generator will be included in the final Interconnection Agreement.

3.1 Simplified Process

Interconnecting Customers using Listed single-phase inverter-based Facilities with power ratings of 10 kW or less at locations receiving single-phase service from a single-phase transformer, or using Listed three-phase inverter-based Facilities with power ratings of 25 kW or less at locations receiving three-phase service from a three-phase transformer configuration, and requesting an interconnection on radial EPS’s where the aggregate Facility capacity on the circuit is less than 7.5% of circuit annual peak load qualify for Simplified interconnection. This is the fastest and least costly interconnection path. There is also a Simplified interconnection path
for Listed single-phase inverter-based Facilities with power ratings of 15 kW or less requesting an interconnection on spot networks when the aggregate Facility capacity is less than one-fifteenth of the Customer’s minimum load.

The Simplified Process is as follows:

a. Application process:
   i. Interconnecting Customer submits a Simplified Process application filled out properly and completely (Exhibit A).
   ii. Company acknowledges to the Interconnecting Customer receipt of the application within 3 business days of receipt.
   iii. Company evaluates the application for completeness and notifies the Interconnecting Customer within 10 business days of receipt that the application is or is not complete and, if not, advises what is missing.

b. Company verifies Facility equipment passes screens 1, 2, and 3 in Figure 1 if a radial EPS, or the screens in Figure 2 if a network EPS.

c. If approved, the Company signs the application approval line and sends to the Interconnecting Customer. In certain rare circumstances, the Company may require the Interconnecting Customer to pay for minor System Modifications. If so, a description of work and an estimate will be sent back to the Interconnecting Customer for approval. The Interconnecting Customer would then approve via a signature and payment for the minor System Modifications. If the Interconnecting Customer approves, the Company performs the System Modifications. Then, the Company signs the application approval line and sends to the Interconnecting Customer.

d. Upon receipt of signed application, the Interconnecting Customer installs the Facility. Then the Interconnecting Customer arranges for inspection of the completed installation by the local electrical wiring inspector, or other authority having jurisdiction, and this person signs the Certificate of Completion. If the Facility was installed by an electrical contractor, this person also fills out the Certificate of Completion.

e. The Interconnecting Customer returns Certificate of Completion to the Company.

f. Following receipt of the Certificate of Completion, the Company may inspect the Facility for compliance with standards by arranging for a Witness Test. The Interconnecting Customer has no right to operate in parallel until a Witness Test has been performed or has been previously waived on the Application Form. The Company is obligated to complete this Witness Test within 10 business days of the receipt of the Certificate of Completion. If the Company does not inspect in 10 business days or by mutual agreement of the Parties, the Witness Test is deemed waived.

g. Assuming the wiring inspection and/or Witness Test is satisfactory, the Company notifies the Interconnecting Customer in writing that interconnection is authorized. If the Witness Test is not satisfactory, the Company has the right to disconnect the Facility, and will provide information to the Interconnecting Customer describing clearly what is required for approval.

If the Interconnecting Customer does not substantially complete construction within 12 months after receiving approval from the Company, the Company will require the Interconnecting Customer to reapply for interconnection.

3.2 Expedited Process

Other Interconnecting Customers not qualifying for the Simplified Process or not in the Standard Process must pass a series of screens before qualifying for Expedited interconnection. Depending on whether one or more screens are passed, additional steps may be required.

The Expedited Process is as follows:

a. Application process:
i. Interconnecting Customer submits an Expedited/Standard application filled out properly and completely (Exhibit B).

ii. Company acknowledges to the Interconnecting Customer receipt of the application within 3 business days of receipt.

iii. Company evaluates the application for completeness and notifies the Interconnecting Customer within 10 business days of receipt that the application is or is not complete and, if not, advises what is missing.

b. Company then conducts an initial review which includes applying the screening methodology (Screens 1 through 8 in Figure 1).

c. The Company reserves the right to conduct internal studies if deemed necessary and at no additional cost to the Interconnecting Customer, such as but not limited to: protection review, aggregate harmonics analysis review, aggregate power factor review and voltage regulation review. Likewise, when the proposed interconnection may result in reversed load flow through the Company's load tap changing transformer(s), line voltage regulator(s), control modifications necessary to mitigate the effects may be made to these devices by the Company at the Interconnecting Customer’s expense or the Facility may be required to limit its output so reverse load flow cannot occur or to provide reverse power relaying that trips the Facility.

As part of the Expedited Process, the Company will assess whether any System Modifications are required for interconnection, even if the project passes all of the applicable Screens. If the needed modifications are minor, that is, the requirement can be determined within the time allotted through the application fee and any internal studies, then the modification requirements, reasoning, and costs for these minor modifications will be identified and included in the executable Interconnection Service Agreement. If the requirements cannot be determined within the time and cost allotted in the initial review and any internal studies, the Company may require that the project undergo additional review to determine those requirements. The time allocated for additional review is a maximum of 10 hours of engineering time.

If after this review, the Company still cannot determine the requirements, the Company will document the reasons why and will meet with the Interconnecting Customer to determine how to move the process forward to the Parties' mutual satisfaction. In all cases, the Interconnecting Customer will pay for the cost of modifications as discussed in Section 5.0.

d. Assuming all applicable Screens are passed, Company sends the Interconnecting Customer an executable Interconnection Service Agreement and a quote for any required System Modifications or reasonable Witness Test costs.

e. If one or more Screens are not passed, the Company will provide a Supplemental Review Agreement. If the Interconnecting Customer executes the agreement, the Company will conduct the review. If the Supplemental Review determines the requirements for processing the application through the Expedited Process including any System Modifications, then the modification requirements, reasoning, and costs for these modifications as defined in Section 5.0 will be identified and included in an executable Interconnection Service Agreement sent to the Interconnecting Customer for execution. If the Supplemental Review does not determine the requirements, it will include a proposed Impact Study Agreement as part of the Standard Process which will include an estimate of the cost of the study. Even if a proposed project initially fails a particular Screen in the Expedited Process, if Supplemental Review shows that it can return to the Expedited Process then it will do so. Supplemental Review includes up to 10 hours of engineering time.

f. Interconnecting Customer returns the signed Interconnection Service Agreement which is then executed by the Company.
g. Interconnecting Customer completes installation and, upon receipt of payment, the Company completes System Modifications, if required.

h. Company inspects completed installation for compliance with standards and attends Witness Test, if required.

i. Interconnecting Customer sends Certificate of Completion to Company.

j. Assuming inspection is satisfactory, Company notifies Interconnecting Customer in writing that interconnection is authorized.

3.3 Standard Process

The Standard Process has the longest maximum time period and highest potential costs. There are three ways to enter the Standard Process:

1. Interconnecting Customers may choose to proceed immediately to the Standard Process. Application process:
   i. Interconnecting Customer submits an Expedited/Standard Application filled out properly and completely (Exhibit B).
   ii. Company acknowledges to the Interconnecting Customer receipt of the application within 3 business days.
   iii. Company evaluates the application for completeness and notifies the Interconnecting Customer within 10 business days of receipt that the application is or is not complete and, if not, advises what is missing.

2. Based upon the results of the initial and Supplemental Reviews, Interconnecting Customers may be required to enter the Standard Process.

3. Based on the results of the Screens in Figure 2 for networks, Interconnecting Customers may be required to enter the Standard Process.

The Standard Process is as follows:

a. The Company will conduct an initial review that includes a scoping meeting/discussion with the Interconnecting Customer (if necessary) to review the application. At the scoping meeting the Company will provide pertinent information such as:
   • The available fault current at the proposed location;
   • The existing peak loading on the lines in the general vicinity of the Facility;
   • The configuration of the distribution lines.

b. Company provides an Impact Study Agreement, including a cost estimate for the study. Where there are other potentially Affected Systems, and no single Party is in a position to prepare an Impact Study covering all potentially Affected Systems, the Company will coordinate but not be responsible for the timing of any studies required to determine the impact of the interconnection request on other potentially Affected Systems. The Interconnecting Customer will be directly responsible to the potentially Affected System operators for all costs of any additional studies required to evaluate the impact of the interconnection on the potentially Affected Systems. The timelines in Table 1 will be affected if ISO-NE determines that a system impact study is required. This will occur if the Interconnecting Customer’s Facility is greater than 5 MW and may occur if the Interconnecting Customer’s Facility is greater than 1 MW.

c. Once the Interconnecting Customer executes the Impact Study Agreement and pays pursuant to the terms thereof, the Company will conduct the Impact Study.

d. If the Company determines, in accordance with Good Utility Practice, that the System Modifications to the Company EPS are not substantial, the Impact Study will determine the scope and cost of the modifications as defined in Section 5.0. If the Company determines, in accordance with Good Utility Practice, that the System Modifications to the Company EPS are substantial, the Impact Study will produce an estimate for the
modification costs (within ±25%) and a Detailed Study Agreement and cost for Interconnecting Customer's approval.

e. Once the Interconnecting Customer executes the Detailed Study Agreement and pays pursuant to the terms thereof, the Company will conduct the Detailed Study.

f. Upon completion of any necessary studies, the Company shall send the Interconnecting Customer an executable Interconnection Service Agreement including a quote for any required System Modifications and reasonable Witness Test costs.

g. Interconnecting Customer returns signed Interconnection Service Agreement.

h. Interconnecting Customer completes installation and Company completes System Modifications, if required.

i. Company inspects completed installation for compliance with requirements and attends Witness Test, if required.

j. Interconnecting Customer sends Certificate of Completion to Company.

k. Assuming inspection is satisfactory, Company notifies Interconnecting Customer in writing that interconnection is authorized.

3.4 Time Frames

Unless otherwise noted, all days in the Interconnection Tariff reference Company business days under normal work conditions.

Table 1 lays out the maximum timeframes allowed under the Simplified, Expedited, and Standard Review processes. The maximum time allowed for the Company to execute the entire Simplified Process is 15 days. The maximum time allowed for the Company to execute the entire Expedited Process on a radial system is 40 days where no Supplemental Review is needed and 60 days where it is needed. The maximum time allowed for the Company to execute the entire Standard Process is 125 days for the Standard Review Process if the Customer goes directly to Standard Review and 150 days if the Customer goes from the Expedited Process into Standard Review. For Customers qualifying for the Simplified Process on a spot network, the maximum time is 40 days if load data is available and 100 days if it is not. The Company clock is stopped when awaiting information from Customers. Any delays caused by Customer will interrupt the applicable clock. Moreover, if an Interconnecting Customer fails to act expeditiously to continue the interconnection process or delays the process by failing to provide necessary information within the longer of 15 days or half the time allotted to the Company to perform a given step, or as extended by mutual agreement, then the Company may terminate the application and the Interconnecting Customer must re-apply. However, the Company will be required to retain the work previously performed in order to reduce the initial and Supplemental Review costs incurred for a period of no less than 1 year. If the Interconnecting Customer does not initiate construction within twelve (12) months of signing the Interconnection Agreement, the Company may require the customer to provide evidence that the project is moving toward construction. In the event that the Customer cannot provide such evidence, the Company reserves the right to require additional study or require the Customer to reapply for interconnection. Situations that could trigger enforcement of this time limit are: (1) material changes on the distribution circuits (e.g. load changes, circuit reconfiguration) or (2) a second application for interconnection received by the Company on a circuit from the same substation. The same rights of the Company to require the customer to reapply for interconnection pertains if the interconnecting customer, after initiating construction, does not complete construction within twenty-four months. Notwithstanding these maximum time frames, the Company shall endeavor to meet the Customer’s needs.

3.5 Fee Schedules

Table 2 lays out the fees required for Interconnecting Customers to apply for interconnection. There are no fees for those facilities that qualify for the Simplified Process on a radial EPS
(except in certain unique cases where a System Modification would be needed which would be covered by the Interconnecting Customer). Those qualifying for the Expedited Process will pay a $3/kW application fee (minimum of $300 and maximum of $2,500) plus $125/hour up to 10 hours ($1,250) for Supplemental Review, when applicable, plus the actual cost as defined in Section 5.0 of any required System Modifications. Those on the Standard Process path would pay the same application fee as in the Expedited Process path as well as the actual cost as defined in Section 5.0 of any required System Modifications, plus the actual cost of any Impact and Facility Studies, if required. Facilities qualifying for the Simplified Process on a spot network will pay a flat application fee of $100 for 3 kW or less, and $300 for Facilities larger than 3 kW up to and including 10 kW, plus any System Modification costs.
3.6 Figure 1 – Schematic of Massachusetts DG Interconnection Process

Interconnecting Customer submits complete application and application fee

1. Is the Point of Common Coupling on a radial distribution system? No Go to Figure 2

Ye

2. Is the aggregate generating Facility capacity on the circuit less than 7.5% of circuit annual peak load? (Note 1) No

Ye

3. Does the Facility use a Listed Inverter (UL 1741)? (Note 3)
4. Is the Facility power rating \( \leq 10 \text{ kWs single-phase} \) or \( \leq 25 \text{ kWs three-phase} \)?
5. Is the Service Type Screen met? (Note 2)

Yes

Does the Facility pass all the following Screens?
6. Is the Facility Listed per Note 3?
7. Is the Starting Voltage Drop Screen met? (Note 4)
8. Is the Fault Current Contribution Screen met? (Note 5)
9. Is the Service Configuration Screen met? (Note 6)
10. Is the Transient Stability Screen met? (Note 7)

No

Does Supplemental Review determine requirements?

Yes

Company provides cost estimate and schedule for Interconnection Study(ies)

Interconnecting Customer accepts

Company performs Impact and Detailed (if required) Study

Sixty Day Review Screening

Facility Processed for Simplified Interconnection Under Interconnection Tariff

Facility Processed for Expedited Interconnection Under Interconnection Tariff

Facility Processed for Standard Interconnection Under Interconnection Tariff

Perform Supplemental Review

Standard Process Initial Review

System Modification Check

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
3.7 Figure 2 – Simplified Interconnection to Networks

Is the Point of Common Coupling on a spot network?

Yes

Does the Facility use a Listed Inverter (UL 1741) with a power rating ≤ 15 kW single-phase?

No

Yes

Is the aggregate generating Facility capacity less than 1/15 of Customer’s minimum load (daytime load in the case of solar)?

No, exceeds relative threshold

Yes

System Modification Check

No

Yes

Simplified Interconnection

Standard Process

No, area network
Explanatory Notes to Accompany Figure 1

**Note 1.** On a typical radial distribution EPS circuit (“feeder”) the annual peak load is measured at the substation circuit breaker, which corresponds to the supply point of the circuit. A circuit may also be supplied from a tap on a higher-voltage line, sometimes called a subtransmission line. On more complex radial EPS’s, where bidirectional power flow is possible due to alternative circuit supply options (“loop service”), the normal supply point is the loop tap.

**Note 2.** This screen includes a review of the type of electrical service provided to the Interconnection Customer, including the service transformer configuration and service type to limit the potential for creating unacceptable voltage imbalance, over-voltage or under-voltage conditions, or service equipment overloads on the Company EPS due to a mismatch between the size and phasing of the energy source, the service loads fed from the service transformer(s), and the service equipment ratings.

To be eligible for the Simplified Process, a Listed inverter-based Facility must be either (1) a single-phase unit on a customer’s local EPS receiving single-phase secondary service at the PCC from a single-phase service transformer, or (2) a three-phase unit on a customer’s local EPS receiving three-phase secondary service at the PCC from a three-phase transformer configuration.

**Note 3.** A Listed Facility has successfully passed all pertinent tests to conform with IEEE Standard 1547. IEEE Standard 1547 includes design specifications, operational requirements, and a list of tests that are required for Facilities. IEEE Standard 1547.1 describes how to conduct tests to show compliance with provisions of IEEE Standard 1547. To meet Screen 3 or 4, Interconnecting Customers must provide information or documentation that demonstrates how the Facility is in compliance with the IEEE Standard 1547.1 A Facility will be deemed to be in compliance with the IEEE Standard 1547.1 if the Company previously determined it was in compliance. Applicants who can demonstrate Facility compliance with IEEE Standard 1547.1, with the testing done by a nationally recognized testing laboratory, will be eligible for the Expedited Process, and may be eligible for the Simplified process upon review by the utility.

Massachusetts has adopted UL1741 (Inverters, Converters and Charge Controllers for Use in Independent Power Systems) and UL2200 (Stationary Engine Generator Assemblies) as the standard for power systems to comply with IEEE Std 1547 and 1547.1. Equipment listed to UL1741 or UL2200 by a nationally recognized testing laboratory will be considered in compliance with IEEE Std 1547 and 1547.1. An Interconnecting Customer should contact the Facility supplier(s) to determine if it has been listed to either of these standards.

In addition, California and New York have adopted rules for expediting application review and approval of Facility interconnections onto electric distribution systems. Facilities in these states must meet the applicable commission approved tests and/or criteria for expedited procedures in these states. The Company will accept a Facility as eligible for "Listed" and a candidate for the Massachusetts Simplified or Expedited Process if it has been approved for such expedited procedures, or approved for interconnection, in California or New York.

It is the Interconnecting Customer's responsibility to determine if, and submit verification that, the proposed Facility has been so approved in California or New York.

**Note 4.** This Screen only applies to Facilities that start by motoring the generating unit(s) or the act of connecting synchronous generators. The voltage drops should be less than the criteria below. There are two options in determining whether Starting Voltage Drop could be a problem. The option to be used is at the Company’s discretion:

- **Option 1:** The Company may determine that the Facility’s starting inrush current is equal to or less than the continuous ampere rating of the Facility’s service equipment.
Option 2: The Company may determine the impedances of the service distribution transformer (if present) and the secondary conductors to the Facility’s service equipment and perform a voltage drop calculation. Alternatively, the Company may use tables or nomographs to determine the voltage drop. Voltage drops caused by starting a generating unit as a motor must be less than 2.5% for primary interconnections and 5% for secondary interconnections.

Note 5. The purpose of this Screen is to ensure that fault (short-circuit) current contributions from all Facilities will have no significant impact on the Company’s protective devices and EPS. All of the following criteria must be met when applicable:

The proposed Facility, in aggregation with other generation on the distribution circuit, will not contribute more than 10% to the distribution circuit’s maximum fault current under normal operating conditions at the point on the high voltage (primary) level nearest the proposed PCC.

The proposed Facility, in aggregate with other generation on the distribution circuit, will not cause any distribution protective devices and equipment (including but not limited to substation breakers, fuse cutouts, and line reclosers), or Interconnecting Customer equipment on the EPS to exceed 85% of the short-circuit interrupting capability. In addition, the proposed Facility will not be installed on a circuit that already exceeds 85% of the short-circuit interrupting capability.

When measured at the secondary side (low side) of a shared distribution transformer, the short-circuit contribution of the proposed Facility must be less than or equal to 2.5% of the interrupting rating of the Company’s service equipment.

Coordination of fault-current protection devices and systems will be examined as part of this Screen.

Note 6. This Screen includes a review of the type of electrical service provided to the Interconnecting Customer, including line configuration and the transformer connection to limit the potential for creating over voltages on the Company EPS due to a loss of ground during the operating time of any anti-islanding function.

<table>
<thead>
<tr>
<th>Primary Distribution Line Type</th>
<th>Type of Interconnection to Primary Distribution Line</th>
<th>Result/Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-phase, three wire</td>
<td>3-phase or single phase, phase-to-phase</td>
<td>Pass Screen</td>
</tr>
<tr>
<td>Three-phase, four wire</td>
<td>Effectively-grounded 3 phase or single-phase, line-to-neutral</td>
<td>Pass Screen</td>
</tr>
</tbody>
</table>

If the proposed generator is to be interconnected on a single-phase transformer shared secondary, the aggregate generation capacity on the shared secondary, including the proposed generator, will not exceed 20 kilovolt-ampere (“kVA”).

If the proposed generator is single-phase and is to be interconnected on a center tap neutral of a 240 volt service, its addition will not create an imbalance between the two sides of the 240 volt service of more than 20% of nameplate rating of the service transformer.

Note 7. The proposed Facility, in aggregate with other Facilities interconnected to the distribution low voltage side of the substation transformer feeding the distribution circuit where the Facility proposes to interconnect, will not exceed 10 MW in an area where there are known or posted transient stability limitations to generating units located in the general electrical vicinity (e.g., 3 or 4 transmission voltage level buses from the PCC).
### Table 1 – Time Frames (Note 1)

<table>
<thead>
<tr>
<th>Review Process</th>
<th>Simplified</th>
<th>Expedited</th>
<th>Standard</th>
<th>Simplified Spot Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligible Facilities</td>
<td>Listed Small Inverter</td>
<td>Listed DG</td>
<td>Any DG</td>
<td>Listed Inverter ≤ 15 kW single-phase</td>
</tr>
<tr>
<td>Acknowledge receipt of Application</td>
<td>(3 days)</td>
<td>(3 days)</td>
<td>(3 days)</td>
<td>(3 days)</td>
</tr>
<tr>
<td>Review Application for completeness</td>
<td>10 days</td>
<td>10 days</td>
<td>10 days</td>
<td>10 days</td>
</tr>
<tr>
<td>Complete Review of all screens</td>
<td>10 days</td>
<td>25 days</td>
<td>n/a</td>
<td>Site review 30/90 days (Note 2)</td>
</tr>
<tr>
<td>Complete Supplemental Review (if needed)</td>
<td>n/a</td>
<td>20 days</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Complete Standard Process Initial Review</td>
<td>n/a</td>
<td></td>
<td>20 days</td>
<td>n/a</td>
</tr>
<tr>
<td>Send Follow-on Studies Cost/Agreement</td>
<td>n/a</td>
<td></td>
<td>5 days</td>
<td>n/a</td>
</tr>
<tr>
<td>Complete Impact Study (if needed)</td>
<td>n/a</td>
<td></td>
<td>55 days</td>
<td></td>
</tr>
<tr>
<td>Complete Detailed Study (if needed)</td>
<td></td>
<td></td>
<td>30 days</td>
<td></td>
</tr>
<tr>
<td>Send Executable Agreement (Note 3)</td>
<td>Done</td>
<td>10 days</td>
<td>15 days</td>
<td>Done (comparable to Simplified for radial)</td>
</tr>
<tr>
<td>Total Maximum Days (Note 4)</td>
<td>15 days</td>
<td>40/ 60 days (Note 5)</td>
<td>125/150 days (Note 6)</td>
<td>40/ 100 days</td>
</tr>
<tr>
<td>Notice/ Witness Test</td>
<td>&lt; 1 day with 10 day notice or by mutual agreement</td>
<td>1-2 days with 10 day notice or by mutual agreement</td>
<td>By mutual agreement</td>
<td>1 day with 10- day notice or by mutual agreement</td>
</tr>
</tbody>
</table>
### 3.9 Table 2 – Fee Schedules

<table>
<thead>
<tr>
<th></th>
<th>Simplified</th>
<th>Expedited</th>
<th>Standard</th>
<th>Simplified Spot Network</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Listed Small Inverter</td>
<td>Listed DG</td>
<td>Any DG</td>
<td>Listed Inverter ≤ 15 kW</td>
</tr>
<tr>
<td>Application Fee (covers Screens)</td>
<td>0 (Note 1)</td>
<td>$3/kW, minimum $300, maximum $2,500</td>
<td>$3/kW, minimum $300, maximum $2,500</td>
<td>≤$3/kW $100, &gt;3 kW $300</td>
</tr>
<tr>
<td>Supplemental Review or Additional Review (if applicable)</td>
<td>N/A</td>
<td>Up to 10 engineering hours at $125/hr ($1,250 maximum) (Note 2)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Standard Interconnection Initial Review</td>
<td>N/A</td>
<td>N/A</td>
<td>Included in application fee (if applicable)</td>
<td>N/A</td>
</tr>
<tr>
<td>Impact and Detailed Study (if required)</td>
<td>N/A</td>
<td>N/A</td>
<td>Actual cost (Note 3)</td>
<td>N/A</td>
</tr>
<tr>
<td>Facility Upgrades</td>
<td>N/A (Note 4)</td>
<td>Actual cost</td>
<td>Actual cost</td>
<td>N/A</td>
</tr>
<tr>
<td>O&amp;M (Note 5)</td>
<td>N/A</td>
<td>TBD</td>
<td>TBD</td>
<td>N/A</td>
</tr>
<tr>
<td>Witness Test</td>
<td>0</td>
<td>Actual cost, up to $300 + travel time (Note 6)</td>
<td>Actual Cost</td>
<td>0 (Note 7)</td>
</tr>
</tbody>
</table>
Explanatory Notes to Accompany Tables 1 and 2

Table 1 – Time Frames

Note 1. All days listed apply to Company business days under normal work conditions. All numbers in this table assume a reasonable number of applicants under review. All timelines may be extended by mutual agreement. Any delays caused by Interconnecting Customer will interrupt the applicable clock. Moreover, if an Interconnecting Customer fails to act expeditiously to continue the interconnection process or delays the process by failing to provide necessary information within the longer of 15 days or half the time allotted to the Company to perform a given step, or as extended by mutual agreement, then the Company may terminate the application and the Interconnecting Customer must reapply. However, the Company will be required to retain the work previously performed in order to reduce the initial and Supplemental Review costs incurred for a period of no less than 1 year. The timelines in Table 1 will be affected if ISO-NE determines that a system impact study is required. This will occur if the Interconnecting Customer’s Facility is greater than 5 MW and may occur if the Interconnecting Customer’s Facility is greater than 1 MW.

Note 2. 30 days if load is known or can be reasonably determined, 90 days if it has to be metered.

Note 3. Company delivers an executable agreement form. Once the Interconnection Service Agreement is delivered by the Company, any further modification and timetable will be established by mutual agreement.

Note 4. Actual totals laid out in columns exceed the maximum target. The Parties further agree that average days (fewer than maximum days) is a performance metric that will be tracked.

Note 5. Shorter time applies to Expedited Process without Supplemental Review, longer time applies to Expedited Process with Supplemental Review.

Note 6. 125 day maximum applies to an Interconnecting Customer opting to begin directly in Standard Process, and 150 days is for an Interconnecting Customer who goes through initial Expedited Process first. In both cases this assumes that both the Impact and Facilities Studies are needed. If the Detailed Study is not needed, the timelines will be shorter.

Table 2 – Fee Schedules

Note 1. If the Company determines that the Facility does not qualify for the Simplified Process, it will let the Interconnecting Customer know what the appropriate fee is.

Note 2. Supplemental Review and additional review are defined in Section 3.2.

Note 3. This is the actual cost only attributable to the applicant. Any costs not expended from the application fee previously collected will go toward the costs of these studies.

Note 4. Not applicable except in certain rare cases where a System Modification would be needed. If so, the modifications are the Interconnecting Customer’s responsibility.

Note 5. O & M is defined as the Company’s operations and maintenance carrying charges on the incremental costs associated with serving the Interconnecting Customer.

Note 6. The fee will be based on actual cost up to $300 plus driving time, unless Company representatives are required to do additional work due to extraordinary circumstances or due to problems on the Interconnecting Customer’s side of the PCC (e.g., Company representative required to make two trips to the site), in which case Interconnecting Customer will cover the additional cost.

Note 7. Unless extraordinary circumstances.
4.0 Interconnection Requirements

4.1 General Design Considerations

Interconnecting Customer shall design and construct the Facility in accordance with the applicable manufacturer's recommended maintenance schedule, in compliance with all aspects of the Company's Interconnection Tariff. Interconnecting Customer agrees to cause its Facility to be constructed in accordance with applicable specifications that meet or exceed those provided under this Section of the Interconnection Tariff.

4.1.1 Transient Voltage Conditions

Because of unusual events in the Company's EPS, there will be transient voltage fluctuations, which will result in voltages exceeding the limits of the stated ranges. These transient voltage fluctuations, which generally last only a few milliseconds, arise due to EPS disturbances including, but not limited to, lightning strikes, clearing of faults, and other switching operations. The magnitude of transient voltage fluctuations varies with EPS configuration, grounding methods utilized, local short circuit availability, and other parameters, which vary from point-to-point and from time-to-time on the distribution EPS.

The fluctuations may result in voltages exceeding the limits of the stated ranges and occur because of EPS disturbance, clearing of faults and other switching operations. These unavoidable transients are generally of too short duration and insufficient magnitude to have any adverse effects on general service applications. They may, however, cause malfunctions in equipment highly sensitive to voltage changes, and protective devices may operate to shut down such devices. The magnitude, duration and frequency of transient fluctuations will vary due to EPS configuration and/or circuit arrangement. In addition, disturbances of indeterminate magnitude and duration may occur on infrequent occasions due to short circuits, faults, and other unpredictable conditions.

Transient voltages should be evaluated in the design of the Facility.

4.1.2 Noise and Harmonics

The introduction of abnormal noise/harmonics can cause abnormal neutral current flow, and excessive heating of electrical equipment. Harmonics may also cause distortion in TV pictures, telephone interference, and malfunctions in digital equipment such as computers. The permissible level of harmonics is dependent upon the voltage level and short circuit ratio at a given location. IEEE Standard 1547-2003 provides these levels at the PCC. In requiring adherence to IEEE Standard 1547-2003 the Company is in no way making a recommendation regarding the level of harmonics that a given piece of equipment can tolerate nor is it making a recommendation as to the permissible level in the Interconnecting Customer's Facility.

4.1.3 Frequency

The interconnected electric power system in North America, which is maintained at 60 hertz ("Hz") frequency on its alternating current services, is subject to certain deviations. The usual maximum instantaneous deviation from the standard 60 Hz is ±2/10 cycle (±0.33%), except on infrequent occasions when the deviation may reach ±1/10 cycle (±0.17%). The usual normal deviation is approximately ±1/20 cycle (±0.083%). These conditions are subject to occur at any time of the day or night and should be considered in the design of the Facility. All are measured on a 60 Hz base.

4.1.4 Voltage Level
All electricity flow across the PCC shall be in the form of single-phase or three-phase 60 Hz alternating current at a voltage class determined by mutual agreement of the Parties.

### 4.1.5 Machine Reactive Capability

Facilities less than 1 megawatt (“MW”) will not be required to provide reactive capability, except as may be provided by the retail rate schedule and Terms and Conditions for Distribution Services under which the Customer takes service.

Facilities greater than or equal to 1 MW interconnected with the Company EPS shall be required to provide reactive capability to regulate and maintain EPS voltage at the PCC as per NEPOOL requirements. The Company and NEPOOL shall establish a scheduled range of voltages to be maintained by the Facility. The reactive capability requirements shall be reviewed as part of the Impact Study and Facilities Study.

### 4.2 Protection Requirements for New or Modified Facility Interconnections with the EPS

#### 4.2.1 General Requirements

Any Facility desiring to interconnect with the Company EPS or modify an existing interconnection must meet minimum specifications, where applicable, as set forth in the following documents and standards and requirements in this Section.


The specifications and requirements listed herein are intended to mitigate possible adverse impacts caused by the Facility on the Company’s equipment and personnel and on other Interconnecting Customers of the Company. They are not intended to address protection of the Facility itself or its internal load. It is the responsibility of the Facility to comply with the requirements of all appropriate standards, codes, statutes and authorities to protect itself and its loads.

The Company shall not be responsible for the protection of the Facility. The Facility shall be responsible for protection of its system against possible damage resulting from parallel operation with the Company so long as the Company adheres to Good Utility Practice. If requested by the Interconnecting Customer, the Company will provide system protection information for the line terminal(s) directly related to the interconnection. This protection information contained herein is provided exclusively for use by the Interconnecting Customer to evaluate protection of its Facility during parallel operation.

At its sole discretion, the Company may consider approving alternatives that satisfy the intent of the requirements contained in this Section.

#### 4.2.2 Facility Classification

To determine the protection requirements for a given Facility, the following Groups have been established:

<table>
<thead>
<tr>
<th>Group</th>
<th>Type of Interconnection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Facilities Qualified for Simplified Interconnection</td>
</tr>
<tr>
<td>2</td>
<td>All Facilities Not Qualified for Simplified Interconnection</td>
</tr>
</tbody>
</table>

#### 4.2.3 Protection Requirements
All Facilities must meet performance requirements set forth in relevant sections of IEEE Standard 1547-2003. The following italicized text is excerpted from IEEE Standard 1547-2003 and applies to Section 4.2.3 only. The numbering is also from IEEE Standard 1547-2003 and therefore is not in sequence with the Interconnection Tariff numbering.

4.1.1 Voltage regulation
The DR [distributed resource] shall not actively regulate the voltage at the PCC [unless required by NEPOOL’s operating procedures]. The DR shall not cause the Area EPS service voltage at other Local EPS’s to go outside the requirements of ANSI C84.1-1995, Range A.

4.1.2 Integration with Area EPS grounding
The grounding scheme of the DR interconnection shall not cause overvoltages that exceed the rating of the equipment connected to the Area EPS and shall not disrupt the coordination of the ground fault protection on the Area EPS.

4.1.3 Synchronization
The DR unit shall parallel with the Area EPS without causing a voltage fluctuation at the PCC greater than ±5% of the prevailing voltage level of the Area EPS at the PCC, and meet the flicker requirements of 4.3.2.

4.1.8.2 Surge withstand performance
The interconnection system shall have the capability to withstand voltage and current surges in accordance with the environments defined in IEEE Std C62.41.2-2002 or IEEE C37.90.1-2002 as applicable.

4.2 Response to Area EPS abnormal conditions
Abnormal conditions can arise on the Area EPS that require a response from the connected DR. This response contributes to the safety of utility maintenance personnel and the general public, as well as the avoidance of damage to connected equipment, including the DR. All voltage and frequency parameters specified in these subclauses shall be met at the PCC, unless otherwise stated.

4.2.1 Area EPS faults
The DR unit shall cease to energize the Area EPS for faults on the Area EPS circuit to which it is connected.

4.2.2 Area EPS reclosing coordination
The DR shall cease to energize the Area EPS circuit to which it is connected prior to reclosure by the Area EPS.

4.2.3 Voltage
The protection functions of the interconnection system shall detect the effective (rms) or fundamental frequency value of each phase-to-phase voltage, except where the transformer connecting the Local EPS to the Area EPS is a grounded wye-wye configuration, or single phase installation, the phase-to-neutral voltage shall be detected. When any voltage is in a range given in Table 1, the DR shall cease to energize the Area EPS within the clearing time as indicated. Clearing time is the time between the start of the abnormal condition and the DR ceasing to energize the Area EPS. For DR less than or equal to 30 kW in peak capacity, the voltage set points and clearing times shall be either fixed or field adjustable. For DR greater than 30 kW the voltage set points shall be field adjustable.

The voltages shall be detected at either the PCC or the point of DR connection when any of the following conditions exist:
(a) The aggregate capacity of DR systems connected to a single PCC is less than or equal to 30 kW,
(b) the interconnection equipment is certified to pass a non-islanding test for the system to which it is to be connected,

(c) the aggregate DR capacity is less than 50% of the total Local EPS minimum annual integrated electrical demand for a 15 minute time period, and export of real or reactive power by the DR to the Area EPS is not permitted.

Table 1 – Interconnection system response to abnormal voltages

<table>
<thead>
<tr>
<th>Voltage range (% of base voltage)</th>
<th>Clearing time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V &lt; 50</td>
<td>0.16</td>
</tr>
<tr>
<td>50 ≤ V &lt; 88</td>
<td>2.00</td>
</tr>
<tr>
<td>110 &lt; V &lt; 120</td>
<td>1.00</td>
</tr>
<tr>
<td>V ≥ 120</td>
<td>0.16</td>
</tr>
</tbody>
</table>

*a Base voltages are the nominal system voltages stated in ANSI C84.1-1995, Table 1.
*b DR ≤ 30 kW, maximum clearing times; DR > 30 kW, default clearing times

4.2.4 Frequency

When the system frequency is in a range given in Table 2, the DR shall cease to energize the Area EPS within the clearing time as indicated. Clearing time is the time between the start of the abnormal condition and the DR ceasing to energize the Area EPS. For DR less than or equal to 30 kW in peak capacity, the frequency set points and clearing times shall be either fixed or field adjustable. For DR greater than 30 kW, the frequency set points shall be field adjustable.

Adjustable under-frequency trip settings shall be coordinated with Area EPS operations.

Table 2 – Interconnection system response to abnormal frequencies

<table>
<thead>
<tr>
<th>DR size</th>
<th>Frequency range (Hz)</th>
<th>Clearing time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 30 kW</td>
<td>&gt; 60.5</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>&lt; 59.3</td>
<td>0.16</td>
</tr>
<tr>
<td>&gt; 30 kW</td>
<td>&gt; 60.5</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>&lt; (59.8 - 57.0)</td>
<td>Adjustable 0.16 to 300</td>
</tr>
<tr>
<td></td>
<td>(adjustable setpoint)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt; 57.0</td>
<td>0.16</td>
</tr>
</tbody>
</table>

*a DR ≤ 30 kW, maximum clearing times; DR > 30 kW, default clearing times

4.2.5 Loss of synchronism

Loss of synchronism protection is not required except as necessary to meet 4.3.2.

4.2.6 Reconnection to Area EPS

After an Area EPS disturbance, no DR reconnection shall take place until the Area EPS voltage is within Range B of ANSI C84.1-1995, Table 1, and frequency range of 59.3 Hz to 60.5 Hz.

The DR interconnection system shall include an adjustable delay (or a fixed delay of five minutes) that may delay reconnection for up to five minutes after the Area EPS steady-state voltage and frequency are restored to the ranges identified above.

4.3.1 Limitation of dc injection

The DR and its interconnection system shall not inject dc current greater than 0.5% of the full rated output current at the point of DR connection.

4.3.2 Limitation of flicker induced by the DR

The DR shall not create objectionable flicker for other customers on the Area EPS.11

11 Flicker is considered objectionable when it either causes a modulation of the light level of lamps sufficient to be irritating to humans, or causes equipment misoperation. For guidance, refer to IEEE Std 519™-1992, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems; IEEE P1453™, Draft Recommended Practice for Measurement and Limits of Voltage Flicker on...
4.3.3 Harmonics

When the DR is serving balanced linear loads, harmonic current injection into the Area EPS at the PCC shall not exceed the limits stated below in Table 3. The harmonic current injections shall be exclusive of any harmonic currents due to harmonic voltage distortion present in the Area EPS without the DR connected.

<table>
<thead>
<tr>
<th>Individual harmonic order h (odd harmonics)</th>
<th>11 ≤ h &lt; 17</th>
<th>17 ≤ h &lt; 23</th>
<th>23 ≤ h &lt; 35</th>
<th>35 ≤ h</th>
<th>Total Demand Distortion (TDD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent (%)</td>
<td>4.0</td>
<td>2.0</td>
<td>1.5</td>
<td>0.6</td>
<td>0.3</td>
</tr>
</tbody>
</table>

*a I = the greater of the Local EPS maximum load current integrated demand (15 or 30 minutes) without the DR unit, or the DR unit rated current capacity (transformed to the PCC when a transformer exists between the DR unit and the PCC).

*b Even harmonics are limited to 25% of the odd harmonic limits above.

4.4.1 Unintentional islanding

For an unintentional island in which the DR energizes a portion of the Area EPS through the PCC, the DR interconnection system shall detect the island and cease to energize the Area EPS within two seconds of the formation of an island.12

4.2.3.1 Group 1 Facilities

a. The inverter-based Facility shall be considered Listed if it meets requirements set forth in Section 3.1 “Simplified Process”.

b. External Disconnect Switch: For Listed inverters, the Company may require an external disconnect switch (or comparable device by mutual agreement of the Parties) at the PCC with the Company or at another mutually agreeable point that is accessible to Company personnel at all times and that can be opened for isolation if the switch is required. The switch shall be gang operated, have a visible break when open, be rated to interrupt the maximum generator output and be capable of being locked open, tagged and grounded on the Company side by Company personnel. The visible break requirement can be met by opening the enclosure to observe the contact separation. The Company shall have the right to open this disconnect switch in accordance with this Interconnection Tariff.

4.2.3.2 Group 2 Facilities

4.2.3.2.1 General Requirements

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12 Some examples by which this requirement may be met are:

1. The DR aggregate capacity is less than one-third of the minimum load of the Local EPS.
2. The DR is Listed to pass an applicable non-islanding test.
3. The DR installation contains reverse or minimum power flow protection, sensed between the Point of DR Connection and the PCC, which will disconnect or isolate the DR if power flow from the Area EPS to the Local EPS reverses or falls below a set threshold.
4. The DR contains other non-islanding means such as a) forced frequency or voltage shifting, b) transfer trip, or c) governor and excitation controls that maintain constant power and constant power factor.
a. **Non Export Power:** If the Parties mutually agree that non-export functionality will be part of the interconnection protection equipment then it will include one of the following: (1) a reverse power relay with mutually agreed upon delay intervals, or (2) a minimum power function with mutually agreed upon delay intervals, or (3) other mutually agreeable approaches, for example, a comparison of nameplate rating versus certified minimum Customer premises load.

b. The ISO-NE is responsible for assuring compliance with NPCC criteria. For the interconnection of some larger units, the NPCC criteria may additionally require:

**NPCC Protective Relaying Requirements:** The Company may require the Facility to be equipped with two independent, redundant relaying systems in accordance with NPCC criteria, where applicable, for the protection of the bulk power system if the interconnection is to the bulk power system or if it is determined that delayed clearing of faults within the Facility adversely affects the bulk power system.

**NPCC Requirements:** During system conditions where local area load exceeds system generation, NPCC Emergency Operation Criteria requires a program of phased automatic under frequency load shedding of up to 25% of area load to assist in arresting frequency decay and to minimize the possibility of system collapse. Depending on the point of connection of the Facility to the Company’s EPS and in conformance with the NPCC Emergency Operating Criteria, the Facility may be required to remain connected to the EPS during the frequency decline to allow the objectives of the automatic load shedding program to be achieved, or to otherwise provide compensatory load reduction, equivalent to the Facility’s generation lost to the system, if the Interconnecting Customer elects to disconnect the Facility at a higher under-frequency set point.

c. **Disconnect Switch:** The Facility shall provide a disconnect switch (or comparable device mutually agreed upon by the Parties) at the point of Facility interconnection that can be opened for isolation. The switch shall be in a location easily accessible to Company personnel at all times. The switch shall be gang operated, have a visible break when open, be rated to interrupt the maximum generator output and be capable of being locked open, tagged and grounded on the Company side by Company personnel. The visible break requirement can be met by opening the enclosure to observe the contact separation. The Company shall exercise such right in accordance with Section 7.0 of this Interconnection Tariff.

d. **Transfer Tripping:** A direct transfer tripping system, if one is required by either the Interconnecting Customer or by the Company, shall use equipment generally accepted for use by the Company and shall, at the option of the Company, use dual channels.

### 4.2.3.2.2 Requirements for Induction and Synchronous Generator Facilities

a. **Interconnection Interrupting Device:** An interconnection Interrupting Device such as a circuit breaker shall be installed to isolate the Facility from the Company’s EPS. If there is more than one Interrupting Device, this requirement applies to each one individually. The Interconnection Interrupting Device must be capable of interrupting the current produced when the Facility is connected out of phase with the Company’s EPS, consistent with Section 4.1.8.3 of IEEE Standard 1547-2003 which states, “the interconnection system paralleling-device shall be capable of withstanding 220% of the interconnection system rated voltage.”

b. **Synchronizing Devices:** The Interconnecting Customer shall designate one or more Synchronizing Devices such as motorized breakers, contactor/breaker combinations, or a fused contactor (if mutually agreeable) to be used to connect the Facility’s generator to the Company’s EPS. This Synchronizing Device could be a device other than the interconnection Interrupting Device. The Synchronizing Device must be capable of interrupting the current produced when the Facility is
connected out of phase with the Company's EPS, consistent with Section 4.1.8.3 of IEEE Standard 1547-2003 which states, “the interconnection system paralleling-device shall be capable of withstanding 220% of the interconnection system rated voltage.”

c. **Transformers:** The Company reserves the right to specify the winding connections for the transformer between the Company’s voltage and the Facility’s voltage (“Step-Up Transformer”) as well as whether it is to be grounded or ungrounded at the Company’s voltage. In the event that the transformer winding connection is grounded-wye/grounded-wye the Company reserves the right to specify whether the generator stator is to be grounded or not grounded. The Interconnecting Customer shall be responsible for procuring equipment with a level of insulation and fault-withstand capability compatible with the specified grounding method.

d. **Voltage relays:** Voltage relays shall be frequency compensated to provide a uniform response in the range of 40 to 70 Hz.

e. **Protective Relaying Redundancy:** For induction generators greater than 1/15 of on-site minimum verifiable load that is not equipped with on-site capacitors or that is greater than 200 kW, and for all synchronous generators, protective relays utilized by the Facility shall be sufficiently redundant and functionally separate so as to provide adequate protection, consistent with Company practices and standards, upon the failure of any one component.

f. **Protective Relay Hard-Wire Requirement:** Unless authorized otherwise by the Company, protective relays must be hardwired to the device they are tripping. Further, interposing computer or programmable logic controller or the like is not permitted in the trip chain between the relay and the device being tripped.

g. **Protective Relay Supply:** Where protective relays are required in this Section, their control circuits shall be DC powered from a battery/charger system or a UPS. Solid-state relays shall be self-powered, or DC powered from a battery/charger system or a UPS. If the Facility uses a Company-acceptable non-latching interconnection contactor, AC powered relaying shall be allowed provided the relay and its method of application are fail safe, meaning that if the relay fails or if the voltage and/or frequency of its AC power source deviate from the relay's design requirements for power, the relay or a separate fail-safe power monitoring relay acceptable to the Company will immediately trip the generator by opening the coil circuit of the interconnection contactor.

h. **Current Transformers (“CT”):** CT ratios and accuracy classes shall be chosen such that secondary current is less than 100 amperes and transformation errors are consistent with Company practices. CTs used for revenue class metering must have a secondary current of 20 amperes or less.

i. **Voltage Transformers (“VT”)s and Connections:** The Facility shall be equipped with a direct voltage connection or a VT, connected to the Company side of the Interrupting Device. The voltage from this VT shall be used in an interlock scheme, if required by the Company. For three-phase applications, a VT for each phase is required. All three phases must be sensed either by three individual relays or by one relay that contains three elements. If the voltage on any of the three phases is outside the bounds specified by the Company the unit shall be tripped. If the Facility’s Step-Up Transformer is ungrounded at the Company voltage, this VT shall be a single three-phase device or three single-phase devices connected from each phase to ground on the Company's side of the Facility’s Step-Up Transformer, rated for phase-to-phase voltage and provided with two secondary windings. One winding shall be connected in open delta, have a loading resistor to prevent ferroresonance, and be used for the relay specified in these requirements.

### 4.2.3.2.3 Additional Requirements for Induction Generator Facilities
a. **Self-Excitation:** A Facility using induction generators connected in the vicinity of capacitance sufficient to self-excite the generator(s) shall meet the requirements for synchronous machines. The capacitors that enable self-excitation may actually be external to the Facility. The Company will not restrict its existing or future application of capacitors on its lines nor restrict their use by other Interconnecting Customers of the Company to accommodate a Facility with induction machines. If self-excitation becomes possible due to the installation of or presence of capacitance, the protection requirements of the Facility may need to be reviewed and revised, if applicable.

The Facility may be required to install capacitors to limit the adverse effects of drawing reactive power from the EPS for excitation of the generator. Capacitors for supply of reactive power at or near the induction generator with a kilovolts-ampere reactive (“kVAr”) rating greater than 30% of the generator's kW rating may cause the generator to become self-excited. (If self-excitation can occur, the Facility shall be required to provide protection as specified in synchronous machines requirements.)

4.2.3.2.4 **Additional Requirements for Synchronous Generator Facilities**

a. **Ungrounded Transformers:** If the Facility’s Step-Up Transformer connection is ungrounded, the Facility shall be equipped with a zero sequence over-voltage relay fed from the open delta of the three-phase VT specified in the Voltage Transformers and Connections Section 4.2.3.2.2.i.

b. **High-Speed Protection:** The Facility may be required to use high-speed protection if time-delayed protection would result in degradation in the existing sensitivity or speed of the protection systems on the Company’s EPS.

c. **Breaker Failure Protection:** The Facility may be required to be equipped to provide local breaker failure protection which may include direct transfer tripping to the Company's line terminal(s) in order to detect and clear faults within the Facility that cannot be detected by the Company's back-up protection.

d. **Communications Channels:** The Interconnecting Customer is responsible for procuring any communications channels necessary between the Facility and the Company’s stations, and for providing protection from transients and over-voltages at all ends of these communication channels. The Interconnecting Customer will also bear the ongoing cost to lease these communication channels. Examples include, but are not limited to, connection to a line using high-speed protection, transfer tripping, generators located in areas with low-fault currents, or back up for generator breaker failure.

4.2.4 **Protection System Testing and Maintenance**

The Company shall have the right to witness the commissioning testing as defined in IEEE Standard 1547-2003 at the completion of construction and to receive a copy of all test data. The Facility shall be equipped with whatever equipment is required to perform this test.

Testing typically includes, but is not limited to:

- CT and CT circuit polarity, ratio, insulation, excitation, continuity and burden tests,
- VT and VT circuit polarity, ratio, insulation and continuity tests,
- Relay pick-up and time delay tests,
- Functional breaker trip tests from protective relays,
- Relay in-service test to check for proper phase rotation and magnitudes of applied currents and voltages,
- Breaker closing interlock tests, and
- Paralleling and disconnection operation.
Prior to final approval by the Company or anytime thereafter, the Company reserves the right to test the generator relaying and control related to the protection of the Company's EPS.

The Interconnecting Customer has the full responsibility for the proper periodic maintenance of its generating equipment and its associated control, protective equipment and interrupting devices.

The Interconnecting Customer is responsible for the periodic maintenance of those relays, interrupting devices, control schemes, and batteries that involve the protection of the Company's EPS. A periodic maintenance program, mutually agreeable to both the Company and to the Interconnecting Customer is to be established in each case. The Company shall have the right to monitor the periodic maintenance performed.

For relays installed in accordance with the NPCC Criteria for the Protection of the Bulk Power System, maintenance intervals shall be in accordance with such criteria. The results of these tests shall be summarized by the Interconnecting Customer and reported in writing to the Company.

The Company reserves the right to install special test equipment as may be required to monitor the operation of the Facility and its control or for evaluating the quality of power produced by the Facility at a mutually agreed upon location. The cost of this testing will be borne by the Company unless there is shown to be a problem associated with the Facility or if the test was performed at the request of the Interconnecting Customer.

Each routine check shall include both a calibration check and an actual trip of the circuit breaker or contactor from the device being tested. Visually setting a calibration dial, index or tap is not considered an adequate calibration check.

Inverters with field adjustable settings for their internal protective elements shall be periodically tested if those internal elements are being used by the Facility to satisfy the requirements of this Section.

4.2.5 Protection Requirements – Momentary Paralleling of Standby Generators

Protective relays to isolate the Facility for faults in the Company EPS are not required if the paralleling operation is automatic and takes place for less than one-half of a second. An Interrupting Device with a half-second timer (30 cycles) is required as a fail-safe mechanism.

Parallel operation of the Facility with the Company EPS shall be prevented when the Company's line is dead or out of phase with the Facility.

The control scheme for automatic paralleling must be submitted by the Interconnecting Customer for review and acceptance by the Company prior to the Facility being allowed to interconnect with the Company EPS.

4.2.6 Protection System Changes

The Interconnecting Customer must provide the Company with reasonable advance notice of any proposed changes to be made to the protective relay system, relay settings, operating procedures or equipment that affect the interconnection. The Company will determine if such proposed changes require re-acceptance of the interconnection per the requirements of this Section.

In the future, should the Company implement changes to the EPS to which the Facility is interconnected, the Interconnecting Customer will be responsible at its own expense for identifying and incorporating any necessary changes to its protection equipment. These changes to the Facility’s protection equipment are subject to review and approval by the Company.
5.0 Responsibility for Costs of Interconnecting a Facility

5.1 Review and Study Costs

The Interconnecting Customer shall be responsible for the reasonably incurred costs of the review by the Company and any interconnection studies conducted as defined by Table 2 (“Fee Schedules”) of Section 3.0 of this Interconnection Tariff solely to determine the requirements of interconnecting a Facility with the Company EPS.

5.2 Interconnection Equipment Costs

The Interconnecting Customer shall be responsible for all costs associated with the installation and construction of the Facility and associated interconnection equipment on the Interconnecting Customer’s side of the PCC.

5.3 System Modification Costs

The Interconnecting Customer shall also be responsible for all costs reasonably incurred by Company attributable to the proposed interconnection project in designing, constructing, operating and maintaining the System Modifications. At the time that the Company provides an Interconnecting Customer with any Impact Study or Detailed Study, the Company shall also provide, along with that Study, a statement of the Company’s policies on collection of tax gross-ups. To the extent that Company Terms and Conditions and/or tariffs allow, the Company will refund the appropriate portion of System Modification costs to the Interconnecting Customer as required by the applicable tariff.

5.4 Separation of Costs

Should the Company combine the installation of System Modifications with additions to the Company’s EPS to serve other customers or interconnecting customers, the Company shall not include the costs of such separate or incremental facilities in the amounts billed to the Interconnecting Customer for the System Modifications required pursuant to this Interconnection Tariff.

The Interconnecting Customer shall only pay for that portion of the interconnection costs resulting solely from the System Modifications required to allow for safe, reliable parallel operation of the Facility with the Company EPS.

5.5 Normal Payment Procedure

All application, study fees and System Modification costs (except as noted below) are due in full prior to the execution of the work as outlined in this Interconnection Tariff. If the anticipated costs exceed $25,000 the Interconnecting Customer is eligible for a payment plan, including a payment and construction schedule with milestones for both parties. At the request of the Interconnecting Customer, the Company will break the costs into phases in which the costs will be collected prior to Company expenditures for each phase of the study and/or construction including ordering equipment. The payment plan will be attached as an exhibit to the Interconnection Service Agreement or relevant study agreements.

5.6 Security and Creditworthiness

In order for the Company to agree to any payment plan where some work may be performed in advance of payment, the Company may require the Interconnecting Customer to provide evidence of creditworthiness. In the event that Interconnecting Customer cannot provide such evidence to the satisfaction of the Company, then the Company may require the Interconnecting Customer to provide sufficient security in order to take advantage of a payment plan. Interconnecting Customer acknowledges that it will be responsible for the actual costs of the System Modifications described in the attached exhibit to the Interconnection Service Agreement.
Agreement, whether greater or lesser than the amount of the payment security provided under this section.

6.0 Operating Requirements

6.1 General Operating Requirements

Interconnecting Customer shall operate and maintain the Facility in accordance with the applicable manufacturer's recommended maintenance schedule, in compliance with all aspects of the Company's Interconnection Tariff. The Interconnecting Customer will continue to comply with all applicable laws and requirements after interconnection has occurred. In the event the Company has reason to believe that the Interconnecting Customer's installation may be the source of problems on the Company EPS, the Company has the right to install monitoring equipment at a mutually agreed upon location to determine the source of the problems. If the Facility is determined to be the source of the problems, the Company may require disconnection as outlined in Section 7.0 of this Interconnection Tariff. The cost of this testing will be borne by the Company unless the Company demonstrates that the problem or problems are caused by the Facility or if the test was performed at the request of the Interconnecting Customer.

6.2 No Adverse Effects; Non-interference

Company shall notify Interconnecting Customer if there is evidence that the operation of the Facility could cause disruption or deterioration of service to other Customers served from the same Company EPS or if operation of the Facility could cause damage to Company EPS or Affected Systems. The deterioration of service could be, but is not limited to, harmonic injection in excess of IEEE Standard 1547-2003, as well as voltage fluctuations caused by large step changes in loading at the Facility. Each Party will notify the other of any emergency or hazardous condition or occurrence with its equipment or facilities which could affect safe operation of the other Party's equipment or facilities. Each Party shall use reasonable efforts to provide the other Party with advance notice of such conditions.

The Company will operate the EPS in such a manner so as to not unreasonably interfere with the operation of the Facility. The Interconnecting Customer will protect itself from normal disturbances propagating through the Company EPS, and such normal disturbances shall not constitute unreasonable interference unless the Company has deviated from Good Utility Practice. Examples of such disturbances could be, but are not limited to, single-phasing events, voltage sags from remote faults on the Company EPS, and outages on the Company EPS. If the Interconnecting Customer demonstrates that the Company EPS is adversely affecting the operation of the Facility and if the adverse effect is a result of a Company deviation from Good Utility Practice, the Company shall take appropriate action to eliminate the adverse effect.

6.3 Safe Operations and Maintenance

Each Party shall operate, maintain, repair, and inspect, and shall be fully responsible for, the facility or facilities that it now or hereafter may own unless otherwise specified in this Agreement. Each Party shall be responsible for the maintenance, repair and condition of its respective lines and appurtenances on their respective side of the PCC. The Company and the Interconnecting Customer shall each provide equipment on its respective side of the PCC that adequately protects the Company's EPS, personnel, and other persons from damage and injury.

6.4 Access

The Company shall have access to the disconnect switch of the Facility at all times.

6.4.1 Company and Interconnecting Customer Representatives
Each Party shall provide and update as necessary the telephone number that can be used at all times to allow either Party to report an emergency.

6.4.2 Company Right to Access Company-Owned Facilities and Equipment

If necessary for the purposes of this Interconnection Tariff and in the manner it describes, the Interconnecting Customer shall allow the Company access to the Company’s equipment and the Company’s facilities located on the Interconnecting Customer’s or Customer’s premises. To the extent that the Interconnecting Customer does not own all or any part of the property on which the Company is required to locate its equipment or facilities to serve the Interconnecting Customer under this Interconnection Tariff, the Interconnecting Customer shall secure and provide in favor of the Company the necessary rights to obtain access to such equipment or facilities, including easements if the circumstances so require.

6.4.3 Right to Review Information

The Company shall have the right to review and obtain copies of Interconnecting Customer’s operations and maintenance records, logs, or other information such as, unit availability, maintenance outages, circuit breaker operation requiring manual reset, relay targets and unusual events pertaining to Interconnecting Customer’s Facility or its interconnection with the Company EPS. This information will be treated as customer-confidential and only used for the purposes of meeting the requirements of Section 4.2.4.

7.0 Disconnection

7.1 Temporary Disconnection

a. Emergency Conditions. Company shall have the right to immediately and temporarily disconnect the Facility without prior notification in cases where, in the reasonable judgment of Company, continuance of such service to Interconnecting Customer is imminently likely to (i) endanger persons or damage property or (ii) cause a material adverse effect on the integrity or security of, or damage to, Company EPS or to the electric systems of others to which the Company EPS is directly connected. Company shall notify Interconnecting Customer promptly of the emergency condition. Interconnecting Customer shall notify Company promptly when it becomes aware of an emergency condition that affects the Facility that may reasonably be expected to affect the Company EPS. To the extent information is known, the notification shall describe the emergency condition, the extent of the damage or deficiency, or the expected effect on the operation of both Parties’ facilities and operations, its anticipated duration and the necessary corrective action.

b. Routine Maintenance, Construction and Repair. Company shall have the right to disconnect the Facility from the Company EPS when necessary for routine maintenance, construction and repairs on the Company EPS. The Company shall provide the Interconnecting Customer with a minimum of seven calendar days planned outage notification consistent with the Company’s planned outage notification protocols. If the Interconnecting Customer requests disconnection by the Company at the PCC, the Interconnecting Customer will provide a minimum of seven days notice to the Company. Any additional notification requirements will be specified by mutual agreement in the Interconnection Service Agreement. Company shall make an effort to schedule such curtailment or temporary disconnection with Interconnecting Customer.

c. Forced Outages. During any forced outage, Company shall have the right to suspend interconnection service to effect immediate repairs on the Company EPS; provided, however, Company shall use reasonable efforts to provide the Interconnecting Customer with prior notice. Where circumstances do not permit such prior notice to Interconnecting Customer, Company may interrupt Interconnection Service and disconnect the Facility from the Company EPS without such notice.
d. **Non-Emergency Adverse Operating Effects.** The Company may disconnect the Facility if the Facility is having an adverse operating effect on the Company EPS or other customers that is not an emergency, and the Interconnecting Customer fails to correct such adverse operating effect after written notice has been provided and a maximum of 45 days to correct such adverse operating effect has elapsed.

e. **Modification of the Facility.** Company shall notify Interconnecting Customer if there is evidence of a material modification to the Facility and shall have the right to immediately suspend interconnection service in cases where such material modification has been implemented without prior written authorization from the Company.

f. **Re-connection.** Any curtailment, reduction or disconnection shall continue only for so long as reasonably necessary. The Interconnecting Customer and the Company shall cooperate with each other to restore the Facility and the Company EPS, respectively, to their normal operating state as soon as reasonably practicable following the cessation or remedy of the event that led to the temporary disconnection.

### 7.2 Permanent Disconnection

The Interconnecting Customer has the right to permanently disconnect at any time with 30 days written notice to the Company.

The Company may permanently disconnect the Facility upon termination of the Interconnection Service Agreement in accordance with the terms thereof.

### 8.0 Metering, Monitoring, and Communication

This Section sets forth the rules, procedures and requirements for metering, monitoring and communication between the Facility and the Company EPS where the Facility exports power or is net metered or is otherwise subject to NEPOOL requirements. Interconnecting Customer will be responsible for reasonable and necessary costs incurred by Company for the purchase, installation, operation, maintenance, testing, repair and replacement of metering and data acquisition equipment specified in the Attachments to the Interconnection Service Agreement. Interconnecting Customer’s metering (and data acquisition, as required) equipment shall conform to rules and applicable operating requirements.

#### 8.1 Metering, Related Equipment and Billing Options

The Company shall furnish, read and maintain all revenue metering equipment. The Interconnecting Customer shall furnish and maintain all meter mounting equipment such as or including meter sockets, test switches, conduits, and enclosures. Except as provided below, the Company shall own the meter and the Interconnecting Customer shall pay to the Company a monthly charge to cover taxes, meter maintenance, incremental reading and billing costs, the allowable return on the invoice cost of the meter and the depreciation of the meter. These charges are set forth in the applicable Company tariff(s), as amended from time to time. If the Facility is a Qualifying Facility or On-Site Generating Facility the Interconnecting Customer may elect to own the meter, in which case, the Interconnecting Customer shall pay to the Company a monthly charge to cover meter maintenance and incremental reading and billing costs. Metering requirements and associated charges for Qualifying Facilities and On-Site Generating Facilities are set forth in the applicable Company tariff(s), as amended from time to time. If the Interconnecting Customer elects to install its own meter under the terms of 220 CMR 8.0, the Interconnecting Customer shall be responsible for purchasing and installing software, hardware and/or other technology that may be required by the Company to read billing meters.

The Interconnecting Customer shall provide suitable space within the Facility for installation of the metering, and communication equipment at no cost to the Company.
All metering equipment installed pursuant to this Interconnection Tariff and associated with the Facility shall be routinely tested by the Company at Interconnecting Customer’s expense, in accordance with applicable Company and/or ISO-NE criteria, rules and standards. If, at any time, any metering equipment is found to be inaccurate by a margin greater than that allowed under applicable criteria, rules and standards, the Company shall cause such metering equipment to be made accurate or replaced. The cost to repair or replace the meter shall be borne by the Company, if the Company owns the meter, or by the Interconnecting Customer if the Interconnecting Customer owns the meter. Meter readings for the period of inaccuracy shall be adjusted so far as the same can be reasonably ascertained; provided, however, no adjustment prior to the beginning of the preceding month shall be made except by agreement of the Parties. Each Party shall comply with any reasonable request of the other concerning the sealing of meters, the presence of a representative of the other Party when the seals are broken and the tests are made, and other matters affecting the accuracy of the measurement of electricity delivered from the Facility. If either Party believes that there has been a meter failure or stoppage, it shall immediately notify the other.

If the Metering Point and the Point of Receipt or Point of Delivery are not at the same location, the metering equipment shall record delivery of electricity in a manner that accounts for losses occurring between the Metering Point and the Point of Receipt or Point of Delivery. Losses between the Metering Point and Point of Receipt will be reflected pursuant to applicable Company, NEPOOL or ISO-NE criteria, rules or standards.

The type of metering equipment to be installed at a Facility is dependent on the Category (size) of the Facility and how and if the Facility plans to export power or net meter. For those that will export power or net meter, the available equipment options and associated requirements are:

- **Net Metering** – For Facilities 60 kW or less, unless the Interconnecting Customer elects another form of metering, the Facilities will be equipped with net metering in which metering equivalent to or replicating that of a standard distribution class meter is installed and is enabled to run in a normal direction during periods of net consumption and to run backwards during periods of net generator output. All metering equipment included in this type of installation, including self-contained meters and instrument transformers and meters, shall meet ANSI C12.1 Metering Accuracy Standards and ANSI C57.13 accuracy requirements for instrument transformers. See 220 CMR 11.04 (7)(c).

- **Bi-directional, non-interval meter without remote access** – in which a distribution class meter with multiple registers is installed. One set of registers will record energy flows from the Company to the Facility during periods when the Facility is a net consumer of energy (the other register will record no flow during these periods) and a second set of registers will record energy flows from the Facility to the Company during periods when the Facility is a net producer of energy (the other register will record no flow during these periods). Each set of registers will record total flows only and will not record flows during specific intervals. All metering equipment included in this type of installation, including self-contained meters and instrument transformers and meters, shall meet ANSI C12.1 Metering Accuracy Standards and ANSI C57.13 accuracy requirements for instrument transformers.

- **Bi-directional, interval meter with remote access** – in which a distribution class meter with multiple registers is installed. One set of registers will record energy flows from the Company to the Facility during periods when the Facility is a net consumer of energy (the other register will record no flow during these periods) and a second set of registers will record energy flows from the Facility to the Company during periods when the Facility is a net producer of energy (the other register will record no flow during these periods). Each set of registers will record total flows as well as flows during hourly intervals. In addition, the meters will be equipped with remote access capability that may include communication to the extent required by applicable NEPOOL standards. All metering equipment included in this type of installation shall meet the requirements contained in NEPOOL Operating Procedure No. 18, “Metering and Telemetering Criteria” and the Company’s “Policy and
Practices for Metering and Telemetering Requirements for New or Modified Interconnections.” Copies of both publications are available from the Company upon request. The Interconnecting Customer shall be responsible for providing all necessary leased telephone lines and any necessary protection for leased lines and shall furthermore be responsible for all communication required by ISO-NE, or by ISO-NE’s designated satellite. The Interconnecting Customer shall maintain all communication and transducer equipment at the Facility in accordance with ISO-NE criteria, rules and standards. The Company will purchase, own and maintain all communication equipment located on the Interconnecting Customer’s Facilities, if the Interconnecting Customer desires, at the Interconnecting Customer’s expense. The Interconnecting Customer shall provide, install and own Company-approved or Company-specified test switches in the transducer circuits.

**Units over 60 kW:** Will be equipped with a bi-directional meter. Such meter will have remote access capability and may be an interval meter.

**Units over 1 MW:** Shall be equipped with bi-directional, interval meters with remote access. In addition, Facilities which are 5 MW or greater are required by NEPOOL Operating Procedure No. 18 to provide communication equipment and to supply accurate and reliable information to system operators regarding metered values for MW, MVAR, volt, amp, frequency, breaker status and all other information deemed necessary by ISO-NE and the NEPOOL Satellite (REMVEC).

### 8.2 Additional Monitoring and Communication Requirements

As the amount of distributed generation on the Company EPS grows significantly, additional monitoring and communication may be required by the Department pursuant to a future proceeding.

### 9.0 Dispute Resolution Process

The Dispute Resolution Process is a multi-stage process described below, beginning with negotiation, then mediation, followed by non-binding arbitration and then adjudication. All days in this Section are calendar days.

#### 9.1 Good Faith Negotiation

a. One party submits a request in writing to the other party for initiation of Step 9.1 of the Dispute Resolution Process. The Parties will elevate the dispute to a Vice President or senior management with sufficient authority to make a decision.

b. If, after 8 days, the dispute is still not resolved, one or both Parties may initiate Section 9.2.a

#### 9.2 Mediation/Non-binding Arbitration

a. One party to the dispute requests dispute resolution assistance by submitting a written request to the Department, with a summary of the situation. The other party may also submit a summary.

b. The Parties will meet with a Department hearing officer or other Department staff person within 14 days to convene the Dispute Resolution Process. During that meeting, the Department staff person may assist the Parties in attempting to resolve outstanding differences.

c. If the differences are not resolved in Step 9.2.b, the Department will provide a list of qualified neutrals and manage the selection of individual neutrals for the case. The Department will use a list of pre-qualified neutrals maintained at the Department and, the Parties will select a mutually agreeable mediator pursuant to a reverse-strike-out
process † or another mutually-agreeable method. If either party requests a technical expert, both a mediator and a technical expert will be selected, and the technical expert will be selected using the same strike out process or another mutually-agreeable method as that used for selection of the mediator.

d. Parties will complete the neutral selection process with the Department within seven days. This timetable will only be possible if the Department has, during the initial 14 days, identified mediators and technical experts who have the time available to assist the Parties in a timely manner.

e. The Department will arrange for the selected mediator to contact Parties.

f. The Parties will contract with neutrals for services, splitting the fees 50/50.

g. The mediator begins by discussing the case with the disputing Parties to assess the scope of issues and understand the Parties’ positions and interests. The mediator and Parties will establish a schedule for completion of mediation within 30 days. Ten days after the 30-day time period begins, the Department will issue a public notice of the proceeding and will schedule a pre-hearing conference for Section 9.3. The mediator will assist the Parties in developing a scope of work for the technical expert if one is needed. The mediator will also assist the Parties in estimating the Dispute Resolution Process costs and addressing any concerns about those costs.

h. Mediation meeting or meetings are held.

i. If the Parties reach agreement, the Dispute Resolution Process ends here.

j. If the Parties do not reach a mediated agreement, the neutral(s) will issue a brief recommended solution or decision.

k. If the Parties accept the neutral’s recommendation, the Dispute Resolution Process ends here.

l. If one or both Parties do not accept the neutral recommendation and there is still no agreement, the dispute proceeds to Step 9.3.

9.3 Department Adjudicatory Hearing

The goal of this Step is an adjudicatory hearing at the Department, with witnesses, evidence, etc. that results in a binding precedential decision, appealable to the Massachusetts Supreme Judicial Court.

a. In the event a party does not accept the recommendation in Step 9.2, it may request, in writing, a Department adjudication.

b. The Department holds a pre-hearing conference for which notice has been provided in accordance with Section 9.2.g. The Parties, to the extent desirable and feasible, exchange information and establish an expedited schedule during the pre-hearing conference.

c. The Department and the Parties engage in pre-hearing discovery, as needed in the specific case, building on the information developed in Step 9.2, including the mediator’s recommendation.

d. The Department conducts a hearing.

e. The Parties file briefs, if one or both desire to do so or the Department requests they do so. The Parties and the Department will complete Step 9.3.b through 9.3.e in 90 days.

f. The Department issues its order within 20 days. If it is unable to do so, it will notify the Parties and provide a revised decision date.

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† A “reverse strike out process” involves each party eliminating the least desirable mediator until one is left standing.
The Department will appoint a hearing officer or other Department staff person familiar with the DG interconnection process in Massachusetts to oversee the selection of private neutrals and otherwise serve as a resource for DG cases.

Disputes subject to the Dispute Resolution Process on these issues are not meant to be considered as Interconnecting Customer complaints as part of the Company’s service quality plan. The docket number for this plan is D.T.E. 01-71. This does not preclude the Interconnecting Customer from filing Interconnecting Customer complaints for which they are otherwise eligible.

10.0 Confidentiality Statement

Information including identifying information and specific Facility information may be shared with the Department. A list of all executed DG Interconnection Service Agreements will be submitted to the Department annually. Interconnecting Customers may elect to petition the Department to maintain confidentiality with their information, however, the Department is under no obligation to grant this confidentiality.

In an ongoing effort to improve the interconnection process for Interconnecting Customer-owned Facilities, the information provided by Interconnecting Customers and the results of the application process will be aggregated with the information of other applicants and periodically reviewed by a DG Collaborative authorized by the Department consisting of industry participants. The aggregation process will not reveal specific details for any one Interconnecting Customer. In addition to this process, Interconnecting Customers may choose to allow non-identifying information specific to their applications to be shared with the Collaborative by answering “Yes” to the Confidentiality Statement question on the first page of the application form.

11.0 Insurance Requirements

11.1 General Liability

11.1(a) In connection with Interconnecting Customer’s performance of its duties and obligations under the Interconnection Service Agreement, Interconnecting Customer shall maintain, during the term of the Agreement, general liability insurance with a combined single limit of not less than:

i. Five million dollars ($5,000,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than five (5) MW;

ii. Two million dollars ($2,000,000) for each occurrence and five million dollars ($5,000,000) in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than one (1) MW and less than or equal to five (5) MW;

iii. One million dollars ($1,000,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than one hundred (100) kW and less than or equal to one (1) MW;

iv. Five hundred thousand dollars ($500,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than ten (10) kW and less than or equal to one hundred (100) kW, except for eligible net metered customers which are exempt from insurance requirements pursuant to 220 CMR 11.04.

11.1(b) No insurance is required for Facilities eligible for net metering. However, the Company recommends that the Interconnecting Customer obtain adequate insurance to cover potential liabilities.
11.1(c) Any combination of General Liability and Umbrella/Excess Liability policy limits can be used to satisfy the limit requirements stated above.

11.1(d) The general liability insurance required to be purchased in this Section 11 may be purchased for the direct benefit of the Company and shall respond to third party claims asserted against the Company (hereinafter known as “Owners Protective Liability”). Should this option be chosen, the requirement of Section 11.2(a) will not apply but the Owners Protective Liability policy will be purchased for the direct benefit of the Company and the Company will be designated as the primary and “Named Insured” under the policy.

11.1(e) The insurance hereunder is intended to provide coverage for the Company solely with respect to claims made by third parties against the Company.

11.1(f) In the event the Commonwealth of Massachusetts, or any other governmental subdivision thereof subject to the claims limits of the Massachusetts Tort Claims Act, G.L. c. 258 (hereinafter referred to as the “Governmental Entity”) is the Interconnecting Customer, any insurance maintained by the Governmental Entity shall contain an endorsement that strictly prohibits the applicable insurance company from interposing the claims limits of G.L. c. 258 as a defense in either the adjustment of any claim, or in the defense of any lawsuit directly asserted against the insurer by the Company. Nothing herein is intended to constitute a waiver or indication of an intent to waive the protections of G.L. c. 258 by the Governmental Entity.

11.2 Insurer Requirements and Endorsements

All required insurance shall be carried by reputable insurers qualified to underwrite insurance in MA having a Best Rating of “A-”. In addition, all insurance shall, (a) include Company as an additional insured; (b) contain a severability of interest clause or cross-liability clause; (c) provide that Company shall not incur liability to the insurance carrier for payment of premium for such insurance; and (c) provide for thirty (30) calendar days’ written notice to Company prior to cancellation, termination, or material change of such insurance; provided that to the extent the Interconnecting Customer is satisfying the requirements of subpart (d) of this paragraph by means of a presently existing insurance policy, the Interconnecting Customer shall only be required to make good faith efforts to satisfy that requirement and will assume the responsibility for notifying the Company as required above.

If the requirement of clause (a) in the paragraph above prevents Interconnecting Customer from obtaining the insurance required without added cost or due to written refusal by the insurance carrier, then upon Interconnecting Customer’s written Notice to Company, the requirements of clause (a) shall be waived.

11.3 Evidence of Insurance

Evidence of the insurance required shall state that coverage provided is primary and is not in excess to or contributing with any insurance or self-insurance maintained by Interconnecting Customer.

The Interconnecting Customer is responsible for providing the Company with evidence of insurance in compliance with this Interconnection Tariff on an annual basis.

Prior to the Company commencing work on System Modifications, and annually thereafter, the Interconnecting Customer shall have its insurer furnish to the Company certificates of insurance evidencing the insurance coverage required above. The Interconnecting Customer shall notify and send to the Company a certificate of insurance for any policy written on a "claims-made" basis. The Interconnecting Customer will maintain extended reporting coverage for three years on all policies written on a "claims-made" basis.
In the event that an Owners Protective Liability policy is provided, the original policy shall be provided to the Company.

11.4 Self Insurance

If Interconnecting Customer has a self-insurance program established in accordance with commercially acceptable risk management practices. Interconnecting Customer may comply with the following in lieu of the above requirements as reasonably approved by the Company:

   a. Interconnecting Customer shall provide to Company, at least thirty (30) calendar days prior to the Date of Initial Operation, evidence of such program to self-insure to a level of coverage equivalent to that required.

   b. If Interconnecting Customer ceases to self-insure to the standards required hereunder, or if Interconnecting Customer is unable to provide continuing evidence of Interconnecting Customer’s financial ability to self-insure, Interconnecting Customer agrees to promptly obtain the coverage required under Section 11.1.

This section shall not allow any Governmental Entity to self-insure where the existence of a limitation on damages payable by a Government Entity imposed by the Massachusetts Tort Claims Act, G.L. c. 258, or similar law, could effectively limit recovery (by virtue of a cap on recovery) to an amount lower than that required in Section 11.1(a).
Exhibit A – Simplified Process Interconnection Application

Instructions (please do not submit this page)

General Information: If you, the Interconnecting Customer, wish to submit an application to interconnect your generating Facility using the Simplified Process (reference Section 3.1 of the Interconnection Tariff for eligibility) please fill out the attached application form completely (not including this page of instructions), including your signature in the space provided. Interconnections that may be eligible for this Simplified Process include UL 1741-Listed inverter-based Facilities that are either (1) connecting to radial electric power systems with power ratings of ≤10 kW single-phase or ≤25 kW three-phase, or (2) connecting to spot network electric power systems with power ratings of ≤15 kW single-phase. Please attach any documentation provided by the inverter manufacturer concerning the UL 1741 listing provided by the manufacturer.

Mail all material to: COMPANY SPECIFIC ADDRESS

The Simplified Process is as follows:

1. Application process:
   a. Interconnecting Customer submits a Simplified Application filled out properly and completely.
   b. The electric utility (Company) acknowledges to the Interconnecting Customer receipt of the application within 3 business days of receipt.
   c. Company evaluates the application for completeness and notifies the Interconnecting Customer within 10 business days of receipt that the application is or is not complete and, if not, advises what is missing.

2. Company verifies Facility equipment can be interconnected safely and reliably.

3. If approved, the Company signs the application approval line and sends to the Interconnecting Customer. In certain rare circumstances, the Company may require the Interconnecting Customer to pay for minor System Modifications. If so, a description of work and an estimate will be sent back to the Interconnecting Customer for approval. The Interconnecting Customer would then approve via a signature and payment for the minor System Modifications. If the Interconnecting Customer approves, the Company performs the System Modifications. Then, the Company signs the application approval line and sends to the Interconnecting Customer.

4. Upon receipt of the signed application, the Interconnecting Customer installs the Facility. Then the Interconnecting Customer arranges for inspection of the completed installation by the local electrical wiring inspector, or other authority having jurisdiction, and this person signs the Certificate of Completion. If the Facility was installed by an electrical contractor, this person also fills out the Certificate of Completion.

5. The Interconnecting Customer returns the Certificate of Completion to the Company.

6. Following receipt of the Certificate of Completion, the Company may inspect the Facility for compliance with standards by arranging for a Witness Test. The Interconnecting Customer has no right to operate in parallel (interconnect) until a Witness Test has been performed or has been previously waived on the Application Form. The Company is obligated to complete this Witness Test within 10 business days of the receipt of the Certificate of Completion. If the Company does not inspect in 10 business days or by mutual agreement of the Parties, the Witness Test is deemed waived.

7. Assuming the wiring inspection and/or Witness Test is satisfactory, the Company notifies the Interconnecting Customer in writing that interconnection is authorized. If the Witness Test is not satisfactory, the Company has the right to disconnect the Facility, and will provide information to the Interconnecting Customer describing clearly what is required for approval.

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
Contact Information: You must provide the contact information for the legal applicant (i.e. the Interconnecting Customer). If other parties are responsible for interfacing with the Company, you should provide their contact information as well.

Ownership Information: Please enter the legal names of the owner or owners of the Facility. Include the percentage ownership (if any) by any Company or public utility holding company, or by any entity owned by either.

Generating Facility Information: Please consult an actual electric bill from the Electric Service Company and enter the correct Account Number and Meter Number on this application. If the facility is to be installed in a new location, a temporary number may be assigned by the Electric Company.

Confidentiality Statement: In an ongoing effort to improve the interconnection process for Interconnecting Customers, the information you provide and the results of the application process will be aggregated with the information of other applicants and periodically reviewed by a DG Collaborative of industry participants that has been organized by the Massachusetts Department of Telecommunications and Energy (DTE). The aggregation process mixes the data together so that specific details for one Interconnecting Customer are not revealed. In addition to this process, you may choose to allow the information specific to your application to be shared with the Collaborative by answering “Yes” to the Confidentiality Statement question on the first page. Please note that even in this case your identification information (contact data) and specific Facility location will not be shared.

UL 1741 Listed? The standard UL 1741, “Inverters, Converters, and Controllers for Use in Independent Power Systems,” addresses the electrical interconnection design of various forms of generating equipment. Many manufacturers choose to submit their equipment to a Nationally Recognized Testing Laboratory (NRTL) that verifies compliance with UL 1741. This term “Listed” is then marked on the equipment and supporting documentation.
Simplified Process Interconnection Application and Service Agreement

Contact Information: ______________________

Legal Name and address of Interconnecting Customer (or, Company name, if appropriate)

Customer or Company Name (print): _________________________ Contact Person, if Company:

Mailing Address: ______

City: ______ State: ______ Zip Code: ______

Telephone (Daytime): ______ (Evening): ______

Facsimile Number: ______ E-Mail Address: ______

Alternative Contact Information (e.g., system installation contractor or coordinating company, if appropriate):

Name: ______

Mailing Address: ______

City: ______ State: ______ Zip Code: ______

Telephone (Daytime): ______ (Evening): ______

Facsimile Number: ______ E-Mail Address: ______

Electrical Contractor Contact Information (if appropriate):

Name: ______ Telephone: ______

Mailing Address: ______

City: ______ State: ______ Zip Code: ______

Ownership Information (include % ownership by any electric utility): ______

Confidentiality Statement: “I agree to allow information regarding the processing of my application (without my name and address) to be reviewed by the Massachusetts DG Collaborative that is exploring ways to further expedite future interconnections.” Yes ______ No ______

Facility Information:

Address of Facility: ______

City: ______ State: ______ Zip Code: ______

Electric Service Company: ______ Account Number: ______

Meter Number: ______

Inverter Manufacturer: ______ Model Name and Number: ______ Quantity: ______

Nameplate Rating: ______ (kW) ______ (kVA) __ (AC Volts) Single Or Three ______ Phase

System Design Capacity: ______ (kW) ______ (kVA)

Prime Mover: Photovoltaic ______ Reciprocating Engine ______ Fuel Cell ______ Turbine ______ Other ______

Energy Source: Solar ______ Wind ______ Hydro ______ Diesel ______ Natural Gas ______ Fuel Oil ______ Other ______

IEEE 1547.1 (UL 1741) Listed? Yes ______ No ______

Estimated Install Date: ________ Estimated In-Service Date: ________

Customer Signature

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true and I agree to the Terms and Conditions on the following page:

Interconnecting Customer Signature: ______ Title: ______ Date: ______

Please attach any documentation provided by the inverter manufacturer describing the inverter’s UL 1741 listing.

Approval to Install Facility (For Company use only)
Installation of the Facility is approved contingent upon the terms and conditions of this Agreement, and agreement to any system modifications, if required (Are system modifications required? Yes ___ No ___ To be Determined ___): 

Company Signature: _ Title: _ Date: .

Application ID number: _______________________ Company waives inspection/Witness Test? Yes ____ No____
Construction of the Facility. The Interconnecting Customer may proceed to construct the Facility once the Approval to Install the Facility has been signed by the Company.

Interconnection and operation. The Interconnecting Customer may operate Facility and interconnect with the Company’s system once the following has occurred:

Municipal Inspection. Upon completing construction, the Interconnecting Customer will cause the Facility to be inspected or otherwise certified by the local electrical wiring inspector with jurisdiction.

Certificate of Completion. The Interconnecting Customer returns the Certificate of Completion appearing as Attachment 2 to the Agreement to the Company at address noted.

Company has completed or waived the right to inspection.

Company Right of Inspection. Within ten (10) business days after receipt of the Certificate of Completion, the Company may, upon reasonable notice and at a mutually convenient time, conduct an inspection of the Facility to ensure that all equipment has been appropriately installed and that all electrical connections have been made in accordance with the Interconnection Tariff. The Company has the right to disconnect the Facility in the event of improper installation or failure to return Certificate of Completion. If the Company does not inspect in 10 days or by mutual agreement of the Parties, the Witness Test is deemed waived.

Safe Operations and Maintenance. The Interconnecting Customer shall be fully responsible to operate, maintain, and repair the Facility.

Access. The Company shall have access to the disconnect switch (if required) of the Facility at all times.

Disconnection. The Company may temporarily disconnect the Facility to facilitate planned or emergency Company work.

Metering and Billing. All Facilities approved under this Agreement qualify for net metering, as approved by the Department from time to time, and the following is necessary to implement the net metering provisions:

Interconnecting Customer Provides Meter Socket. The Interconnecting Customer shall furnish and install, if not already in place, the necessary meter socket and wiring in accordance with accepted electrical standards.

Company Installs Meter. The Company shall furnish and install a meter capable of net metering within ten (10) business days after receipt of the Certificate of Completion if inspection is waived, or within 10 business days after the inspection is completed, if such meter is not already in place.

Indemnification. Except as the Commonwealth is precluded from pledging credit by Section 1 of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth’s cities and towns are precluded by Section 7 of Article 2 of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority, Interconnecting Customer and Company shall each indemnify, defend and hold the other, its directors, officers, employees and agents (including, but not limited to, Affiliates and contractors and their employees), harmless from and against all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever for personal injury (including death) or property damages to unaffiliated third parties that arise out of, or are in any manner connected with, the performance of this Agreement by that party, except to the extent that such injury or damages to unaffiliated third parties may be attributable to the negligence or willful misconduct of the party seeking indemnification.

Limitation of Liability. Each party’s liability to the other party for any loss, cost, claim, injury, liability, or expense, including reasonable attorney’s fees, relating to or arising from any act or omission in its performance of this Agreement, shall be limited to the amount of direct damage actually incurred. In no event shall either party be liable to the other party for any indirect, incidental, special, consequential, or punitive damages of any kind whatsoever.

Termination. This Agreement may be terminated under the following conditions:

By Mutual Agreement. The Parties agree in writing to terminate the Agreement.

By Interconnecting Customer. The Interconnecting Customer may terminate this Agreement by providing written notice to Company.

By Company. The Company may terminate this Agreement (1) if the Facility fails to operate for any consecutive 12 month period, or (2) in the event that the Facility impairs the operation of the electric distribution system or service to other customers or materially impairs the local circuit and the Interconnecting Customer does not cure the impairment.

Assignment/Transfer of Ownership of the Facility. This Agreement shall survive the transfer of ownership of the Facility to a new owner when the new owner agrees in writing to comply with the terms of this Agreement and so notifies the Company.

Interconnection Tariff. These Terms and Conditions are pursuant to the Company’s Tariff for the Interconnection of Customer-Owned Generating Facilities, as approved by the Department of Telecommunications and Energy and as the same may be amended from time to time ("Interconnection Tariff"). All defined terms set forth in these Terms and Conditions are as defined in the Interconnection Tariff (see Company’s website for complete tariff).
ATTACHMENT 2

Certificate of Completion for Simplified Process Interconnections

Installation Information:

Customer or Company Name (print): _________________________  Contact Person, if Company: ___
Mailing Address: ___
City: ___ State: _____ Zip Code: ___
Telephone (Daytime): _____ (Evening): ___
Facsimile Number: ___ E-Mail Address: ___

Address of Facility (if different from above): ___
City: ___ State: _____ Zip Code: ___

Electrical Contractor’s Name (if appropriate): ___
Mailing Address: ___
City: ___ State: _____ Zip Code: ___
Telephone (Daytime): _____ (Evening): ___
Facsimile Number: ___ E-Mail Address: ___
License number: ___________________________

Date of approval to install Facility granted by the Company: _______________________

Application ID number: ______________________________

Inspection:

The system has been installed and inspected in compliance with the local Building/Electrical Code of ___

(City/County)

Signed (Local Electrical Wiring Inspector, or attach signed electrical inspection):

___________________________
Name (printed): ________________________________
Date: ___________

As a condition of interconnection you are required to send/fax a copy of this form along with a copy of the signed electrical permit to (insert Company’s name below):

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
Exhibit B – Expedited/Standard Process Interconnection Application

Instructions (please do not submit this page)

General Information
If you wish to submit an application to interconnect your generating facility using the Expedited or Standard Process, please fill out all pages of the attached application form (not including this page of instructions). Once complete, please sign, attach the supporting documentation requested and enclose an application fee of $3/kW (minimum of $300 and maximum of $2,500).

Contact Information: You must provide as a minimum the contact information of the legal applicant. If another party is responsible for interfacing with the Company (utility), you may optionally provide their contact information as well.

Ownership Information: Please enter the legal names of the owner or owners of the generating facility. Include the percentage ownership (if any) by any electric service company (utility) or public utility holding company, or by any entity owned by either.

Confidentiality Statement: In an ongoing effort to improve the interconnection process for Interconnecting Customer-owned generating facilities, the information you provide and the results of the application process will be aggregated with the information of other applicants and periodically reviewed by a DG Collaborative of industry participants that has been organized by the Massachusetts Department of Telecommunications and Energy (DTE). The aggregation process mixes the data together so that specific details for one Interconnecting Customer are not revealed. In addition to this process, you may choose to allow the information specific to your application to be shared with the Collaborative by answering “Yes” to the Confidentiality Statement question on the first page. Please note that even in this case your identification information (contact data) and specific generating facility location will not be shared.

Generating Facility Information

Account and Meter Numbers: Please consult an actual electric bill from the Electric Service Company and enter the correct Account Number and Meter Number on this application. If the facility is to be installed in a new location, a temporary number may be assigned by the Electric Company.

UL 1741 Listed? The standard UL 1741, “Inverters, Converters, and Controllers for Use in Independent Power Systems,” addresses the electrical interconnection design of various forms of generating equipment. Many manufacturers choose to submit their equipment to a Nationally Recognized Testing Laboratory (NRTL) that verifies compliance with UL 1741. This “listing” is then marked on the equipment and supporting documentation.

DEP Air Quality Permit Needed? A generating facility may be considered a point source of emissions of concern by the Massachusetts Department of Environmental Protection (DEP). Therefore, when submitting this application please indicate whether your generating facility will require an Air Quality Permit. You must answer these questions, however, your specific answers will not affect whether your application is deemed complete. Please contact the DEP to determine whether the generating technology planned for your facility qualifies for a DEP waiver or requires a permit.
Generating Facility Expedited/Standard Process Interconnection Application

Contact Information

Date Prepared: ______________________

Legal Name and address of Interconnecting Customer (or, Company name, if appropriate)

Customer or Company Name: ______ Contact Person, if Company: ____________

Mailing Address: __________________

City: _ State: ______ Zip Code: ___

Telephone (Daytime): ______ (Evening): __________

Facsimile Number: __ E-Mail Address: __________

Alternative Contact Information (e.g. system installation contractor or coordinating company)

Name: __________

Mailing Address: __________________

City: _ State: ______ Zip Code: ___

Telephone (Daytime): ______ (Evening): __________

Facsimile Number: __ E-Mail Address: __________

Ownership (include % ownership by any electric utility): __

Confidentiality Statement: “I agree to allow information regarding the processing of my application (without my name and address) to be reviewed by the Massachusetts DG Collaborative that is exploring ways to further expedite future interconnections.” Yes ____ No____

Generating Facility Information

Address of Facility: __

City: _ State: ______ Zip Code: ___

Electric Service Company: _____________ Account Number: _____________ Meter Number: _____________

Type of Generating Unit: Synchronous__ Induction___ Inverter_____

Manufacturer: ______ Model: ______

Nameplate Rating: __ (kW) _ (kVAr) ______ (Volts) Single_ or Three____ Phase

Prime Mover: Fuel Cell____ Recip Engine_ Gas Turb____ Steam Turb__ Microturbine_ PV____ Other_

Energy Source: Solar__ Wind_ Hydro_ Diesel, Natural Gas_ Fuel Oil____ Other_ (Specify)

IEEE 1547.1 (UL 1741) Listed? Yes_ No_____ Need an air quality permit from DEP? Yes___ No____ Not Sure _____

If “yes”, have you applied for it? Yes____ No_____ Planning to Export Power? Yes_____ No____ A Cogeneration Facility? Yes_ No____

Anticipated Export Power Purchaser: ____________

Export Form? Simultaneous Purchase/Sale_ Net Purchase/Sale_ Net Metering_ Other_ (Specify)

Est. Install Date: ______ Est. In-Service Date: ______ Agreement Needed By: ______

Application Process

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true:

Interconnecting Customer Signature: ______ Title: __ Date: __

The information provided in this application is complete:

Company Signature: _ Title: __ Date: __

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
Generating Facility Technical Detail  Date: ______________

Information on components of the generating facility that are currently Listed:

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Manufacturer</th>
<th>Model</th>
<th>National Standard</th>
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Total Number of Generating Units in Facility? ____

Generator Unit Power Factor Rating: ______

Max Adjustable Leading Power Factor? ____ Max Adjustable Lagging Power Factor? ____

Generator Characteristic Data (for all inverter-based machines)

Max Design Fault Contribution Current? ____ Instantaneous _____ or RMS? ____

Harmonics Characteristics: ______

Start-up power requirements: ______

Generator Characteristic Data (for all rotating machines)

Rotating Frequency: ______ (rpm) Neutral Grounding Resistor (If Applicable): ______

Additional Information for Synchronous Generating Units

Synchronous Reactance, Xd: ______ (PU) Transient Reactance, X’d: ______ (PU)

Subtransient Reactance, X”d: ______ (PU) Neg Sequence Reactance, X2:______ (PU)

Zero Sequence Reactance, Xo: ______ (PU) kVA Base: ______

Field Voltage: ______ (Volts) Field Current: ______ (Amps)

Additional Information for Induction Generating Units

Rotor Resistance, Rr: ______ Stator Resistance, Rs:_______

Rotor Reactance, Xr: ______ Stator Reactance, Xs:_______

Magnetizing Reactance, Xm:_______ Short Circuit Reactance, Xd”:_______

Exciting Current: ______ Temperature Rise: ______

Frame Size: ______

Total Rotating Inertia, H: ______ Per Unit on kVA Base: ______

Reactive Power Required In Vars (No Load): ______

Reactive Power Required In Vars (Full Load): ______

Additional information for Induction Generating Units that are started by motoring

Motoring Power: ______ (kW) Design Letter: ______

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
## Interconnection Equipment Technical Detail

**Date:** __________

Will a transformer be used between the generator and the point of interconnection?  
*Yes*  *No*  

Will the transformer be provided by Interconnecting Customer?  
*Yes*  *No*  

### Transformer Data (if applicable, for Interconnecting Customer-Owned Transformer):

<table>
<thead>
<tr>
<th>Nameplate Rating:</th>
<th>(kVA) Single or Three Phase</th>
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Transformer Impedance: (%) on a kVA Base  
If Three Phase:

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<thead>
<tr>
<th>Transformer Primary:</th>
<th>(Volts) Delta Wye Wye Grounded Other</th>
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<tr>
<th>Transformer Secondary:</th>
<th>(Volts) Delta Wye Wye Grounded Other</th>
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Transformer Fuse Data (if applicable, for Interconnecting Customer-Owned Fuse):  
(Attach copy of fuse manufacturer’s Minimum Melt & Total Clearing Time-Current Curves)

Manufacter:  
Type:  
Size:  
Speed:  

Interconnecting Circuit Breaker (if applicable):

<table>
<thead>
<tr>
<th>Manufacturer:</th>
<th>Type:</th>
<th>Load Rating:</th>
<th>Interrupting Rating:</th>
<th>Trip Speed:</th>
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<tr>
<td></td>
<td></td>
<td>(Amps)</td>
<td>(Amps) (Cycles)</td>
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Interconnection Protective Relays (if applicable):  
(If microprocessor-controlled)

List of Functions and Adjustable Setpoints for the protective equipment or software:

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<tr>
<th>Setpoint Function</th>
<th>Minimum</th>
<th>Maximum</th>
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(If discrete components)  
(Enclose copy of any proposed Time-Overcurrent Coordination Curves)

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<th>Type:</th>
<th>Style/Catalog No.:</th>
<th>Proposed Setting:</th>
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Current Transformer Data (if applicable):  
(Enclose copy of Manufacturer’s Excitation & Ratio Correction Curves)

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<th>Manufacturer:</th>
<th>Type:</th>
<th>Accuracy Class:</th>
<th>Proposed Ratio Connection:</th>
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Potential Transformer Data (if applicable):

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For the latest authorized version please refer to the Company’s website at [http://www.nationalgridus.com/electricalspecifications](http://www.nationalgridus.com/electricalspecifications).
General Technical Detail
Date: ______________

Enclose 3 copies of site electrical One-Line Diagram showing the configuration of all generating facility equipment, current and potential circuits, and protection and control schemes with a Massachusetts registered professional engineer (PE) stamp.

Enclose 3 copies of any applicable site documentation that indicates the precise physical location of the proposed generating facility (e.g., USGS topographic map or other diagram or documentation).

Proposed Location of Protective Interface Equipment on Property:
(Include Address if Different from Application Address)

Enclose copy of any applicable site documentation that describes and details the operation of the protection and control schemes.

Enclose copies of applicable schematic drawings for all protection and control circuits, relay current circuits, relay potential circuits, and alarm/monitoring circuits (if applicable).

Please enclose any other information pertinent to this installation.
ATTACHMENT 2

Certificate of Completion for Expedited/Standard Process Interconnections

Installation Information:  
Check if owner-installed

Customer or Company Name (print): _________________________  Contact Person, if Company:____
Mailing Address: _____  
City: __ State: _____ Zip Code: __
Telephone (Daytime): ______ (Evening): __
Facsimile Number: __ E-Mail Address: ____

Address of Facility (if different from above): 
City: __ State: _____ Zip Code: __

Electrical Contractor’s Name (if appropriate): ______
Mailing Address: ______
City: __ State: _____ Zip Code: __
Telephone (Daytime): ______ (Evening): __
Facsimile Number: __ E-Mail Address: ____
License number: _____________________________

Date of approval to install Facility granted by the Company: _______________________

Application ID number: ______________________________

Inspection:

The system has been installed and inspected in compliance with the local Building/Electrical Code of

________________________________________________________
(City/County)

Signed (Local Electrical Wiring Inspector, or attach signed electrical inspection):
________________________________________________________

Name (printed): _________________________________

Date: __________

As a condition of interconnection you are required to send/fax a copy of this form along with a copy of the signed electrical permit to (insert Company’s name below):
Exhibit C – Supplemental Review Agreement

This Agreement, dated ____________, is entered into by and between __________________ ("Interconnecting Customer") and the Company, for the purpose of setting forth the terms, conditions and costs for conducting a Supplemental Review relative to the Expedited Process as defined in Section 1.0 and outlined in Section 3.0 of the Interconnection Tariff. This Supplemental Review pertains to Application Number _____ (the Interconnecting Customer’s application ID number).

If the Supplemental Review determines the requirements for processing the application through the Expedited Process including any System Modifications, then the modification requirements, reasoning, and costs for these modifications will be identified and included in an executable Interconnection Service Agreement sent to the Interconnecting Customer for execution. If the Supplemental Review does not determine the requirements, it will include a proposed Impact Study Agreement as part of the Standard Process which will include an estimate of the cost of the study.

The Interconnecting Customer agrees to provide, in a timely and complete manner, all additional information and technical data necessary for the Company to conduct the Supplemental Review not already provided in the Interconnecting Customer’s application.

All work pertaining to the Supplemental Review that is the subject of this Agreement will be approved and coordinated only through designated and authorized representatives of the Company and the Interconnecting Customer. Each party shall inform the other in writing of its designated and authorized representative, if different than what is in the application.

The Company shall perform the Supplemental Review for a fee not to exceed $1,250. The Company anticipates that the Supplemental Review will cost $____. No work will be performed until payment is received.

Please indicate your acceptance of this Agreement by signing below.

_____________________
Interconnecting Customer
Exhibit D – Impact Study Agreement

This Agreement, dated ___________ , is entered into by and between __________________________ (“Interconnecting Customer”) and the Company, for the purpose of setting forth the terms, conditions and costs for conducting an Impact Study relative to the Standard Process as defined in Section 1.0 and outlined in Section 3.0 of the Interconnection Tariff. This Impact Study pertains to Application Number _____ (the Interconnecting Customer’s application ID number).

1. The Interconnecting Customer agrees to provide, in a timely and complete manner, all additional information and technical data necessary for the Company to conduct the Impact Study not already provided in the Interconnecting Customer’s application.

2. All work pertaining to the Impact Study that is the subject of this Agreement will be approved and coordinated only through designated and authorized representatives of the Company and the Interconnecting Customer. Each party shall inform the other in writing of its designated and authorized representative, if different than what is in the application.

3. Where there are other potentially Affected Systems, and no single Party is in a position to prepare an Impact Study covering all potentially Affected Systems, the Company will coordinate but not be responsible for the timing of any additional studies required to determine the impact of the interconnection request on other potentially Affected Systems. The Interconnecting Customer will be directly responsible to the potentially Affected System operators for all costs of any additional studies required to evaluate the impact of the interconnection on the potentially Affected Systems. The Company will not proceed with this Impact Study without the Interconnecting Customer’s consent to have the other studies conducted.

4. If the Company determines, in accordance with Good Utility Practice, that the System Modifications to the Company EPS are not substantial, the Impact Study will determine the scope and cost of the modifications. If the Company determines, in accordance with Good Utility Practice, that the System Modifications to the Company EPS are substantial, the Impact Study will produce an estimate for the modification costs (within ±25%) and a Detailed Study Agreement and its estimated cost.

5. Impact Study, together with any additional studies contemplated in Paragraph 3, shall form the basis for the Interconnecting Customer’s proposed use of the Company EPS and shall be furthermore utilized in obtaining necessary third-party approvals of any required facilities and requested distribution services. The Interconnecting Customer understands and acknowledges that any use of study results by the Interconnecting Customer or its agents, whether in preliminary or final form, prior to NEPOOL 18.4 approval, should such approval be required, is completely at the Interconnecting Customer’s risk.

6. The Impact Study fee of $XX (except as noted below) is due in full prior to the execution of the Impact Study. If the anticipated cost exceeds $25,000, the Interconnecting Customer is eligible for a payment plan, including a payment and construction schedule with milestones for both parties. At the request of the Interconnecting Customer, the Company will break the costs into phases in which the costs will be collected prior to Company expenditures for each phase of the study. The payment plan will be attached as an exhibit to the Impact Study Agreement.
7. The Company will, in writing, advise the Interconnecting Customer in advance of any cost increase for work to be performed up to a total amount of increase of 10% only. All costs that exceed the 10% increase cap will be borne solely by the Company. Any such changes to the Company’s costs for the work shall be subject to the Interconnecting Customer’s consent. The Interconnecting Customer shall, within thirty (30) days of the Company’s notice of increase, authorize such increase and make payment in the amount up to the 10% increase cap, or the Company will suspend the work and the corresponding agreement will terminate.

Final Accounting. Upon request by the Interconnecting Customer, the Company within ninety (90) business days after completion of the construction and installation of the System Modifications described in an attached exhibit to the Interconnection Service Agreement, shall provide Interconnecting Customer with a final accounting report of any difference between (a) Interconnecting Customer’s cost responsibility under the Interconnection Service Agreement for the actual cost of such System Modifications, and (b) Interconnecting Customer’s previous aggregate payments to the Company for such System Modifications. To the extent that Interconnecting Customer’s cost responsibility in the Interconnection Service Agreement exceeds Interconnecting Customer’s previous aggregate payments, the Company shall invoice Interconnecting Customer and Interconnecting Customer shall make payment to the Company within forty-five (45) days. To the extent that Interconnecting Customer’s previous aggregate payments exceed Interconnecting Customer’s cost responsibility under this agreement, the Company shall refund to Interconnecting Customer an amount equal to the difference within forty-five (45) days of the provision of such final accounting report.

8. In the event this Agreement is terminated for any reason, the Company shall refund to the Interconnecting Customer the portion of the above fee or any subsequent payment to the Company by the Interconnecting Customer that the Company did not expend or commit in performing its obligations under this Agreement. Payments for work performed shall not be subject to refunding except in accordance with Paragraph 10 below.

9. Nothing in this Agreement shall be interpreted to give the Interconnecting Customer immediate rights to wheel over or interconnect with the Company’s EPS.

10. Except as the Commonwealth is precluded from pledging credit by Section 1 of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth’s cities and towns are precluded by Section 7 of Article 2 of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority, Interconnecting Customer and Company shall each indemnify, defend and hold the other, its directors, officers, employees and agents (including, but not limited to, affiliates and contractors and their employees), harmless from and against all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever for personal injury (including death) or property damages to unaffiliated third parties that arise out of, or are in any manner connected with, the performance of this Agreement by that party, except to the extent that such injury or damages to unaffiliated third parties may be attributable to the negligence or willful misconduct of the party seeking indemnification.

Notwithstanding the foregoing, the Interconnecting Customer hereby waives recourse against the Company and its Affiliates for, and releases the Company and
its Affiliates from, any and all liabilities arising from or attributable to incomplete, inaccurate, or otherwise faulty information supplied by the Interconnecting Customer.

11. If either party materially breaches any of its covenants hereunder, the other party may terminate this Agreement by serving notice of same on the other party to this Agreement.

12. This agreement shall be construed and governed in accordance with the laws of the Commonwealth of Massachusetts.

13. All amendments to this Agreement shall be in written form executed by both Parties.

14. The terms and conditions of this Agreement shall be binding on the successors and assigns of either Party.

15. This Agreement will remain in effect for a period of up to two years from its effective date.

16. This Agreement may be terminated under the following conditions.

a) The Parties agree in writing to terminate the Agreement.

b) The Interconnecting Customer may terminate this agreement at any time by providing written notice to Company.

c) The Company may terminate this Agreement if the Interconnecting Customer either: (1) has not paid the fee or, (2) has not responded to requests for further information in accordance with provisions in the Interconnection Tariff.

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<tr>
<th>Interconnecting Customer:</th>
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Exhibit E – Detailed Study Agreement

This Agreement, dated ____________, is entered into by and between _________________ (“Interconnecting Customer”) and the Company, for the purpose of setting forth the terms, conditions and costs for conducting an Detailed Study relative to the Standard process as defined in Section 1 and outlined in Section 3 of the Interconnection Tariff. This Detailed Study pertains to Application Number _____ (the Interconnecting Customer's application ID number).

1. The Interconnecting Customer agrees to provide, in a timely and complete manner, all additional information and technical data necessary for the Company to conduct the Detailed Study not already provided in the Interconnecting Customer’s application.

2. All work pertaining to the Detailed Study that is the subject of this Agreement will be approved and coordinated only through designated and authorized representatives of the Company and the Interconnecting Customer. Each party shall inform the other in writing of its designated and authorized representative, if different than what is in the application.

3. Where there are other Affected Systems identified by the Impact Studies, and no single Party is in a position to prepare a Detailed Study covering all Affected Systems, the Company will coordinate but not be responsible for the timing of any additional studies required to determine the System Modifications of the interconnection request on other Affected Systems. The Interconnecting Customer will be directly responsible to the Affected System operators for all costs of any additional studies required to evaluate the impact of the interconnection on the Affected Systems. The Company will not proceed with this Detailed Study without the Interconnecting Customer’s consent to have the other studies conducted.

4. The Company will provide an estimate of the costs of the System Modifications required as a result of the Detailed Study.

5. The Detailed Study, together with any additional studies contemplated in Paragraph 3, shall form the basis for the Interconnecting Customer’s proposed use of the Company EPS and shall be furthermore utilized in obtaining necessary third-party approvals of any required facilities and requested distribution services. The Interconnecting Customer understands and acknowledges that any use of study results by the Interconnecting Customer or its agents, whether in preliminary or final form, prior to NEPOOL 18.4 approval, should such approval be required, is completely at the Interconnecting Customer’s risk.

6. The Detailed Study fee of $XX (except as noted below) is due in full prior to the execution of the Detailed Study. If the anticipated cost exceeds $25,000, the Interconnecting Customer is eligible for a payment plan, including a payment and construction schedule with milestones for both parties. At the request of the Interconnecting Customer, the Company will break the costs into phases in which the costs will be collected prior to Company expenditures for each phase of the study. The payment plan will be attached as an exhibit to the Detailed Study Agreement.

7. The Company will, in writing, advise the Interconnecting Customer in advance of any cost increase for work to be performed up to a total amount of increase of 10% only. All costs that exceed the 10% increase cap will be borne solely by the
Company. Any such changes to the Company’s costs for the work shall be subject to the Interconnecting Customer’s consent. The Interconnecting Customer shall, within thirty (30) days of the Company’s notice of increase, authorize such increase and make payment in the amount up to the 10% increase cap, or the Company will suspend the work and the corresponding agreement will terminate.

Final Accounting. Upon request by the Interconnecting Customer, the Company within ninety (90) business days after completion of the construction and installation of the System Modifications described in an attached exhibit to the Interconnection Service Agreement, shall provide Interconnecting Customer with a final accounting report of any difference between (a) Interconnecting Customer’s cost responsibility under the Interconnection Service Agreement for the actual cost of such System Modifications, and (b) Interconnecting Customer’s previous aggregate payments to the Company for such System Modifications. To the extent that Interconnecting Customer’s cost responsibility in the Interconnection Service Agreement exceeds Interconnecting Customer’s previous aggregate payments, the Company shall invoice Interconnecting Customer and Interconnecting Customer shall make payment to the Company within forty-five (45) days. To the extent that Interconnecting Customer’s previous aggregate payments exceed Interconnecting Customer’s cost responsibility under this agreement, the Company shall refund to Interconnecting Customer an amount equal to the difference within forty-five (45) days of the provision of such final accounting report.

8. In the event this Agreement is terminated for any reason, the Company shall refund to the Interconnecting Customer the portion of the above fee or any subsequent payment to the Company by the Interconnecting Customer that the Company did not expend or commit in performing its obligations under this Agreement. Payments for work performed shall not be subject to refunding except in accordance with Paragraph 9 below.

9. Nothing in this Agreement shall be interpreted to give the Interconnecting Customer immediate rights to wheel over or interconnect with the Company’s EPS.

10. Except as the Commonwealth is precluded from pledging credit by Section of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth’s cities and towns are precluded by Section 7 of Article 2 of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority, Interconnecting Customer and Company shall each indemnify, defend and hold the other, its directors, officers, employees and agents (including, but not limited to, affiliates and contractors and their employees), harmless from and against all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever for personal injury (including death) or property damages to unaffiliated third parties that arise out of, or are in any manner connected with, the performance of this Agreement by that party, except to the extent that such injury or damages to unaffiliated third parties may be attributable to the negligence or willful misconduct of the party seeking indemnification.

Notwithstanding the foregoing, the Interconnecting Customer hereby waives recourse against the Company and its Affiliates for, and releases the Company and its Affiliates from, any and all liabilities arising from or attributable to information supplied by the Interconnecting Customer.
11. This agreement shall be construed and governed in accordance with the laws of the Commonwealth of Massachusetts.

12. All amendments to this Agreement shall be in written form executed by both Parties.

13. The terms and conditions of this Agreement shall be binding on the successors and assigns of either Party.

14. This Agreement will remain in effect for a period of up to two years from its effective date.

15. This Agreement may be terminated under the following conditions.

a) The Parties agree in writing to terminate the Agreement.

b) The Interconnecting Customer may terminate this agreement at any time by providing written notice to Company.

c) The Company may terminate this Agreement if the Interconnecting Customer either: (1) has not paid the fee or, (2) has not responded to requests for further information in accordance with provisions in the Interconnection Tariff.

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**Interconnecting Customer:**

Name: _______________________________
Title: _______________________________
Date: _______________________________

**Company:**

Name: _______________________________
Title: _______________________________
Date: _______________________________
Exhibit F – Interconnection Service Agreement

1. Parties. This Interconnection Service Agreement (“Agreement”), dated as of __________ (“Effective Date”) is entered into, by and between ________________, a Massachusetts corporation with a principal place of business at __________ (hereinafter referred to as the “Company”), and ________________, a __________ corporation with a principal place of business at __________ (“Interconnecting Customer”). (The Company and Interconnecting Customer are collectively referred to as the “Parties”). Terms used herein without definition shall have the meanings set forth in Section 1.2 of the Interconnection Tariff which is hereby incorporated by reference.

2. Basic Understandings. This Agreement provides for parallel operation of an Interconnecting Customer’s Facility with the Company EPS to be installed and operated by the Interconnecting Customer at __________ (Facility name, address, and end-use customer account number, if applicable). A description of the Facility is located in Attachment 2. If the Interconnecting Customer is not the Customer, an Agreement between the Company and the Company’s Retail Customer, attached as Exhibit G to the Interconnection Tariff, must be signed and included as an Attachment to this Agreement.

The Interconnecting Customer has the right to operate its Facility in parallel with the Company EPS immediately upon successful completion of the protective relays testing as witnessed by the Company and receipt of written notice from the Company that interconnection with the Company EPS is authorized (“Authorization Date”).

3. Term. This Agreement shall become effective as of the Effective Date. The Agreement shall continue in full force and effect until terminated pursuant to Section 4 of this Agreement.

4. Termination.

4.1 This Agreement may be terminated under the following conditions.

4.1.1 The Parties agree in writing to terminate the Agreement.

4.1.2 The Interconnecting Customer may terminate this agreement at any time by providing sixty (60) days written notice to Company.

4.1.3 The Company may terminate this Agreement upon the occurrence of an Event of Default by the Interconnecting Customer as provided in Section 18 of this Agreement.

4.1.4 The Company may terminate this Agreement if the Interconnecting Customer either: (1) fails to energize the Facility within 12 months of the Authorization Date; or, (2) permanently abandons the Facility. Failure to operate the Facility for any consecutive 12 month period after the Authorization Date shall constitute permanent abandonment unless otherwise agreed to in writing between the Parties.

4.1.5 The Company, upon 30 days notice, may terminate this Agreement if there are any changes in Department regulations or state law that have a material adverse effect on the Company’s ability to perform its obligations under the terms of this Agreement.
4.2 Survival of Obligations. The termination of this Agreement shall not relieve either Party of its liabilities and obligations, owed or continuing at the time of termination. Sections 5, 10, 12, 13, and 25 as it relates to disputes pending or for wrongful termination of this Agreement shall survive the termination of this Agreement.

4.3 Related Agreements. Any agreement attached to and incorporated into this Agreement shall terminate concurrently with this Agreement unless the Parties have agreed otherwise in writing.

5. General Payment Terms. The Interconnecting Customer shall be responsible for the System Modification costs and payment terms identified in Attachment 4 of this Agreement and any approved cost increases pursuant to the terms of the Interconnection Tariff. If the system modifications exceed $25,000, Attachment 4 will include a payment and construction schedule for both parties.

5.1 Cost or Fee Adjustment Procedures. The Company will, in writing, advise the Interconnecting Customer in advance of any cost increase for work to be performed up to a total amount of increase of 10% only. All costs that exceed the 10% increase cap will be borne solely by the Company. Any such changes to the Company’s costs for the work shall be subject to the Interconnecting Customer’s consent. The Interconnecting Customer shall, within thirty (30) days of the Company’s notice of increase, authorize such increase and make payment in the amount up to the 10% increase cap, or the Company will suspend the work and the corresponding agreement will terminate.

5.2 Final Accounting. Upon request by the Interconnecting Customer, the Company within ninety (90) business days after completion of the construction and installation of the System Modifications described in an attached exhibit to the Interconnection Service Agreement, shall provide Interconnecting Customer with a final accounting report of any difference between (a) Interconnecting Customer’s cost responsibility under the Interconnection Service Agreement for the actual cost of such System Modifications, and (b) Interconnecting Customer’s previous aggregate payments to the Company for such System Modifications. To the extent that Interconnecting Customer’s cost responsibility in the Interconnection Service Agreement exceeds Interconnecting Customer’s previous aggregate payments, the Company shall invoice Interconnecting Customer and Interconnecting Customer shall make payment to the Company within 45 days. To the extent that Interconnecting Customer’s previous aggregate payments exceed Interconnecting Customer’s cost responsibility under this agreement, the Company shall refund to Interconnecting Customer an amount equal to the difference within forty five (45) days of the provision of such final accounting report.

6. Operating Requirements

6.1 General Operating Requirements. Interconnecting Customer shall operate and maintain the Facility in accordance with the applicable manufacturer’s recommended maintenance schedule, in compliance with all aspects of the Company’s Interconnection Tariff. The Interconnecting Customer will continue to comply with all applicable laws and requirements after interconnection has occurred. In the event the Company has reason to believe that the Interconnecting Customer’s installation may be the source of problems on the Company EPS, the Company has the right to install monitoring equipment at a mutually agreed upon location to determine the source of the problems. If the Facility is determined to be the source of the problems, the Company may require disconnection as outlined in Section 7.0 of the Interconnection Tariff. The cost of this testing will be borne by the Company unless the Company demonstrates that the problem or problems are caused by the Facility or if the test was performed at the request of the Interconnecting Customer.
6.2 No Adverse Effects; Non-interference. Company shall notify Interconnecting Customer if there is evidence that the operation of the Facility could cause disruption or deterioration of service to other Customers served from the same Company EPS or if operation of the Facility could cause damage to Company EPS or Affected Systems. The deterioration of service could be, but is not limited to, harmonic injection in excess of IEEE Standard 1547-2003, as well as voltage fluctuations caused by large step changes in loading at the Facility. Each Party will notify the other of any emergency or hazardous condition or occurrence with its equipment or facilities which could affect safe operation of the other Party’s equipment or facilities. Each Party shall use reasonable efforts to provide the other Party with advance notice of such conditions.

The Company will operate the EPS in such a manner so as to not unreasonably interfere with the operation of the Facility. The Interconnecting Customer will protect itself from normal disturbances propagating through the Company EPS, and such normal disturbances shall not constitute unreasonable interference unless the Company has deviated from Good Utility Practice. Examples of such disturbances could be, but are not limited to, single-phasing events, voltage sags from remote faults on the Company EPS, and outages on the Company EPS. If the Interconnecting Customer demonstrates that the Company EPS is adversely affecting the operation of the Facility and if the adverse effect is a result of a Company deviation from Good Utility Practice, the Company shall take appropriate action to eliminate the adverse effect.

6.3 Safe Operations and Maintenance. Each Party shall operate, maintain, repair, and inspect, and shall be fully responsible for, the facility or facilities that it now or hereafter may own unless otherwise specified in this Agreement. Each Party shall be responsible for the maintenance, repair and condition of its respective lines and appurtenances on their respective side of the PCC. The Company and the Interconnecting Customer shall each provide equipment on its respective side of the PCC that adequately protects the Company’s EPS, personnel, and other persons from damage and injury.

6.4 Access. The Company shall have access to the disconnect switch of the Facility at all times.

6.4.1 Company and Interconnecting Customer Representatives. Each Party shall provide and update as necessary the telephone number that can be used at all times to allow either Party to report an emergency.

6.4.2 Company Right to Access Company-Owned Facilities and Equipment. If necessary for the purposes of the Interconnection Tariff and in the manner it describes, the Interconnecting Customer shall allow the Company access to the Company’s equipment and the Company’s facilities located on the Interconnecting Customer’s or Customer’s premises. To the extent that the Interconnecting Customer does not own all or any part of the property on which the Company is required to locate its equipment or facilities to serve the Interconnecting Customer under the Interconnection Tariff, the Interconnecting Customer shall secure and provide in favor of the Company the necessary rights to obtain access to such equipment or facilities, including easements if the circumstances so require.

6.4.3 Right to Review Information. The Company shall have the right to review and obtain copies of Interconnecting Customer’s operations and maintenance records, logs, or other information such as, unit availability, maintenance outages, circuit breaker operation requiring manual reset, relay targets and unusual events pertaining to Interconnecting Customer’s Facility or its interconnection with the Company EPS. This information will be
7. Disconnection

7.1 Temporary Disconnection

7.1.1 Emergency Conditions. Company shall have the right to immediately and temporarily disconnect the Facility without prior notification in cases where, in the reasonable judgment of Company, continuance of such service to Interconnecting Customer is imminently likely to (i) endanger persons or damage property or (ii) cause a material adverse effect on the integrity or security of, or damage to, Company EPS or to the electric systems of others to which the Company EPS is directly connected. Company shall notify Interconnecting Customer promptly of the emergency condition. Interconnecting Customer shall notify Company promptly when it becomes aware of an emergency condition that affects the Facility that may reasonably be expected to affect the Company EPS. To the extent information is known, the notification shall describe the emergency condition, the extent of the damage or deficiency, or the expected effect on the operation of both Parties' facilities and operations, its anticipated duration and the necessary corrective action.

7.1.2 Routine Maintenance, Construction and Repair. Company shall have the right to disconnect the Facility from the Company EPS when necessary for routine maintenance, construction and repairs on the Company EPS. The Company shall provide the Interconnecting Customer with a minimum of seven calendar days planned outage notification consistent with the Company’s planned outage notification protocols. If the Interconnecting Customer requests disconnection by the Company at the PCC, the Interconnecting Customer will provide a minimum of seven days notice to the Company. Any additional notification requirements will be specified by mutual agreement in the Interconnection Service Agreement. Company shall make an effort to schedule such curtailment or temporary disconnection with Interconnecting Customer.

7.1.3 Forced Outages. During any forced outage, Company shall have the right to suspend interconnection service to effect immediate repairs on the Company EPS; provided, however, Company shall use reasonable efforts to provide the Interconnecting Customer with prior notice. Where circumstances do not permit such prior notice to Interconnecting Customer, Company may interrupt Interconnection Service and disconnect the Facility from the Company EPS without such notice.

7.1.4 Non-Emergency Adverse Operating Effects. The Company may disconnect the Facility if the Facility is having an adverse operating effect on the Company EPS or other customers that is not an emergency, and the Interconnecting Customer fails to correct such adverse operating effect after written notice has been provided and a maximum of 45 days to correct such adverse operating effect has elapsed.

7.1.5 Modification of the Facility. Company shall notify Interconnecting Customer if there is evidence of a material modification to the Facility and shall have the right to immediately suspend interconnection service in cases where such material modification has been implemented without prior written authorization from the Company.

7.1.6 Re-connection. Any curtailment, reduction or disconnection shall continue only for so long as reasonably necessary. The Interconnecting Customer and the Company shall cooperate with each other to restore the Facility and the Company EPS, respectively, to their normal operating state as soon as reasonably practicable following the cessation or remedy of the event that led to the temporary disconnection.
7.2 Permanent Disconnection. The Interconnecting Customer has the right to permanently disconnect at any time with 30 days written notice to the Company.

7.2.1 The Company may permanently disconnect the Facility upon termination of the Interconnection Service Agreement in accordance with the terms thereof.

7. Metering. Metering of the output from the Facility shall be conducted pursuant to the terms of the Interconnection Tariff.

8. Assignment. Except as provided herein, Interconnecting Customer shall not voluntarily assign its rights or obligations, in whole or in part, under this Agreement without Company’s written consent. Any assignment Interconnecting Customer purports to make without Company’s written consent shall not be valid. Company shall not unreasonably withhold or delay its consent to Interconnecting Customer’s assignment of this Agreement. Notwithstanding the above, Company’s consent will not be required for any assignment made by Interconnecting Customer to an Affiliate or as collateral security in connection with a financing transaction. In all events, the Interconnecting Customer will not be relieved of its obligations under this Agreement unless, and until the assignee assumes in writing all obligations of this Agreement and notifies the Company of such assumption.

9. Confidentiality. Company shall maintain confidentiality of all Interconnecting Customer confidential and proprietary information except as otherwise required by applicable laws and regulations, the Interconnection Tariff, or as approved by the Interconnecting Customer in the Simplified or Expedited/Standard Application form or otherwise.

10. Insurance Requirements.

11.1 General Liability.

11.1(a) In connection with Interconnecting Customer’s performance of its duties and obligations under the Interconnection Service Agreement, Interconnecting Customer shall maintain, during the term of the Agreement, general liability insurance with a combined single limit of not less than:

i. Five million dollars ($5,000,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than five (5) MW.

ii. Two million dollars ($2,000,000) for each occurrence and five million dollars ($5,000,000) in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than one (1) MW and less than or equal to five (5) MW;

iii. One million dollars ($1,000,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than one hundred (100) kW and less than or equal to one (1) MW;

iv. Five hundred thousand dollars ($500,000) for each occurrence and in the aggregate if the Gross Nameplate Rating of Interconnecting Customer’s Facility is greater than ten (10) kW and less than or equal to one hundred (100) kW, except for eligible net metered customers which are exempt from insurance requirements pursuant 220 CMR 11.04.

11.1(b) No insurance is required for Facilities eligible for net metering. However, the Company recommends that the Interconnecting Customer obtain adequate insurance to cover potential liabilities.
11.1(c) Any combination of General Liability and Umbrella/Excess Liability policy limits can be used to satisfy the limit requirements stated above.

11.1(d) The general liability insurance required to be purchased in this Section 11 may be purchased for the direct benefit of the Company and shall respond to third party claims asserted against the Company (hereinafter known as “Owners Protective Liability”). Should this option be chosen, the requirement of Section 11.2(a) will not apply but the Owners Protective Liability policy will be purchased for the direct benefit of the Company and the Company will be designated as the primary and “Named Insured” under the policy.

11.1(e) The insurance hereunder is intended to provide coverage for the Company solely with respect to claims made by third parties against the Company.

11.1(f) In the event the Commonwealth of Massachusetts, or any other governmental subdivision thereof subject to the claims limits of the Massachusetts Tort Claims Act, G.L. c. 258 (hereinafter referred to as the “Governmental Entity”) is the Interconnecting Customer, any insurance maintained by the Governmental Entity shall contain an endorsement that strictly prohibits the applicable insurance company from interposing the claims limits of G.L. c. 258 as a defense in either the adjustment of any claim, or in the defense of any lawsuit directly asserted against the insurer by the Company. Nothing herein is intended to constitute a waiver or indication of an intent to waive the protections of G.L. c. 258 by the Governmental Entity.

11.2 Insurer Requirements and Endorsements. All required insurance shall be carried by reputable insurers qualified to underwrite insurance in MA having a Best Rating of “A-“. In addition, all insurance shall, (a) include Company as an additional insured; (b) contain a severability of interest clause or cross-liability clause; (c) provide that Company shall not incur liability to the insurance carrier for payment of premium for such insurance; and (c) provide for thirty (30) calendar days’ written notice to Company prior to cancellation, termination, or material change of such insurance; provided that to the extent the Interconnecting Customer is satisfying the requirements of subpart (d) of this paragraph by means of a presently existing insurance policy, the Interconnecting Customer shall only be required to make good faith efforts to satisfy that requirement and will assume the responsibility for notifying the Company as required above.

If the requirement of clause (a) in the paragraph above prevents Interconnecting Customer from obtaining the insurance required without added cost or due to written refusal by the insurance carrier, then upon Interconnecting Customer’s written Notice to Company, the requirements of clause (a) shall be waived.

11.3 Evidence of Insurance. Evidence of the insurance required shall state that coverage provided is primary and is not in excess to or contributing with any insurance or self-insurance maintained by Interconnecting Customer.

The Interconnecting Customer is responsible for providing the Company with evidence of insurance in compliance with the Interconnection Tariff on an annual basis.

Prior to the Company commencing work on System Modifications and annually thereafter, the Interconnecting Customer shall have its insurer furnish to the Company certificates of insurance evidencing the insurance coverage required above. The Interconnecting Customer shall notify and send to the Company a certificate of insurance for any policy written on a "claims-made" basis. The Interconnecting Customer will maintain extended reporting coverage for three years on all policies written on a "claims-made" basis.
In the event that an Owners Protective Liability policy is provided, the original policy shall be provided to the Company.

11.4 Self Insurance. If Interconnecting Customer has a self-insurance program established in accordance with commercially acceptable risk management practices. Interconnecting Customer may comply with the following in lieu of the above requirements as reasonably approved by the Company:

- Interconnecting Customer shall provide to Company, at least thirty (30) calendar days prior to the Date of Initial Operation, evidence of such program to self-insure to a level of coverage equivalent to that required.

- If Interconnecting Customer ceases to self-insure to the standards required hereunder, or if Interconnecting Customer is unable to provide continuing evidence of Interconnecting Customer’s financial ability to self-insure, Interconnecting Customer agrees to promptly obtain the coverage required under Section 11.1.

This section shall not allow any Governmental Entity to self-insure where the existence of a limitation on damages payable by a Government Entity imposed by the Massachusetts Tort Claims Act, G.L. c. 258, or similar law, could effectively limit recovery (by virtue of a cap on recovery) to an amount lower than that required in Section 11.1(a).

11.5 All insurance certificates, statements of self insurance, endorsements, cancellations, terminations, alterations, and material changes of such insurance shall be issued and submitted to the following:

[Company Name]
Attention: _____________
______________________
______________________ (specific requirements)

11. Indemnification. Except as the Commonwealth is precluded from pledging credit by Section 1 of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth's cities and towns are precluded by Section 7 of Article 2 of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority, Interconnecting Customer and Company shall each indemnify, defend and hold the other, its directors, officers, employees and agents (including, but not limited to, Affiliates and contractors and their employees), harmless from and against all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever for personal injury (including death) or property damages to unaffiliated third parties that arise out of or are in any manner connected with the performance of this Agreement by that Party except to the extent that such injury or damages to unaffiliated third parties may be attributable to the negligence or willful misconduct of the Party seeking indemnification.

12. Limitation of Liability. Each Party’s liability to the other Party for any loss, cost, claim, injury, liability, or expense, including court costs and reasonable attorney’s fees, relating to or arising from any act or omission in its performance of this Agreement, shall be limited to the amount of direct damage or liability actually incurred. In no event shall either Party be liable to the other Party for any indirect, incidental, special, consequential, or punitive damages of any kind whatsoever.
13. Amendments and Modifications. No amendment or modification of this Agreement shall be binding unless in writing and duly executed by both Parties.

14. Permits and Approvals. Interconnecting Customer shall obtain all environmental and other permits lawfully required by governmental authorities for the construction and operation of the Facility. Prior to the construction of System Modifications the interconnecting customer will notify the Company that it has initiated the permitting process. Prior to the commercial operation of the Facility the Customer will notify the Company that it has obtained all permits necessary. Upon request the Interconnecting Customer shall provide copies of one or more of the necessary permits to the Company.

15. Force Majeure. For purposes of this Agreement, “Force Majeure Event” means any event:

a. that is beyond the reasonable control of the affected Party; and

b. that the affected Party is unable to prevent or provide against by exercising commercially reasonable efforts, including the following events or circumstances, but only to the extent they satisfy the preceding requirements: acts of war or terrorism, public disorder, insurrection, or rebellion; floods, hurricanes, earthquakes, lighting, storms, and other natural calamities; explosions or fire; strikes, work stoppages, or labor disputes; embargoes; and sabotage. If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, such Party will promptly notify the other Party in writing, and will keep the other Party informed on a continuing basis of the scope and duration of the Force Majeure Event. The affected Party will specify in reasonable detail the circumstances of the Force Majeure Event, its expected duration, and the steps that the affected Party is taking to mitigate the effects of the event on its performance. The affected Party will be entitled to suspend or modify its performance of obligations under this Agreement, other than the obligation to make payments then due or becoming due under this Agreement, but only to the extent that the effect of the Force Majeure Event cannot be mitigated by the use of reasonable efforts. The affected Party will use reasonable efforts to resume its performance as soon as possible. In no event will the unavailability or inability to obtain funds constitute a Force Majeure Event.


17.1 Any written notice, demand, or request required or authorized in connection with this Agreement (“Notice”) shall be deemed properly given on the date actually delivered in person or five (5) business days after being sent by certified mail, e-mail or fax with confirmation of receipt and original follow-up by mail, or any nationally-recognized delivery service with proof of delivery, postage prepaid, to the person specified below:

If to Company: Name
Attention: _____________
______________________
______________________
______________________
Phone: __________________
FAX: __________________

If to Interconnecting Customer: Name:
Address:
City:
Phone:
FAX:

17.2 A Party may change its address for Notices at any time by providing the other Party Notice of the change in accordance with Section 16.1.

17.3 The Parties may also designate operating representatives to conduct the daily communications, which may be necessary or convenient for the administration of this Agreement. Such designations, including names, addresses, and phone numbers may be communicated or revised by one Party’s Notice to the other.

17. Default and Remedies

18.1 Defaults. Any one of the following shall constitute “An Event of Default.”

(i) One of the Parties shall fail to pay any undisputed bill for charges incurred under this Agreement or other amounts which one Party owes the other Party as and when due, any such failure shall continue for a period of thirty (30) days after written notice of nonpayment from the affected Party to the defaulting Party, or

(ii) One of the Parties fails to comply with any other provision of this Agreement or breaches any representation or warranty in any material respect and fails to cure or remedy that default or breach within sixty (60) days after notice and written demand by the affected Party to cure the same or such longer period reasonably required to cure (not to exceed an additional 90 days unless otherwise mutually agreed upon), provided that the defaulting Party diligently continues to cure until such failure is fully cured.

18.2 Remedies. Upon the occurrence of an Event of Default, the affected Party may at its option, in addition to any remedies available under any other provision herein, do any, or any combination, as appropriate, of the following:

a. Continue to perform and enforce this Agreement;

b. Recover damages from the defaulting Party except as limited by this Agreement;

c. By written notice to the defaulting Party terminate this Agreement;

d. Pursue any other remedies it may have under this Agreement or under applicable law or in equity.

18. Entire Agreement. This Agreement, including any attachments or appendices, is entered into pursuant to the Interconnection Tariff. Together the Agreement and the Interconnection Tariff represent the entire understanding between the Parties, their agents, and employees as to the subject matter of this Agreement. Each Party also represents that in entering into this Agreement, it has not relied on any promise, inducement, representation, warranty, agreement or other statement not set forth in this Agreement or in the Company’s Interconnection Tariff.

19. Supercedence. In the event of a conflict between this Agreement, the Interconnection Tariff, or the terms of any other tariff, Exhibit or Attachment incorporated by reference, the terms of the Interconnection Tariff, as the same may be amended from time to time, shall control. In the event that the Company files a revised tariff related to interconnection for Department approval after the effective date of this Agreement, the Company shall, not later than the date of such filing, notify the signatories of this Agreement and provide them a copy of said filing.
20. Governing Law. This Agreement shall be interpreted, governed, and construed under the laws of the Commonwealth of Massachusetts without giving effect to choice of law provisions that might apply to the law of a different jurisdiction.

21. Non-waiver. None of the provisions of this Agreement shall be considered waived by a Party unless such waiver is given in writing. The failure of a Party to insist in any one or more instances upon strict performance of any of the provisions of this Agreement or to take advantage of any of its rights hereunder shall not be construed as a waiver of any such provisions or the relinquishment of any such rights for the future, but the same shall continue and remain in full force and effect.

22. Counterparts. This Agreement may be signed in counterparts.

23. No Third Party Beneficiaries. This Agreement is made solely for the benefit of the Parties hereto. Nothing in the Agreement shall be construed to create any rights in or duty to, or standard of care with respect to, or any liability to, any person not a party to this Agreement.

24. Dispute Resolution. Unless otherwise agreed by the Parties, all disputes arising under this Agreement shall be resolved pursuant to the Dispute Resolution Process set forth in the Interconnection Tariff.

25. Severability. If any clause, provision, or section of this Agreement is ruled invalid by any court of competent jurisdiction, the invalidity of such clause, provision, or section, shall not affect any of the remaining provisions herein.

26. Signatures. IN WITNESS WHEREOF, the Parties hereto have caused two (2) originals of this Agreement to be executed under seal by their duly authorized representatives.

Interconnecting Customer

Company

By: SAMPLE By: SAMPLE
Name: Name:
Title: Title:

The following attachments would be developed and included as appropriate for each specific Interconnection Service Agreement:

Attachment 1: Description of Facilities, including demarcation of Point of Common Coupling
Attachment 2: Description of System Modifications
Attachment 3: Costs of System Modifications and Payment Terms
Attachment 4: Special Operating Requirements, if any
Attachment 5: Agreement between the Company and the Company's Retail Customer (to be signed by the Company's retail customer where DG installation and interconnection will be placed, when retail customer is not the owner and/or operator of the distributed generation facility -- see Exhibit G of the Interconnection Tariff)
Exhibit G – Agreement between the Company and the Company’s Retail Customer

(Note: this Agreement is to be signed by the Company's retail customer where the distributed generation installation and interconnection will be placed, when the retail customer is not the owner and/or operator of the distributed generation facility.)

Parties. This Agreement between the Company and the Company's Retail Customer (“Agreement”), dated as of __________ (“Effective Date” of this Agreement) is entered into, by and between ________________, a Massachusetts corporation with a principal place of business at ___________ (hereinafter referred to as the “Company”), and ________________, a __________ corporation with a principal place of business at __________ (“Customer”). (The Company and Customer are collectively referred to as the “Parties”). Terms used herein without definition shall have the meanings set forth in Section 1.2 of the Interconnection Tariff, which is hereby incorporated by reference.

1. SCOPE, PURPOSE, AND RELATED AGREEMENTS

This Agreement, in conjunction with the Interconnection Service Agreement identified in Section 2.2, allows the Interconnecting Customer (as identified in Section 2.3) to utilize Customer’s electrical facilities to interconnect and operate the Facility in Parallel with Company’s EPS. The purpose of the Facility is to serve the Customer’s electrical loads at the location identified in Section 2.1

2. SUMMARY AND DESCRIPTION OF THE PARTIES AND LOCATION OF GENERATING FACILITY

2.1 The name and address used by Company to locate the Customer or electric service account where the Facility interconnects with Company’s EPS is:

________________________
Attention:  
Address:  
City:  
Phone  
FAX:  
Company Account Number:

2.2 The Facility shall be Interconnected with the Company’s EPS pursuant to an Interconnection Service Agreement between Company and Interconnecting Customer, its successors or assigns (“Interconnecting Customer”) dated __________ (“Interconnection Service Agreement”).

2.3 Interconnecting Customer’s contact information:

________________________
Attention:  
Address:  
City:  
Phone  
FAX:  

For the latest authorized version please refer to the Company’s website at http://www.nationalgridus.com/electricalspecifications.
3. CUSTOMER ACKNOWLEDGMENT AND OBLIGATIONS

3.1 Customer acknowledges that it has authorized the Facility to be installed and operated by Interconnecting Customer in accordance with Company’s Interconnection Tariff in or adjacent to Customer’s premises. Such Facility shall be used to serve all or a portion of Customer’s electrical loads associated with the electric service provided by Company at the location identified in Section 2.1 above. Customer shall be solely responsible for the terms of any agreement between it and Interconnecting Customer.

3.2 Customer shall be solely responsible for any charges incurred under Company’s electric service tariffs, and any other regulations and laws governing the provision of electric services. Customer acknowledges that it has been made aware of the charges and conditions related to the operation of the Facility and that the performance or lack of performance of the Facility may affect the rates and charges billed by Company for the electric power delivered to Customer. Copies of such tariffs are available by request to Company or on the Company’s web site.

3.3 Any amount to be paid, or refunded to, Company for the services received by Customer as a result of the Interconnecting Customer failing to operate the Facility in accordance with the terms of the representations and warranties made under the Interconnection Service Agreement shall be paid to Company by the Customer in accordance with Company’s electric tariffs.

3.4 Customer shall provide access as necessary to the Customer’s premises for Company personnel, contractors or agents to perform Company’s duties under the Interconnection Tariff. The Company shall have access to the disconnect switch of the Facility at all times.

4. TERMS AND TERMINATION

4.1 This Agreement shall become effective as of the date referenced in the preamble. The Agreement shall continue in full force and effect until the earliest date that one of the following events occurs:

(a) The Parties agree in writing to terminate the Agreement.

(b) At 12:01 A.M. on the day following the date the Customer’s electric service account through which the Generating Facility is interconnected to Company’s EPS is closed or terminated.

(c) At 12:01 A.M. on the 31st day following the date the Interconnection Service Agreement is terminated.

(d) At 12:01 A.M. on the 61st day after Company provides written Notice pursuant to Section 6 below to the Customer that Customer is not in compliance with the terms of this Agreement.

5. LIMITATION OF LIABILITY

5.1 Each Party’s liability to the other Party for any loss, cost, claim, injury, liability, or expense, including court costs and reasonable attorney’s fees, relating to or arising from any act or omission in its performance of this Agreement, shall be limited to the amount of direct damage or liability actually incurred. In no event shall either Party be liable to the other Party for any indirect, incidental, special, consequential, or punitive damages of any kind whatsoever.
5.2 Company shall not be liable to Customer in any manner, whether in tort or contract or under any other theory, for loss or damages of any kind sustained by Customer resulting from existence of, operation of, or lack of operation of the Facility, or termination of the Interconnection Service Agreement, provided such termination is consistent with the terms of the Interconnection Service Agreement, except to the extent such loss or damage is caused by the negligence or willful misconduct of the Company.

6. NOTICES

6.1 Any written notice, demand, or request required or authorized in connection with this Agreement (“Notice”) shall be deemed properly given on the date actually delivered in person or five (5) business days after being sent by certified mail, e-mail or fax with confirmation of receipt and original follow-up by mail, or any nationally-recognized delivery service with proof of delivery, postage prepaid, to the person specified below:

If to Company: _____________________
Attention: _____________________
Address: _____________________
Phone: _____________________
FAX: _____________________

If to Customer: _____________________
Attention: _____________________
Address: _____________________
City: _____________________
Phone: _____________________
Fax: _____________________

6.2 A Party may change its address for Notices at any time by providing the other Party Notice of the change in accordance with Section 6.1.

6.3 The Parties may also designate operating representatives to conduct the daily communications, which may be necessary or convenient for the administration of this Agreement. Such designations, including names, addresses, and phone numbers may be communicated or revised by one Party’s Notice to the other.

7. RELEASE OF DATA

Company shall maintain confidentiality of all Customer confidential and proprietary information except as otherwise required by applicable laws and regulations, the Interconnection Tariff, or as approved in writing by the Customer.

8. ASSIGNMENT

Except as provided herein, Customer shall not voluntarily assign its rights or obligations, in whole or in part, under this Agreement without Company's written consent. Any assignment Customer purports to make without Company’s written consent shall not be valid. Company shall not unreasonably withhold or delay its consent to Customer’s assignment of this Agreement. Notwithstanding the above, Company’s consent will not be required for any assignment made by Customer to an Affiliate or as collateral security in connection with a financing transaction. In all events, the Customer will not be relieved of its obligations under this Agreement unless, and until the assignee assumes in writing all obligations of this Agreement and notifies the Company of such assumption.
9. **NON-WAIVER**

None of the provisions of this Agreement shall be considered waived by a Party unless such waiver is given in writing. The failure of a Party to insist in any one or more instances upon strict performance of any of the provisions of this Agreement or to take advantage of any of its rights hereunder shall not be construed as a waiver of any such provisions or the relinquishment of any such rights for the future, but the same shall continue and remain in full force and effect.

10. **GOVERNING LAW, JURISDICTION OF COMMISSION, INCLUSION OF COMPANY’S TARIFFS, DEFINED TERMS**

10.1 This Agreement shall be interpreted, governed, and construed under the laws of the Commonwealth of Massachusetts without giving effect to choice of law provisions that might apply to the law of a different jurisdiction.

10.2 The interconnection and services provided under this Agreement shall at all times be subject to terms and conditions set forth in the tariffs applicable to the electric service provided by Company. Copies of such tariffs are available at the Company’s web site or by request to Company and are incorporated into this Agreement by this reference.

10.3 Notwithstanding any other provisions of this Agreement, Company shall have the right to unilaterally file with the Department, pursuant to the Department’s rules and regulations, an application for change in tariffs, rates, charges, classification, service or any agreement relating thereto.

10.4 When initially capitalized, whether in the singular or in the plural, the terms used herein shall have the meanings assigned to them either in this Agreement or in the Interconnection Tariff.

11. **AMENDMENTS AND MODIFICATION**

This Agreement can only be amended or modified by a written agreement signed by both Parties.

12. **ENTIRE AGREEMENT**

This Agreement, including any attachments or appendices, is entered into pursuant to the Interconnection Service Agreement and the Interconnection Tariff. Together this Agreement, the Interconnection Service Agreement, and the Interconnection Tariff represent the entire understanding between the Parties, their agents, and employees as to the subject matter of this Agreement. Each party also represents that in entering into this Agreement, it has not relied on any promise, inducement, representation, warranty, agreement or other statement not set forth in this Agreement or in the Company’s Interconnection Tariff.

13. **INDEMNIFICATION**

Except as the Commonwealth is precluded from pledging credit by Section 1 of Article 62 of the Amendments to the Constitution of the Commonwealth of Massachusetts, and except as the Commonwealth’s cities and towns are precluded by Section 7 of Article 2 of the Amendments to the Massachusetts Constitution from pledging their credit without prior legislative authority, Customer and Company shall each indemnify, defend and hold the other, its directors, officers, employees and agents (including, but not limited to, Affiliates and contractors and their employees), harmless from and against all liabilities, damages, losses, penalties, claims, demands, suits and proceedings of any nature whatsoever for personal injury (including death)
or property damages to unaffiliated third parties that arise out of or are in any manner connected with the performance of this Agreement by that Party except to the extent that such injury or damages to unaffiliated third parties may be attributable to the negligence or willful misconduct of the Party seeking indemnification.

14. SIGNATURES

IN WITNESS WHEREOF, the Parties hereto have caused two originals of this Agreement to be executed under seal by their duly authorized representatives.

Customer
By: ___________________________
Name: ___________________________
Title: ___________________________

Company
By: ___________________________
Name: ___________________________
Title: ___________________________
# 12.0 REVISION HISTORY

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<tr>
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Electric System Bulletin No. 756 Appendix D:

Requirements for Parallel Generation Connected To National Grid Facilities in Rhode Island

May 2007 version 1.1

ESB 765 Appendix D is part of the ESB 750 series
PREFACE


(Note: The entire text of this document will be added to ESB 756 in a future revision.)

This is an appendix to ESB 756 and is available from the Company’s web site and may be obtained:

• From the Internet at http://www.nationalgridus.com/electricalspecifications,

• Or in printed form by contacting either of the Call Centers in Massachusetts or New York (see inside cover of ESB 750). However, printed copies are not document controlled, so for the latest authorized version please refer to the Company’s website.

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Electric System Bulletin No. 756 Appendix E:

Requirements for Parallel Generation Connected To National Grid Facilities in New Hampshire

May 2007 version 1.1

ESB 756 Appendix E is part of the ESB 750 series
PREFACE


For net-metered generators sized less than 25kVA, see PUC900 at: http://www.puc.state.nh.us/Regulatory/Rules/PUC900%20Net%20Metering.pdf

For all other generators, refer to the Massachusetts Department of Telecommunications and Energy (MDTE) document No. 1116-A, effective April 2, 2007 contained in Appendix C of this document.

(Note: The entire text of this document will be added to ESB 756 in a future revision.)

This is an appendix to ESB 756 and is available from the Company’s web site and may be obtained:

- From the Internet at http://www.nationalgridus.com/electricalspecifications,
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