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National Grid
Distributed Generation (DG)
Outreach Seminar

Tuesday, April 12, 2016
10:00am – 12:30 pm
@ Beacon North & Webinar
Syracuse, NY

Agenda

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Welcome Remarks	Jim Cross
Introductions/Safety Moment/Current Activity	Kevin Kelly
DG Interconnection Process /NYS SIR	Mike Pilawa
Community DG and Net Metering	Tim Dzimian
Technical Standards	Neil Labrake
Questions/Closing Remarks	

Welcome
Jim Cross Vice President
Sales and Program Operations

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National Grid Territory

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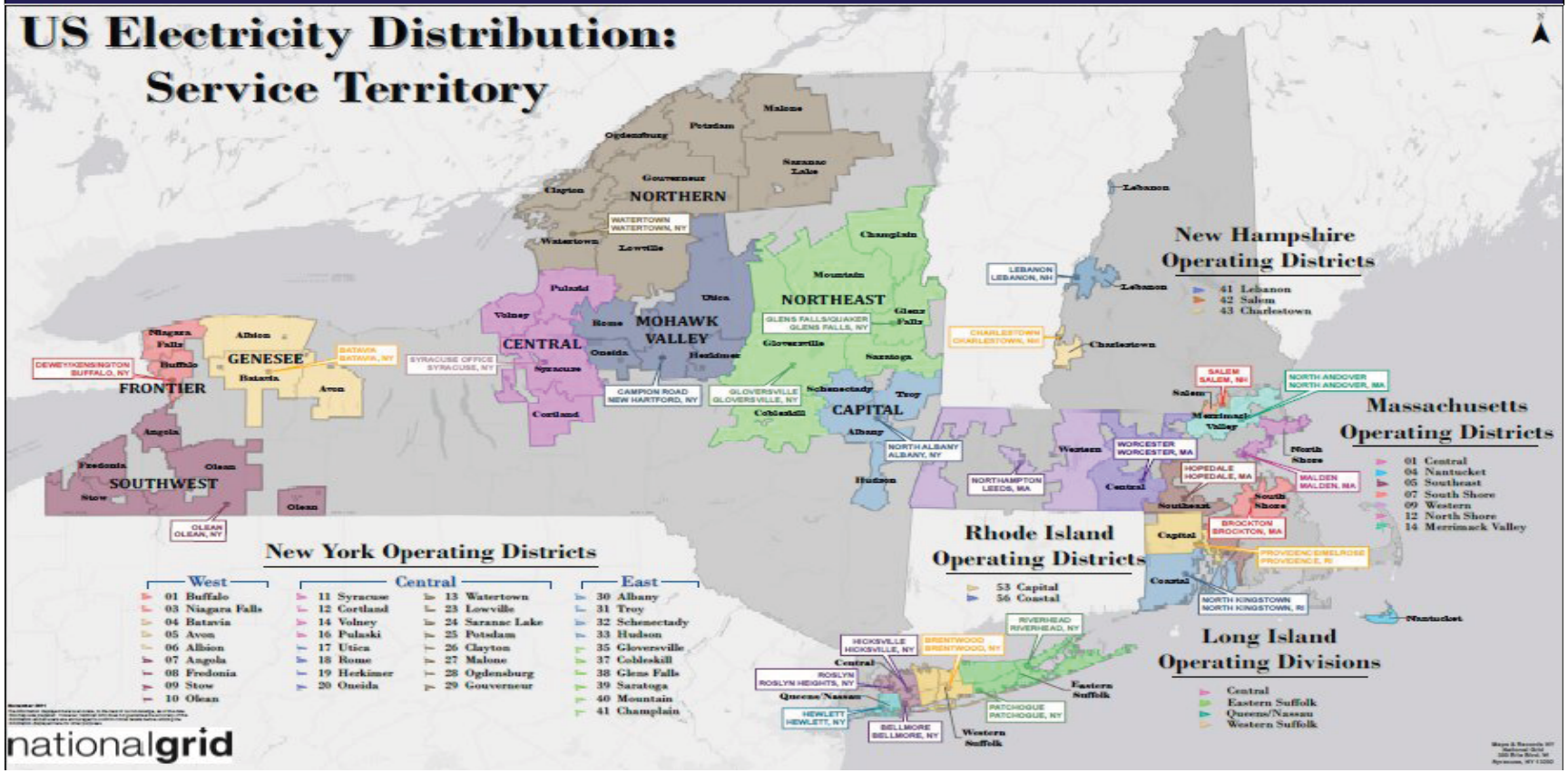

Safety Moment

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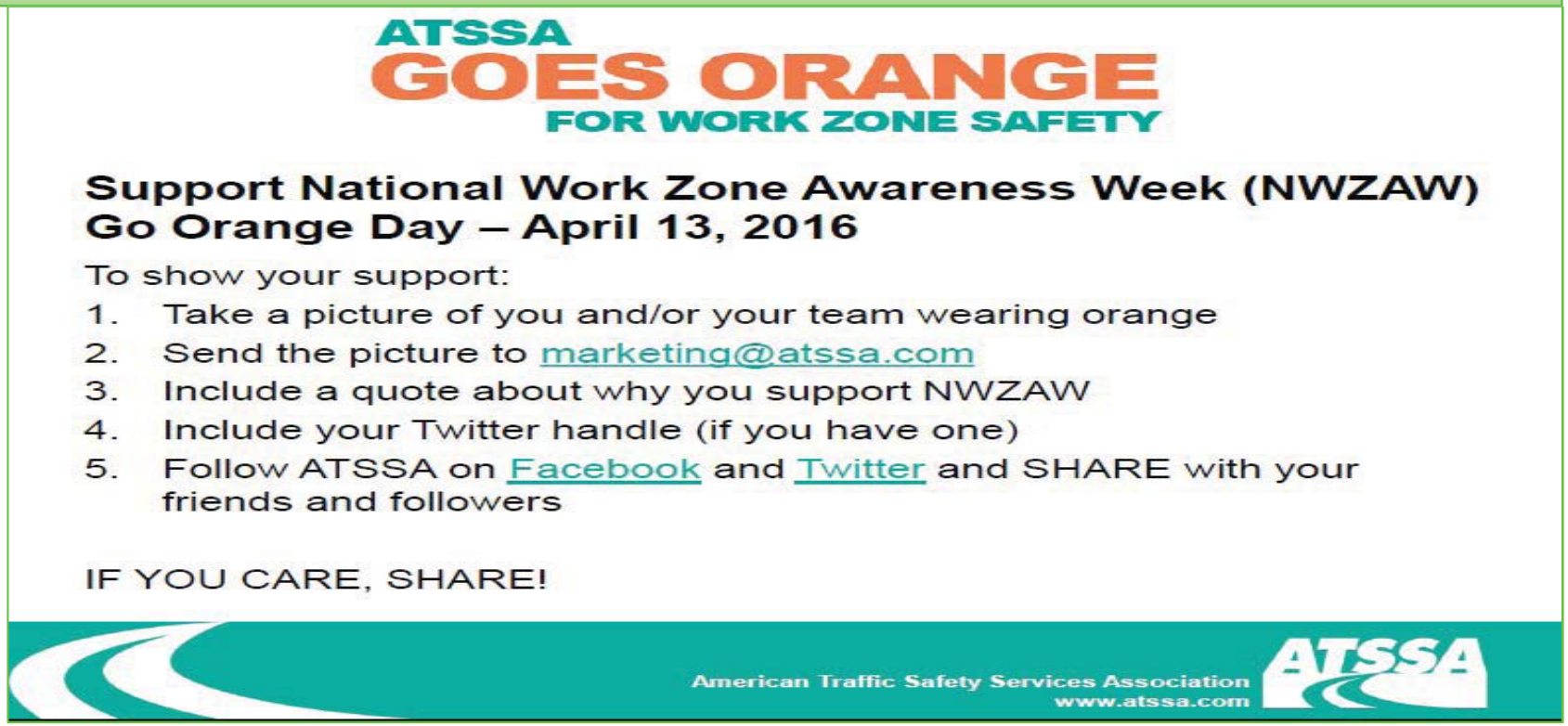
April 11-15, 2016 is National Work Zone Awareness Week



National Grid DG Activity

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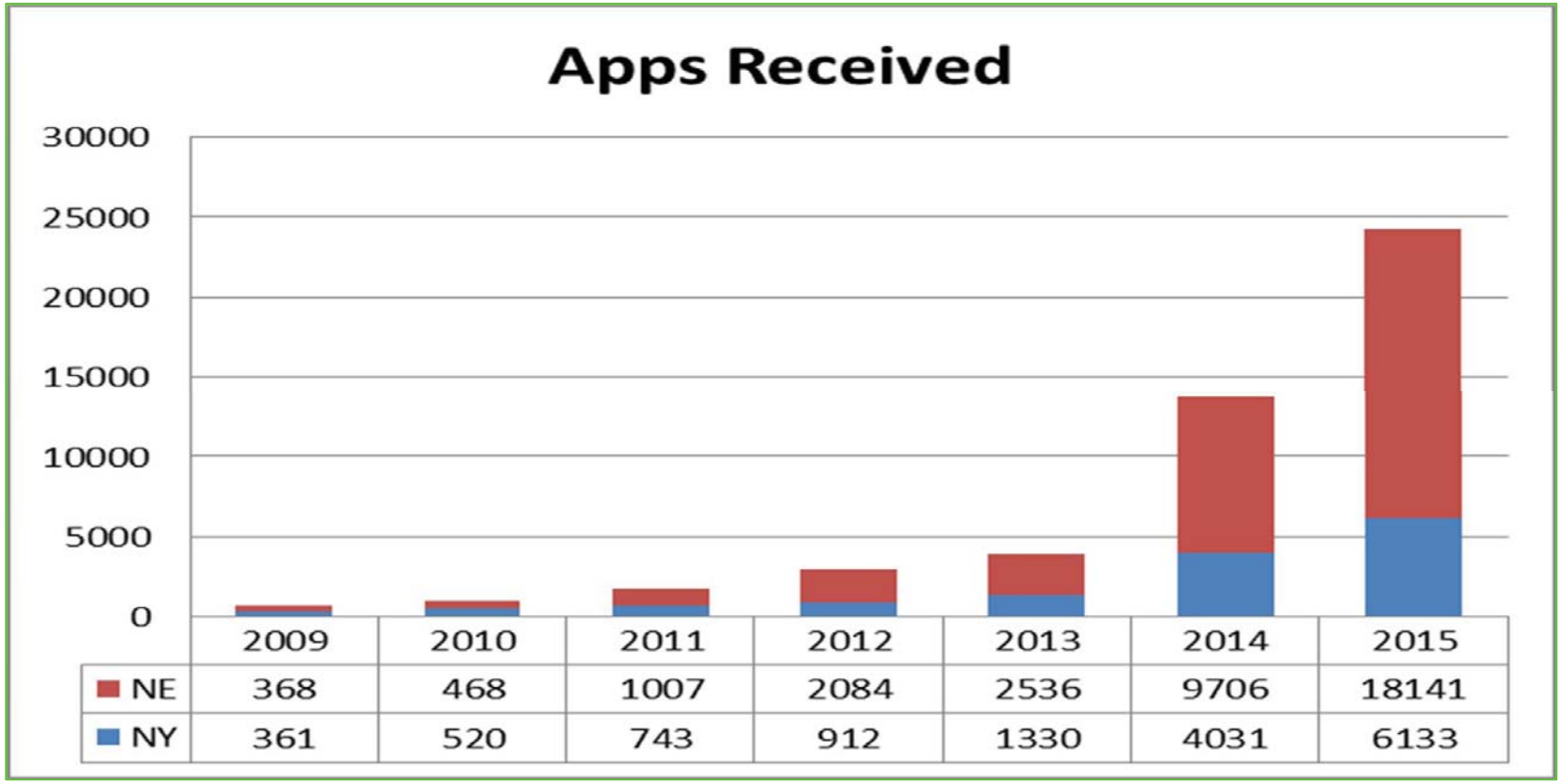

	2009	2010	2011	2012	2013	2014	2015
NE	368	468	1007	2084	2536	9706	18141
NY	361	520	743	912	1330	4031	6133

Upstate New York DG Activity

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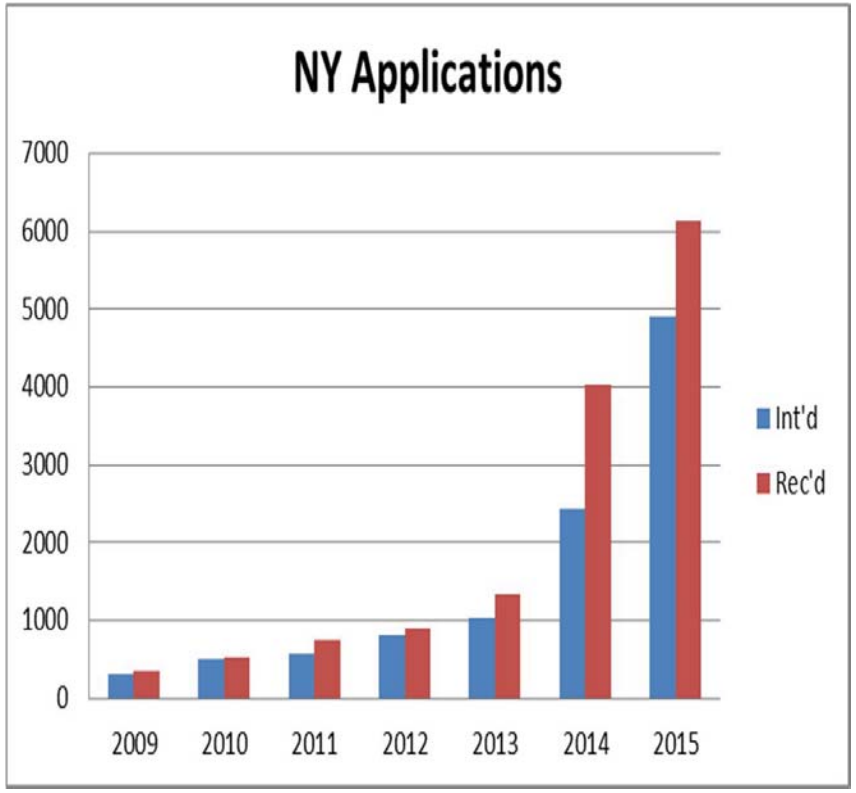

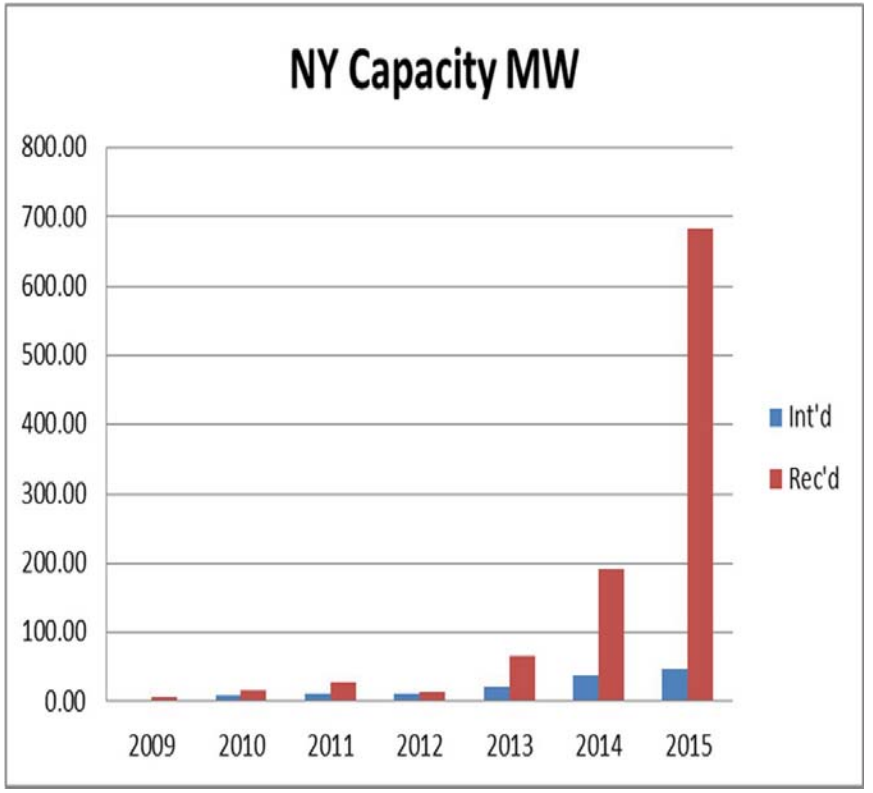

NY DG Activity
Complex applications ("Surge")

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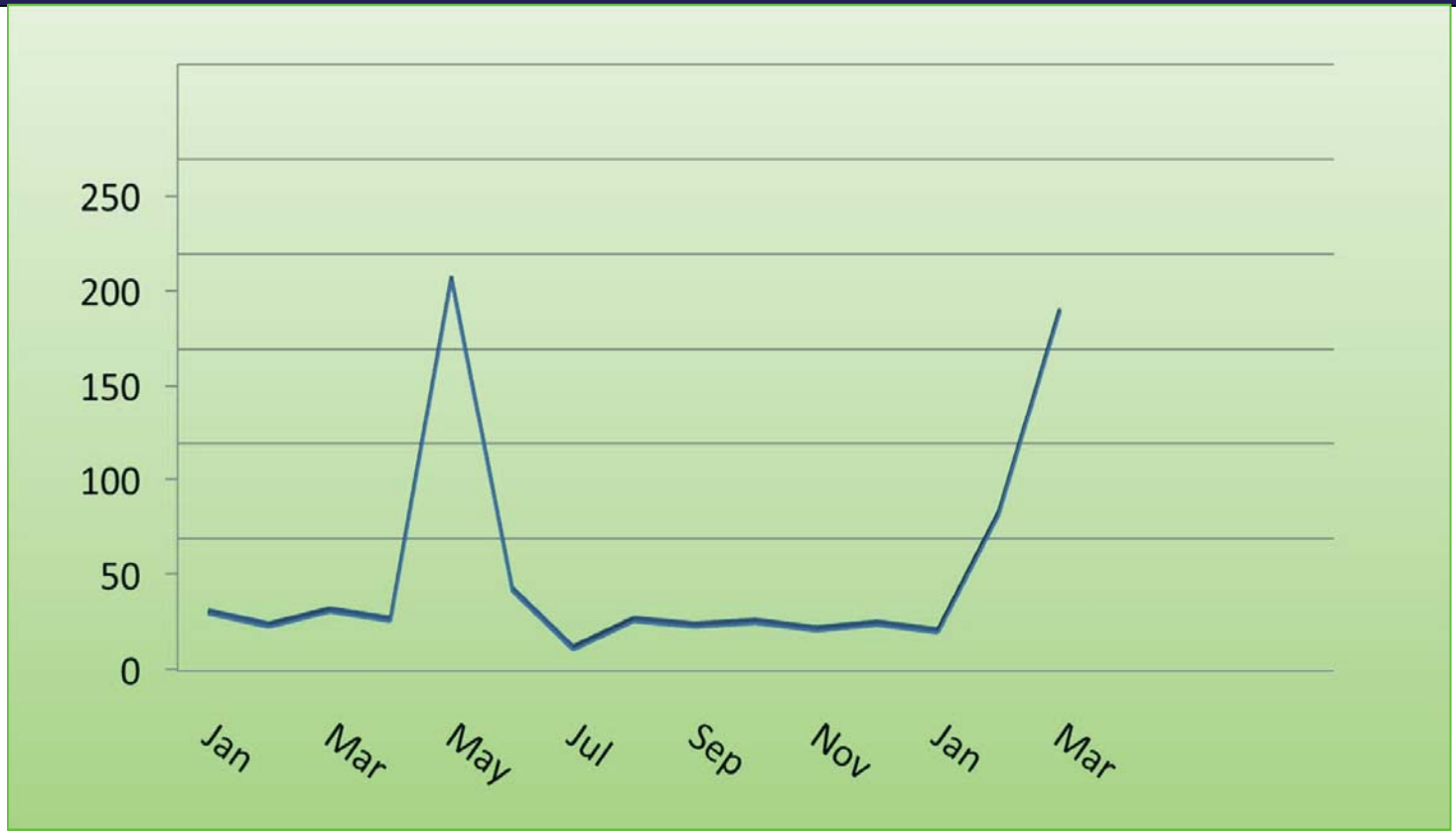

NYS SIR Interconnection Process

Mike Pilawa, Manager TSES

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Solar /PV

Wind

Hydro

Micro Turbines

Fuel Cells

Anaerobic Digesters/Biogas

Interconnection Process Steps

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1. Application (Expedited <50KW & Complex >50KW to 5MW)
2. Preliminary Study (High Level System Impacts and CESIR Estimate)
3. CESIR (Coordinated Electric System Interconnection Review)
4. Applicant commits to construction of utility modifications (Payment/execute IA)
5. Conditional Approval (to construct DG system)
6. National Grid Construction
7. Witness Test
8. Authorization to Interconnect
   - https://www9.nationalgridus.com/niagaramohawk/home/energyeff/4_app-pkg.asp

Application Package

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- Completed standard application form: **Appendix B/C** signed by utility customer or their authorized agent/contractor;
- Signed copy of the standard contract: **Form K** signed by utility customer;
- **Letter of authorization**, signed by the Customer, to provide for the contractor to act as the customer's agent, if necessary;
- If requesting a **new service**, a site plan with the proposed interconnection point identified by a Google Earth, Bing Maps or similar satellite image. For those projects on existing services, account and meter numbers shall be provided;
- **Description / Narrative of the project** and site proposed. If multiple DG systems are being proposed at the same site/location, this information needs to be identified and explained in detail;

Application Package

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- DG technology type;
- DG fuel source / configuration;
- Proposed project size in AC kW;
- Project is net metered, remote, or community net metered;
- Metering configuration;
- Copy of the **certificate of compliance** referencing UL 1741 or a copy of the page Department of Public Service Certified Interconnection Equipment list containing your equipment, as applicable;

Application Package

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- Copy of the **manufacturer's data sheet** for the interface equipment (e.g. inverter and solar panel, turbine, fuel cell, biowaste);
- Copy of the manufacturer's verification test procedures, if required;
- System Diagram - **three line diagram** for designs proposed on three phase systems, including detailed information on the wiring configuration at the PCC and an exact representation of existing utility service, identifying all major system components and all interconnections, customer name, site address, PCC, inverter/energy producing equipment, utility meter, generator disconnect, generator size in kW, redundant relay, etc. **One line diagrams** shall be acceptable for single phase installations;
- Payment of a **$750 Application fee** at time of application, *clearly noting the project name*

Technical Issues:
Technical Submittals for Utility Review

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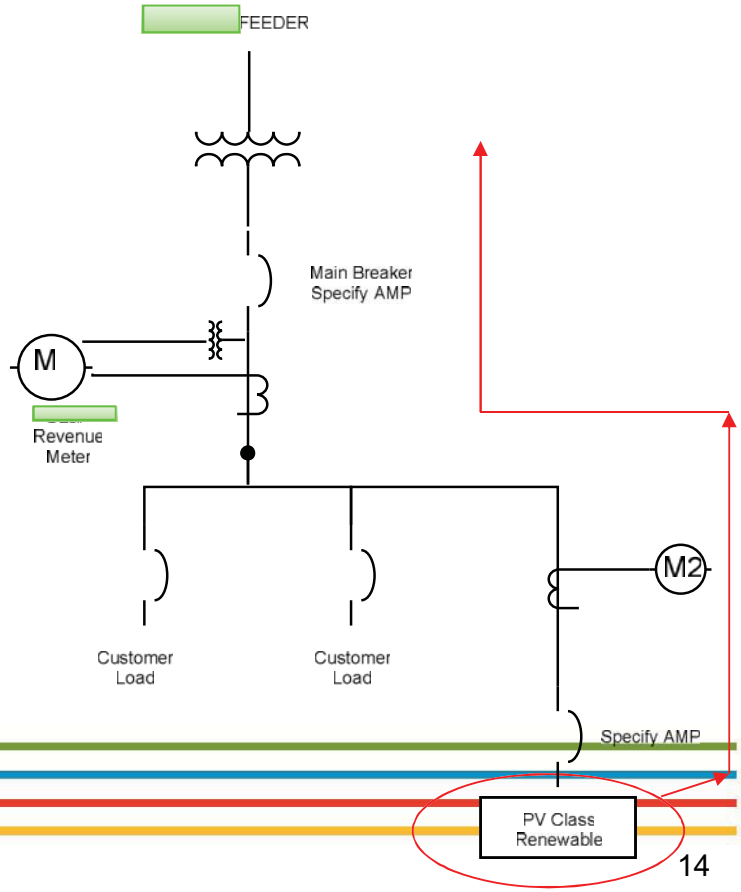
Recommended Guidelines for Residential and Commercial Single-line Diagram Submittals (*for example, see Exhibit 5 & Figures 1 & 2 in ESB 756 Appendix B*)

- ✓ *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 including Point of Common Coupling. (The Company is interested in how the power is getting from the service point to the protective equipment.)*



Technical Issues: (*cont'd*)
Technical Submittals for Utility Review

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One-Lines (cont'd)

- ✓ *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.*

Technical Issues: (*cont'd*)
Technical Submittals for Utility Review

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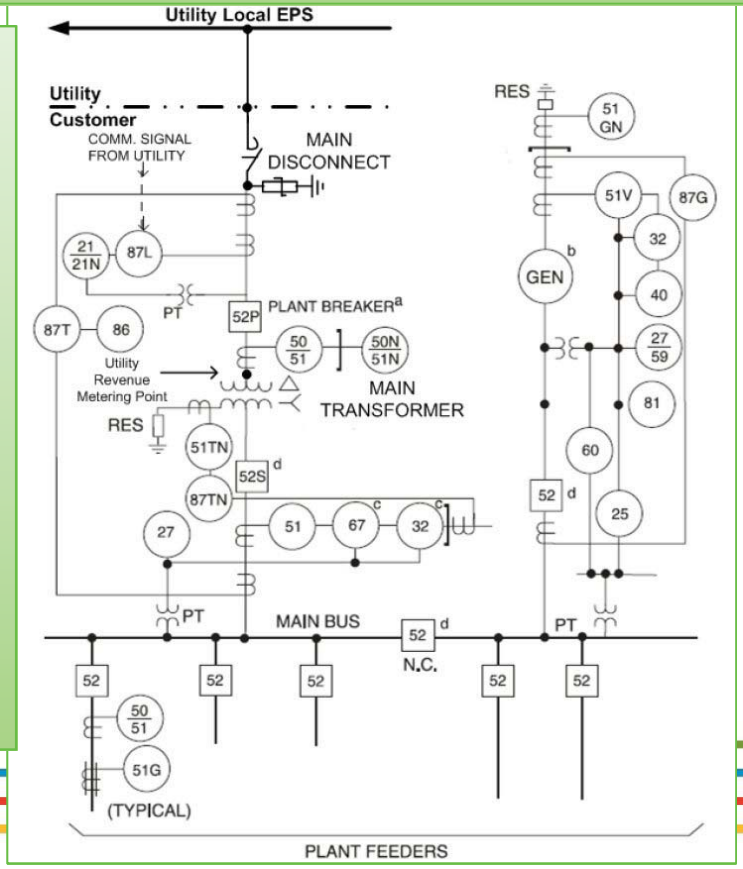
Recommended Guidelines for Functional Single-line Diagram Submittals (*for example, see Exhibit 6 & Figures 3 & 4 in ESB 756 Appendix B*)

In addition to those items in the previous slides:

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

For Protection Schemes:

- ✓ *Three Line (AC Schematic)*
  - ✓ *Including all AC Current and Voltage circuits*
- ✓ *Control Schematic (DC Elementary Diagram)*
  - ✓ *Including protection functions*
  - ✓ *Tripping schemes*



Many Stakeholders Involved

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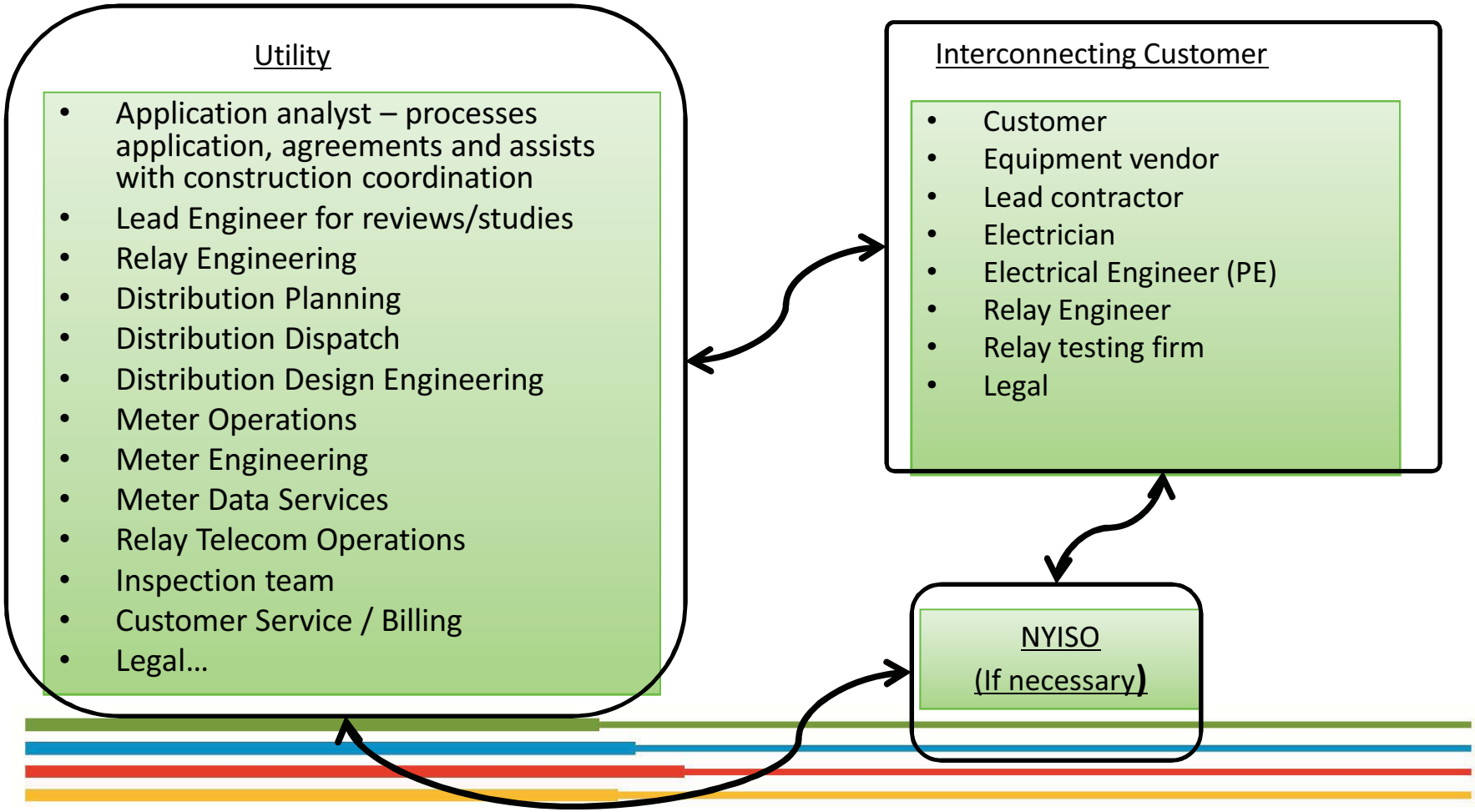

NYS SIR (Standard Interconnection Requirements) 7/2015 vs 4/2016

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- Went from 2MW to 5MW
- App review went from 5 to 10 Business Days (BD)
- If app is deficient, you have 30 BDs to correct or app is withdrawn from queue
- Pre-App Report (Appendix F) may be requested ; $750 fee , potentially applied to application fee
  - Utility required to completed within 10BDs
  - Information provided is non-binding and subject to change (system is dynamic)

NYS SIR (Standard Interconnection Requirements) 7/2015 vs 4/2016

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- Preliminary review to Preliminary/Supplemental Screening Analysis if passes screen, you have up to 30BDs to commit to project or risk being withdrawn from queue
- Supplemental Analysis $2,500
- If CESIR is needed, applicant has 30 BDs to proceed with CESIR or risk being withdrawn from queue
- CESIR completion 60 BDs up to 2MW, 80 BDs above 2MW to 5MW
- Interconnection Estimate in CESIR is good for 60 BDs

NYS SIR (Standard Interconnection Requirements) 7/2015 vs 4/2016

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- 100 % Payment of estimated Interconnection costs (Apps received pre- April 29, 2016)
- 25% of payment of estimated interconnection costs with 60 BDs of date CESIR results received, no equipment/materials will be procured. Balance of 75% to be paid within 120 BDs of when CESIR results were received. (Apps received post-April 29, 2016) If payments are not made within this timeframe, project's app will be withdrawn from queue
- Please review the NYS SIR document for guidance.

The Regulatory Framework
What are the Rules

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- NY Standard Interconnection Requirements ("SIR") - In 1999 the Commission initially instituted the SIR as guidance for distributed generation installation. The utilities were directed to include the SIR in their tariffs as an addendum.
- The SIR has been revised several times since 1999, most recently in July 2015 to include information about the current amendments to PSL 66-j allowing non-residential customers to install farm waste generation at their premises and participate in farm waste net metering and increasing the eligible capacity of fuel cell electric generating equipment from 1,500 kW to 2,000 kW.
- Current NYS SIR has been updated and is effective April 29, 2016.
- The current SIR can be found either on the Company's website:
  - https://www9.nationalgridus.com/niagaramohawk/business/rates/rates.asp
  - Rule 53, PSC 220
- Or the NYS PSC's website:
  - http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DCF68EFCA391AD6085257687006F396B?OpenDocument

Community DG - Timelines & Pre-Apps

Tim Dzimian, Lead Tech Support Consultant

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Community DG (CDG)

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- **Phase I**: effective from October 26, 2015 through April 30, 2016 and will be available where:
  - (a) the generating equipment is located in an Opportunity Zone as designated by the Company; or
  - (b) a minimum of 20% of the associated CDG Satellites in a CDG project are residential customers enrolled in the Company's low income program which includes the Low Income Discount Program, Low Income Electric Discount Program and Low Income Electric Heating Discount Program
- **Phase II**: effective on May 1, 2016 and will be available to any CDG Host within the Company's entire service territory.

Definitions : CDG Host and Satellite

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Host

- Non-residential customer who owns and operates qualifying DG,
- Single entity (including the generating facility developer), an ESCo, a municipal entity (e.g., town or village), a for-profit business or a not-for-profit corporation, a limited liability company, a partnership, or some other form of business or civic organization,
- Responsible for building the CDG facility, interconnecting to the grid, and owning or operating the facility.

Satellites

- Shall own or contract for a portion of the credits accumulated at the CDG Host's meter
- May only have 1 CDG host account
- Shall not be a net meter customer, a remote net meter customer, a satellite account, or take SC-7 or SC-12 service

CDG Host Responsibilities

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- Shall follow CDG Procedural Requirements posted on NG DG Webpage https://www9.nationalgridus.com/niagaramohawk/home/energyeff/3_distributed.asp
- Shall file a complete application as outline within the NYSIR.
- Certifies that it has written authorization from the customer to request and receive the customer's historic usage and that it has entered into a written contract with the Customer (CDG Host Certification Form).
- Responsible for providing the Company with the CDG Satellites' names, addresses, account numbers, proportionate share of excess generation credits and any other such information required 60 days before credits are to be distributed to the CDG Satellite (CDG Allocation Request Form).
- Must certify in writing to the Company, both prior to commencing CDG service and annually thereafter that it meets the creditworthiness standards and requirements.

CDG Host Responsibilities: CDG Allocation Form

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- Submitted at least 60 days before commencing CDG net metered service,
- Shall not have less than 10 CDG Satellites.
- Shall include the percentage (up to three decimal places of accuracy) of the CDG Host's excess generation to be allocated to each Satellite
- the percentage to each Satellite must equal at least 1,000 kWh annually but may not exceed the CDG Satellite account's historic average annual kWh.
- the percentage to be retained by the CDG Host, if any
- No more than 40 percent of the output of the CDG Host may serve CDG satellites of 25 kW or greater.

CDG Host Responsibilities: CDG Allocation Form - continued

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- If less than 100% of the excess generation allocated to CDG Satellites, the balance will be retained on the CDG Host account.
- Allocations of more than 100% of the excess generation shall be rejected by the Company.
- Host may modify its CDG Satellite accounts and/or the percentage to its CDG Satellites by giving notice to the Company no less than 30 days before the CDG Host account's billing date by submitting a revised allocation request form to the Company.

CDG Host Responsibilities: CDG Allocation Form- continued

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- Once a year, CDG Host must furnish the Company, no less than 30 days before the CDG Host's 12 month anniversary of commencing CDG net metered service with written instructions for allocating any remaining credits on the CDG Host account after the issuance of its month 12 bill to its CDG Satellites.
- The CDG Host cannot allocate to its own account.
- No distribution will be made if instructions are not received by the required date.
- If the Company does not receive the required notification any undistributed credits on the CDG Host account will be forfeited.

CDG Allocation of Output : Commercial Rate Non-Demand

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- CDG Host billed on an energy only **commercial rate (non-demand)**, excess generation will be allocated to CDG Satellites on a volumetric basis.
- **Volumetric credits** applied to CDG Satellite accounts will be converted to a monetary credit based on the CDG Satellite's service classification and used to reduce the volumetric charges only on the CDG Satellite's electric utility bill.
- Any remaining credits will be carried forward on that CDG Satellite account to the succeeding billing period.

CDG Allocation of Output : Commercial Rate Demand

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- CDG Host billed on a **demand rate**, excess generation will be converted to a dollar amount based on the CDG Host's service classification.
- **Monetary credit** will be allocated to the CDG Satellites based on the percentage basis.
- Monetary credits will be applied to the CDG Satellite accounts' bill including energy, customer, demand or other charges on the electric bill until the bill is reduced to zero.
- Any remaining monetary credit will be carried forward on that CDG Satellite account to the succeeding billing period.

Net Metering
Sample Customer Bill Formats

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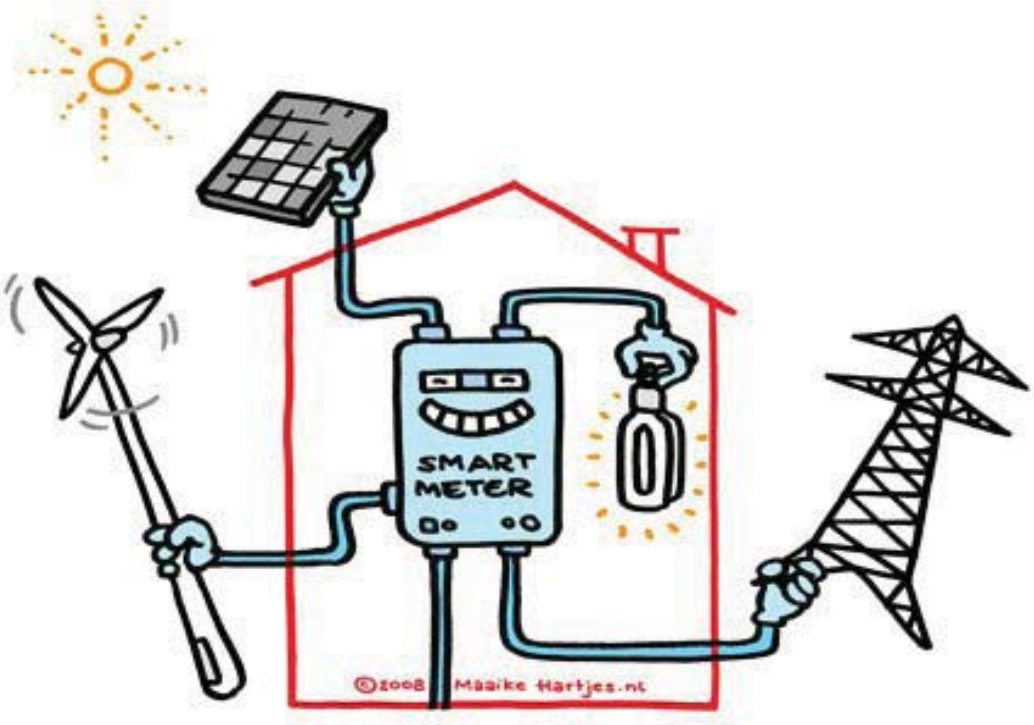

Regular Net Metered
Residential Rate 1 Example

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DETAIL OF CURRENT CHARGES

Delivery Services

Service Period	No. of days	Current Reading -	Previous Reading =	Total Usage
Apr 23 - May 23	30	5837 *Actual*	6013 *Actual*	-176 kWh

METER NUMBER [redacted] NEXT SCHEDULED READ DATE [redacted]

RATE Electric SC1 Non Heat

Cumulative Credit	0 kWh	
Net Metered	-176 kWh	
New Cumulative Credit	-176 kWh	
Anniversary Month	10	
Basic Service (not including usage)		17.00
Tariff Surcharge	2.04082 %	0.34
	Total Delivery Services	**$ 17.34**

Other Charges/Adjustments

Paperless Billing Credit	-0.40
Total Other Charges/Adjustments	**-$ 0.40**

▸ For Your Information

The following charges are already included in the "Delivery Services" portion of your bill. If you were to choose an alternate supplier, billing charges may be included, instead, in that suppliers' charges.

Billing Services

Billing	1.24
Total Billing Services	**$1.24**

Regular Net Metered SC2ND Bill Example

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DETAIL OF CURRENT CHARGES

Delivery Services

Type of Service	Current Reading	- Previous Reading	= Difference	x Meter Multiplier	= Total Usage
Energy	786 Actual	150 Actual	636	1	636 kWh

Total Energy Usage 636 kWh
Billed Energy Usage 0 kWh

METER NUMBER [redacted] NEXT SCHEDULED READ DATE ON OR ABOUT Mar 17
SERVICE PERIOD Jan 14 - Feb 16 NUMBER OF DAYS IN PERIOD 33
RATE Electric SC2 T&D VOLTAGE DELIVERY LEVEL 0 - 2.2 kv

Cumulative Credit	-1322 kWh	
Net Metered	636 kWh	
New Cumulative Credit	-686 kWh	
Customer		21.02
Consolidated Billing Credit		-1.24
Total Delivery Services		**$ 19.78**

Example of meter credits applied

SC2D Net Metered Bill Example

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DETAIL OF CURRENT CHARGES

Delivery Services

Type of Service	Current Reading	-	Previous Reading	=	Difference	x	Meter Multiplier	=	Total Usage
Energy	0 *Actual*		0 *Actual*		0		1		-1948 kWh
							Total Energy Usage		**-1948 kWh**
							Billed Energy Usage		**0 kWh**
Demand	0.00 *Actual*		0.00 *Actual*		0.00		1		4.0 kW
							Total Demand Usage		**4.0 kW**
							Billed Demand Usage		**4.0 kW**

METER NUMBER [redacted] NEXT SCHEDULED READ DATE ON OR ABOUT Oct 2

SERVICE PERIOD Aug 4 - Sep 2 NUMBER OF DAYS IN PERIOD 30 METERING TYPE Secondary

RATE Electric SC2D VOLTAGE DELIVERY LEVEL 0 - 2.2 kv

Cumulative Credit			-691 kWh	
Net Metered			-1948 kWh	
New Cumulative Credit			-2639 kWh	
New Cumulative Carryover			-960 kWh	
Customer				52.52
Net Metering Adjustment	0.05786817	x	-2639 kWh	-97.16
Demand	10.58	x	4 kW	42.32
Incr State Assessment	0.18	x	4 kW	0.72
RDM	0.4	x	4 kW	1.60
			Total Delivery Services	**$ 0.00**

Rate 2 Demand Customer:

←NOTE:
Meter Credits only apply to kWh, not kW

Remote Net Metered Host Account Example

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DETAIL OF CURRENT CHARGES

Delivery Services

Service Period	No. of days	Current Reading	-	Previous Reading	=	Total Usage
Feb 1 - Feb 29	29	0 *Actual*		0 *Actual*		-119269 kWh

METER NUMBER [redacted] NEXT SCHEDULED READ DATE ON OR ABOUT Apr 4

RATE Electric SC1C T&D Non Heat

Basic Service (not including usage)				30.00
Net Mtr Adj OnPk - Delv	0.03991249	x	-10134 kWh	-404.47
Net Mtr Adj OnPk - Comm	0.040159	x	-10134 kWh	-406.97
Net Mtr Adj ShPk - Delv	0.03961894	x	-26363 kWh	-1,044.47
Net Mtr Adj ShPk - Comm	0.029299	x	-26363 kWh	-772.41
Net Mtr Adj OfPk - Delv	0.03932215	x	-82772 kWh	-3,254.77
Net Mtr Adj OfPk - Comm	0.018319	x	-82772 kWh	-1,516.30
Consolidated Billing Credit				-1.24
Tariff Surcharge	2.04082 %			-150.42
			Total Delivery Services	**-$ 7,521.05**

Volumetric Remote Net Metered Host Bill Example

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Delivery Services

Type of Service	Current Reading - Previous Reading = Difference x Meter Multiplier				Total Usage
Energy	98463 Actual	98643 Actual	-180	1	-180 kWh
				Total Energy Usage	-180 kWh
				Billed Energy Usage	0 kWh

METER NUMBER [redacted] NEXT SCHEDULED READ DATE ON OR ABOUT Feb 16
SERVICE PERIOD Dec 14 - Jan 13 NUMBER OF DAYS IN PERIOD 30
RATE Electric SC2 VOLTAGE DELIVERY LEVEL 0 - 2.2 kv

Prior Billing Period kWh		-287 kWh	
Current Net Metered kWh		-180 kWh	
Satellite Transfer kWh		-467 kWh	←Note: Satellite Line Item
Customer			21.02
Sales Tax	8.00%		1.68
	Total Delivery Services		$22.70

Volumetric Remote Net Metered Satellite Bill Example

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Delivery Services

Electricity Delivery

Service Period	No. of days	Current Reading - Previous Reading	*	Total Usage
Dec 11 - Jan 14	34	97999 Actual	97208 Actual	791 kWh

METER NUMBER [redacted] NEXT SCHEDULED READ DATE ON OR ABOUT Feb 16

RATE Electric SC1 Non Heat

Transfer kWh from Host	-467 kWh	
Current Bill Period kWh	791 kWh	
Return kWh to Host	0 kWh	
Basic Service (not including usage)		17.00
Delivery	0.04861351 x 791 kWh	38.46
Net Metering Adjustment	0.05554419	-25.94
Incr State Assessment	0.00078 x 791 kWh	0.62
SBC/RPS	0.00667891 x 791 kWh	5.29
Legacy Transition Chrg	0.001073 x 791 kWh	0.85
RDM	-0.00023 x 791 kWh	-0.18
Transmission Rev Adj	-0.00305 x 791 kWh	-2.41
Tariff Surcharge	3.09278 %	1.04
	Total Delivery Services	**$34.73**

Note: Line Item indicating transfer from Host

The Regulatory Framework
What are the Rules

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- ***Tariffs***
  - *Rule 36* - Net Metering for Solar Electric Generating Equipment, Farm Waste Electric Generating Equipment, Micro-Combined Heat and Power Generating Equipment, Fuel Cell Electric Generating Equipment, and Micro-Hydroelectric Generating Equipment and
  - *Rule 36.7.4 and Rule 36.7.5* also highlights the changes in methodology for calculating credits for non-demand remote net metered customers prior to June 1, 2015 and after June 1, 2015
  - *Rule 37* – Net Metering for Residential, Farm Service and Non-Residential Wind Electric Generating Systems as Defined in PSL 66-l of PSC No. 220 sets forth the guidelines and rules for net metering and remote net metering.
  - *Rule 37.10.3 and 37.11* also highlights the changes in methodology for calculating credits for non-demand remote net metered customers prior to June 1, 2015 and after June 1, 2015
  - The PSC 220 tariff can be found on the Company's website or the PSC's website as specified in the above slide.

Anniversary Dates and Meter Order / Installation

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- Anniversary Month – Residential (SC1 accounts)
  - Customer's have a one time opportunity to change. The date is shown on the second page of the bill as the number of month (not specific date but the month – ex: March would be (3)).
  - The anniversary date is set or determined as it always has when the net meter is ordered.
  - To request a change the customer should email DistributedGenerationServices@nationalgrid.com their current month on bill and the requested or desired month to change to approximately three months prior to the date on the bill. This request must come from the customer and not the contractor. If the contractor is helping the customer, please send a signed letter attachment of customers intention with the email. Once processed the change will show again on the second page of the bill.
- Meter Change outs – Notifications
  - Before April 1, 2013 the net meter was ordered when final approval to interconnect was granted and as of April 1, 2013 it is now ordered and set when approval for customer to begin installing their system or conditional acceptance is granted by the utility company.
  - The customer and contractor are notified of Conditional Approvals and Final Approvals via email, if the customer's email is submitted with the application. IF not submitted we are required to send the agreement via US Mail to the customer.

Technical Standards

Neil Labrake, Director Customer Energy Integration

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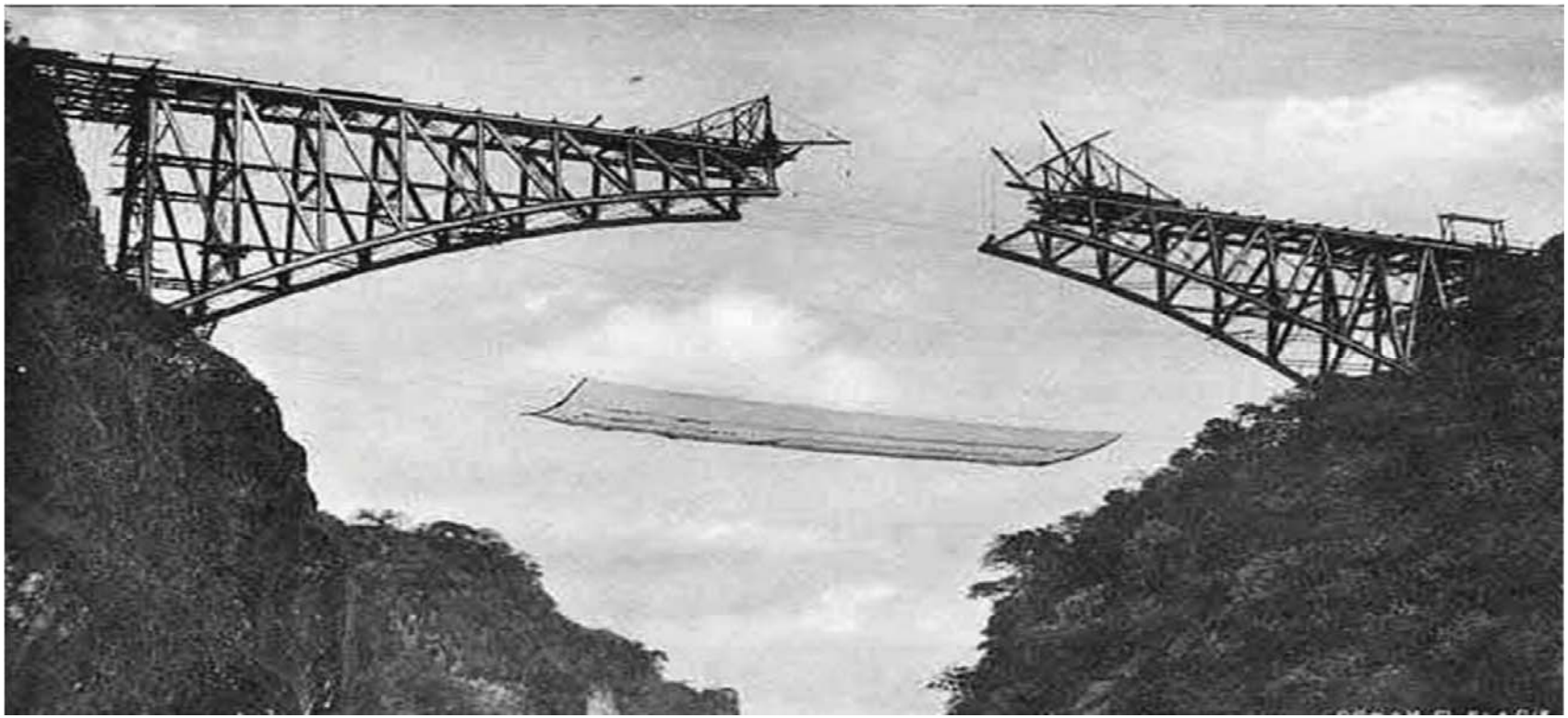

Importance of the Interconnection Process

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- Following the interconnection process is important because a DG system could present dangers to utility workers and the public if proper equipment is not installed.
- While robust and capable of handling minor disturbances, the quality of grid power is extremely important. The interconnection process ensures the DG meets safety, reliability, & power quality requirements with regard to:
  - Islanding
  - Transient Voltage Conditions
  - Noise and Harmonics
  - Frequency
  - Voltage Level
  - Machine Reactive Capability
- It is essential that each DG customer receive an interconnection agreement with the utility before installing any generation. You are proceeding at your own risk if you choose to install a system without utility approval.

Technical Issues:
Potential Impacts of DG on Distribution EPS

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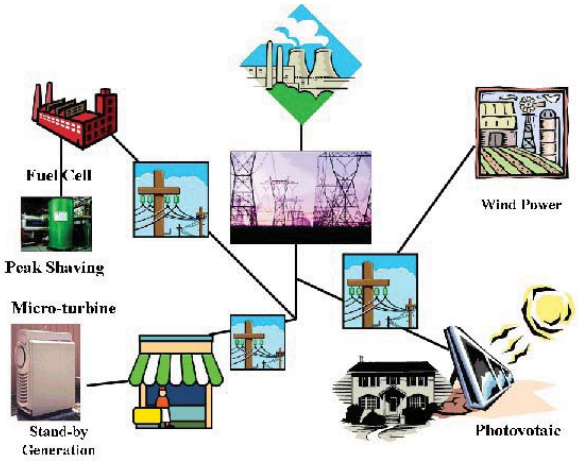
- Customer generation connected to the distribution system can cause a variety of system impacts including steady state and transient voltage changes, harmonic distortion, and increased fault current levels.
- The purpose of impact studies is to identify the severity of system impacts of the Customer's generators and the upgrades needed to avoid problems on the Company's distribution electric power system (EPS).



- *Specifically in accordance with the regulatory requirements whether state or federal under the Company's ESB 756.*
- *Typically 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.*

Technical Issues:
System Modeling Studies

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Careful engineering can effectively eliminate the potentially adverse impacts that DG or distributed resource (DR) penetration could impress on the electric delivery system, such as exposing system and customer equipment to potential damage, decrease in power quality, decrease in reliability, extended time to restoration after outage, and potential risks to public and worker safety.

- The IEEE supports the following system issues that the utility industry faces with DG penetration on the local EPS, but not limited to:
  - ✓ *voltage*
  - ✓ *capacitor operations*
  - ✓ *flicker and voltage regulator and LTC operations*
  - ✓ *protection coordination*
  - ✓ *feeding faults after utility protection opens*
  - ✓ *interrupting rating of devices*
  - ✓ *faults on adjacent feeders*
  - ✓ *fault detection*
  - ✓ *ground source impacts and ground fault overvoltages*
  - ✓ *single phase interruption on three phase line*
  - ✓ *recloser coordination*
  - ✓ *thermal overload and conductor burndown*
  - ✓ *risk-of-islanding:*
    - ✓ *loss of power grid and sensitivity under light load*
    - ✓ *vulnerability and overvoltages*
  - ✓ *system restoration and network issues*
  - ✓ *harmonic distortion contributions*
  - ✓ *power system stability and impact to bulk power network*
  - ✓ *system reinforcement*
  - ✓ *metering*
  - ✓ *telemetering*

Interconnection Standards – *Regulatory Rules*, Standards, Local Rules

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- **Federal Government**
  - **FERC SGIP** "Small Generator Interconnection Procedure" http://www.ferc.gov/EventCalendar/Files/20050512110357-order2006.pdf
- **Regional**
  - **NERC Standard FAC-001-0 - Facility Connection Requirements**
  - **Standard PRC-002-NPCC-01 - Disturbance Monitoring**
- **State Government**
  - **New York Department of Public Service** (NY DPS)
    - PSC NY Standardized Interconnection Requirements for Distributed Generation Connected to the Distribution EPS (NYS SIR)
    - Niagara Mohawk d/b/a National Grid tariff, P.S.C. 220
  - **Massachusetts Department of Public Utilities** (MA DPU)
    - Massachusetts Electric d/b/a National Grid tariff, M.D.P.U. 1248
  - **Rhode Island Public Utilities Commission** (RI PUC)
    - Narragansett Electric d/b/a National Grid tariff, R.I.P.U.C. 2078 https://www.nationalgridus.com/non_html/shared_interconnectStds_RI.pdf

Interconnection Standards – Regulatory Rules, *Standards*, Local Rules

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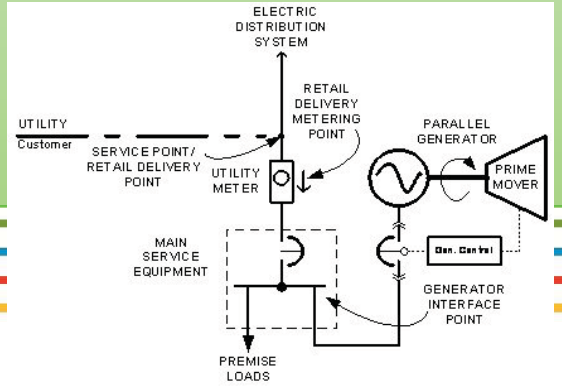
What are industry standards and codes that apply to DG interconnections to the EPS?

- IEEE standards applicable to DG installations:
  - ***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 Distributed Resources Interconnected with Electric Power Systems"*



Interconnection Standards: *(cont'd)*
Industry Standards and Codes

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- **Other IEEE standards:**
  - ***IEEE 519*** *"Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems"*
  - ***IEEE 1453*** *"Recommended Practice for Measurement and Limits of Voltage Flicker on AC Power Systems"*
  - ***IEEE C37.90.1*** *"Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus"*
  - ***IEEE C37.90.2*** *"Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers"*
  - ***IEEE C37.90.3*** *"Standard Electrostatic Discharge Tests for Protective Relays"*

Interconnection Standards: *(cont'd)*
Industry Standards and Codes

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- **Product Standards**

  Applicable standards:

  - UL 1703 | UL 61730 | **UL 1741**
    - ***UL 1741 "Inverters, Converters and Charge Controllers for Use in Independent Power Systems"***
  - IEC 61215 | IEC 61646 | IEC 61730

http://www.ul.com/

✓*Inspections are needed for safe, quality installations!*

Interconnection Standards: *(cont'd)*
Industry Standards and Codes

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- **NFPA**
  - ***NFPA 70* "National Electrical Code" (*NEC*)**
  - ***NFPA 70B* "Recommended Practice for Electrical Equipment *Maintenance*"**
  - ***NFPA 70E* "Standard for Electrical *Safety* in the Workplace"**
  - ***NFPA 850* "Recommended Practice for *Fire Protection* for Electrical Generating Plants and High Voltage Direct Current Converter Stations"**

Interconnection Standards: *(cont'd)*
Industry Standards and Codes - NEC

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Codes for Installing Renewable Energy Sources

- *Article 690 National Electrical Code*
  - Requirements for Photovoltaic Installations in Premises Wiring
- *Article 692 National Electrical Code*
  - Requirements for Fuel Cell Installations in Premises Wiring
- *Article 694 National Electrical Code*
  - Requirements for Wind Electric System Installations in Premises Wiring
- *Article 705 National Electrical Code*
  - Requirements for Interactive Installations in Premises Wiring

✓*Inspections are needed for safe, quality installations!*

Interconnection Standards: *(cont'd)*
National Grid ESB 750 Series

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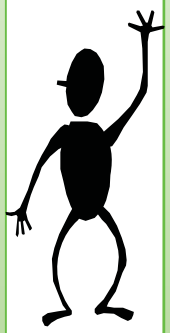
Key Points for Electric Service Requirements:

- Require some means of disconnect and main overcurrent protection, i.e., service equipment.
- Billing meters secure.
- Interface points clear to avoid potential operating and safety problems.

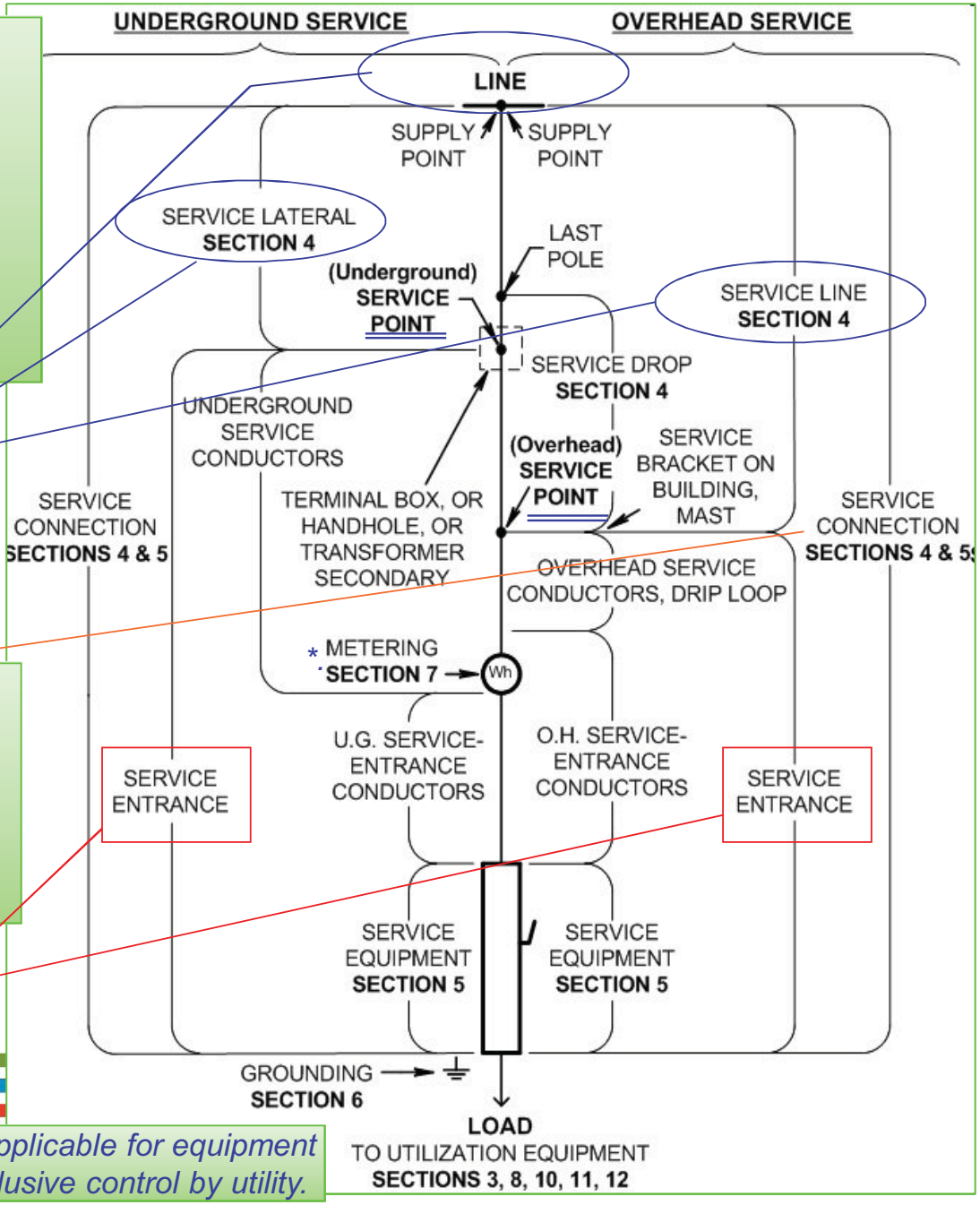


Key Points for Parallel Generation Requirements:

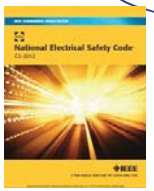
- Company determines the interconnect voltage and method of interconnection.
- Prior notification to and approval by the Company is required for any generation to be installed or operated in parallel with the Company EPS.

ESB 750 Figure 2-1

TYPICAL SERVICE INSTALLATION DIAGRAM BELOW 600 VOLTS – EXCLUDING NETWORK



Supply Side



NESC Rule 011

NEC 90.2(B)

- includes the service lateral or service line, service entrance conductors, meter provision, service equipment, and grounding *where the Electric Utility has Mutual Interest*

Premises Wiring

NEC 90.2(A)

** NESC applicable for equipment under exclusive control by utility.*

Interconnection Standards – Regulatory Rules, Standards, *Local Rules*

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Each utility has their requirements pursuant to the regulations that govern them as varying from state-to-state based on the NESC.

ESB 750 Specifications for Electrical Installations

ESB 756 General Requirements for Parallel Generation Connected to a National Grid Owned EPS

- ***Appendix A*** *Requirements for Parallel Generation Connected to National Grid Facilities in NY*
- ***Appendix B*** *Distributed Generation Connected To National Grid Distribution Facilities per the NYS SIR*
- ***Appendix C*** *Distributed Generation Connected To National Grid Distribution Facilities per the MA SIDG (**September 2015, Version 3.0**)*
- ***Appendix D*** *Distributed Generation Connected To National Grid Distribution Facilities per the RI SCDG **(R.I.P.U.C. 2078, November 2011 tariff.)***
- ***Appendix E*** *Requirements for Parallel Generation Connected to National Grid Facilities in New Hampshire*

✓*The Appendices to ESB 756 are intended for jurisdictional-specific requirements.*
http://www.nationalgridus.com/non_html/shared_constr_esb756.pdf

Interconnection Standards:
Local Rules – National Grid

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What are the local rules that apply to DG interconnections?

- **National Grid ESB 756 Parallel Generation Requirements**
  - ***Originates from the ESB 750 Series and applicable Company tariffs in each state jurisdiction***
  - ***ESB 756 main document***
  - ***Appendices to ESB 756 for Jurisdictional Requirements***

*Some **key factors** that influence the revision/update of Electric Service Requirements are:*

- **Government**
  - DPU (Massachusetts), PSC (NY), and PUC (one each for NH & RI)
  - FERC
  - Federal, State, and Local Laws

    MA Court Rules: *Solar PV Installations are Electrical. PHYSICAL INSTALLATION of PV Systems Must Be Done by LICENSED ELECTRICIANS. [July 2012 ruling by Suffolk Superior Court]*
- **Company tariff: in NY, P.S.C. 220**
- **Company policies & practices**
- **Codes & Standards**
- **NERC Standard FAC-001-0** - Facility Connection Requirements
- **Standard PRC-002-NPCC-01** - Disturbance Monitoring

www.nationalgridus.com/electricalspecifications

Technical Issues:
Limits on Distribution EPS - Radial

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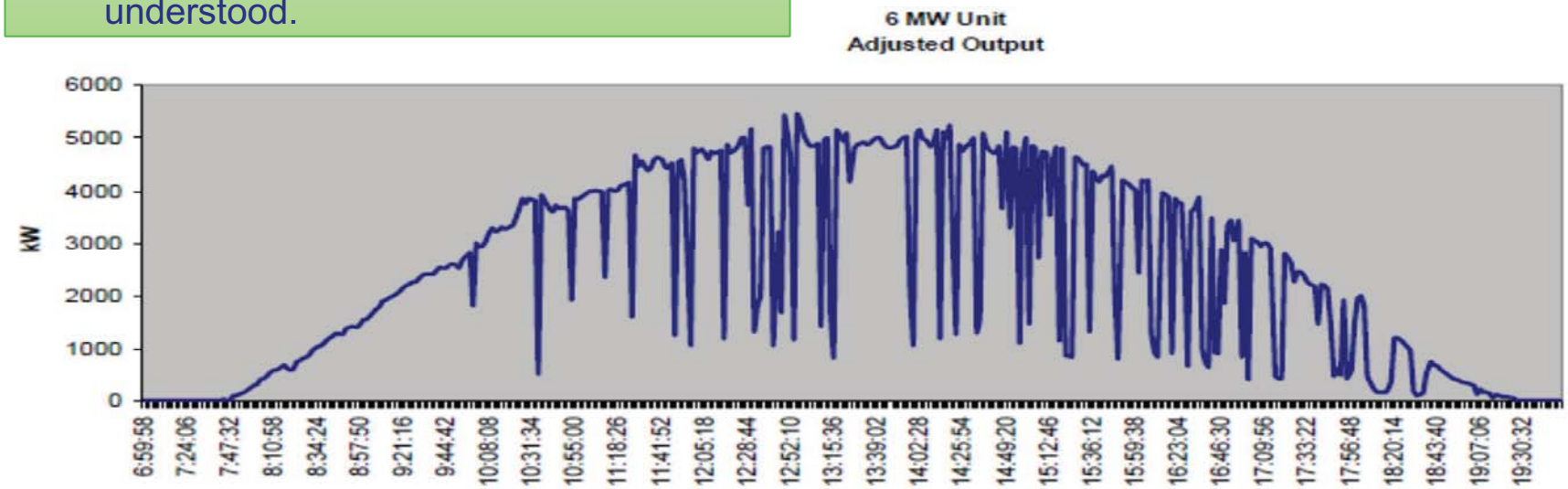
Example: Intermittent Resources - Large PV Inverter-based DG:

- Ramp rates of large PV inverter-based generators can affect EPS operations and power quality.
- Geographic diversity effects not yet fully understood.

✓First check – "How is EPS affected and how much is acceptable on it (*other customers on the feeder*)?"


Courtesy of BP Solar



Technical Issues: (cont'd)
Limits on Distribution EPS - Radial

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- DG saturation refers to the point at which large amounts of parallel generation are installed, whether by a single large facility or multiple facilities in aggregate, such that it becomes technically infeasible to operate on a single distribution feeder.
  - *A resulting example is excessive voltage regulation issues associated with intermittent resources like solar and wind. IEEE 1547 is recognized by the applicable Company tariff, P.S.C. 220 Rule 53 providing technical guidance whereby voltage regulation impacted by DG is a limiting factor.*
- It is expected due to the DG market that distribution feeders in many areas will reach the saturation point based on the application growth rate in those areas.
  - *Stability issues due to generation exceeding the feeder load causing back feed to the transmission system will need to be addressed where DG saturation occurs.*

Technical Issues: (cont'd)
Limits on Distribution EPS - Radial

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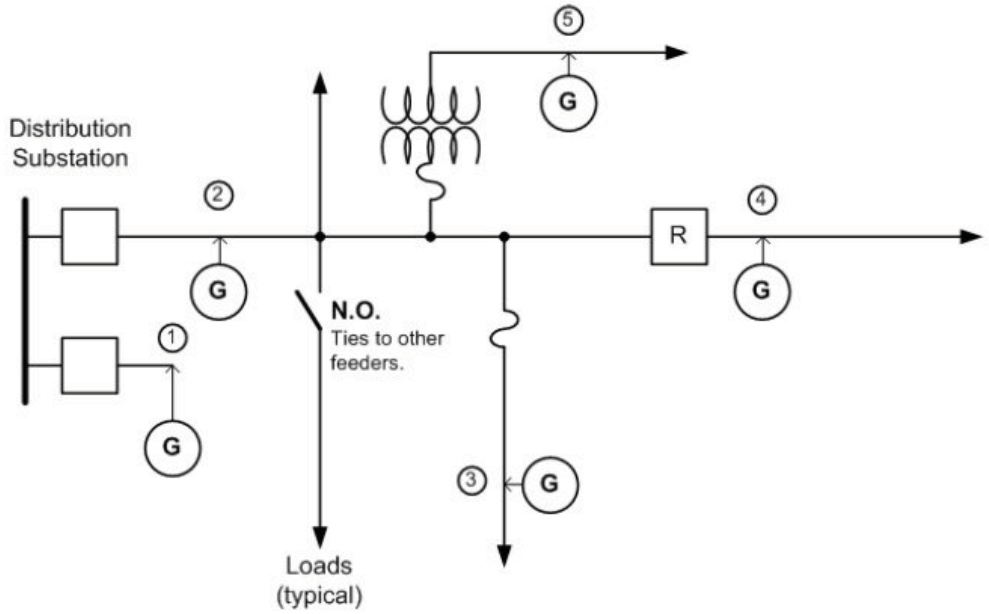
- Classification Types for Typical DG Installation Areas on Radial Distribution Feeders (*for example, see Section 4.0 in ESB 756 Appendix B*)



"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

- Types of Generators

Technical Issues: (cont'd)
Limits on Distribution EPS - Radial

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- Typical Planning Limits for DG Connection to Radial Distribution Feeder

Typical Gross Generation Capacity Limit (see notes below)		
DG Location on Feeder	3-phase Radial Distribution Voltage Class System	
	4 or 5kV	15kV
1. Express (dedicated) Radial Feeder	2.8MVA	9.0MVA
2. Feeder Main	0.75MVA	2.5MVA
3. Feeder Branch protected by Fuse	75kVA	250kVA
4. Sectionalized Feeder Main	100kVA	300kVA
5. Feeder Branch protected by Fuse with Ratio Transformer	50kVA	150kVA

DG installations are classified into two types - those interconnecting to the National Grid system on an express feeder and those interconnecting on a non-express radial feeder. When a DG (or aggregate DG) on a feeder or local EPS of a feeder is above the limits in the table, these warrant further study to determine feasibility and remedial action.

Technical Issues:
Transformer Limits- DG Installations less than 600V

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- ✓ ***Start with ESB 750*** *for electric service connection requirements.*
- ✓ ***When upgrades are needed –***
  - ✓ Follow the **electric service request** process with National Grid.
  - ✓ The Company will determine the supply transformer size based on the demand of the Customer's load and generation export.
    - ✓ *See **Section 3.6** for "Character of Service" and **Section 9** in **ESB 750** for transformers supplied by the Company for secondary services.*
- ✓ ***Notes:***
  - The Company's distribution transformers **continuous duty nameplate rating** is applied to sizing for DG Customer installations to ensure reliability of the supply.
  - **Exceeding transformer nameplate rating from DG sources** affects the transformer normal loading capability and **transformer life cycle becomes shortened**.
  - **Replacement later due to overload by DG causes burden on other ratepayers!**

Technical Issues

Integrating Distributed Generation with the Utility Distribution EPS

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- **Anti-Islanding**
  - **IEEE 1547** requires any Distributed Generator (DG) on a distribution feeder to be **detected and be tripped offline within 2 seconds upon formation of an island*** from the Area Electric Power System (EPS).

    *An **island** is a condition in which a portion of an Area EPS is energized solely by one or more Local DGs while it is electrically separated from the rest of the Area EPS.*

  - The utility industry recognizes Direct Transfer Trip (DTT) as good utility practice that provides a definitive islanding detection means to disconnect the DG and protect the EPS and the customers it serves.

    *DTT has inherent **high costs and physical limitations** of installing leased telecommunication line on the EPS and at the generator(s).*

* *The DG's internal protection system is designed with protective functions according to IEEE 1547 to ensure that there is proper voltage, frequency, and phase angle conditions between the Company's EPS and the DG system, before the generator is permitted to parallel (5 minutes after the Company circuit is energized).*

Technical Issues

Integrating Distributed Generation with the Utility Distribution EPS

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National Grid uses three main "tests"; *any* determine if anti-islanding protection is required for exceeding minimum load issue or a protection issue or operating concern:

1. "**Feeder Light Load versus Generation Test**" – *is the aggregate generation* greater than the feeder's light load*?

   * ***Percentage permissible*** *is based on types of DG, i.e. rotating machine, inverter-based, mix of each and system reactive power and impedance characteristics as studied on a case basis.*

2. "**Fault Sensitivity and Temporary Overvoltage Test**" – *can the DG facility detect pertinent faults that would occur on the feeder, or line section of the feeder*? – can run on times over 2 seconds cause temporary over voltages to exceed equipment ratings and affect other customer equipment?

3. "**Feeder Selectivity Test**" – *can the DG facility be connected to another circuit that has an automatic transfer scheme enabled*?

Note:

✓ DG Customer's protective device coordination study demonstrates generation voltage and/or frequency protection will **trip within 2.00 seconds** for the loss of the utility source (*e.g. feeder breaker trip*). *This will require subsequent compliance verification of the relays and their trip functional tests.*

Technical Issues:
Protection Requirements

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- Interconnection transformer configuration
  - ✓ The Company will designate transformer winding configuration based on Customer's size and local EPS
  - ✓ See Sections 5.3.4 and 5.5 in ESB 756 Appendix B
- Relay Requirements
  - ✓ Utility grade relays required (IEEE C37.90 approved)
  - ✓ PV UL-1741 certified inverters are considered primary protection
  - ✓ Certain DG Customers will be required to have redundant relaying. The Company designated generator breaker shall be set to trip and lock out upon relay failure for non-redundant functions.
  - ✓ See Sections 5.7 and 5.8 in ESB 756 Appendix B

Technical Issues: (cont'd)
Protection Requirements

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- Some typical relays used to protect the Utility from DGs
  - ✓ 51: Time Over Current (*For Synchronous Generators that produce substantial fault current*)
  - ✓ 51C: Voltage Controlled Time Over Current (*Current pickup is constant and is activated when the voltage drops below a certain limit*)
  - ✓ 27/59: Under/Over Voltage (*For all DGs*)
  - ✓ 59G: Ground Over Voltage (*If the utility side of the step up transformer is Delta*)
  - ✓ 81: Frequency – O/U (For a*ll DGs*)

Technical Issues: (cont'd)
Protection Requirements

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- Witness Test Requirements
  - ✓ Relay calibration test results of utility approved settings
  - ✓ On-site confirmation of relay settings
  - ✓ Physical operation of generator breaker by relay
  - ✓ Confirmation of 5 minute re-interconnection of generator
  - ✓ If required, confirmation of correct operation of RTU or DTT equipment

Technical Issues:
Limits on Distribution EPS - Network

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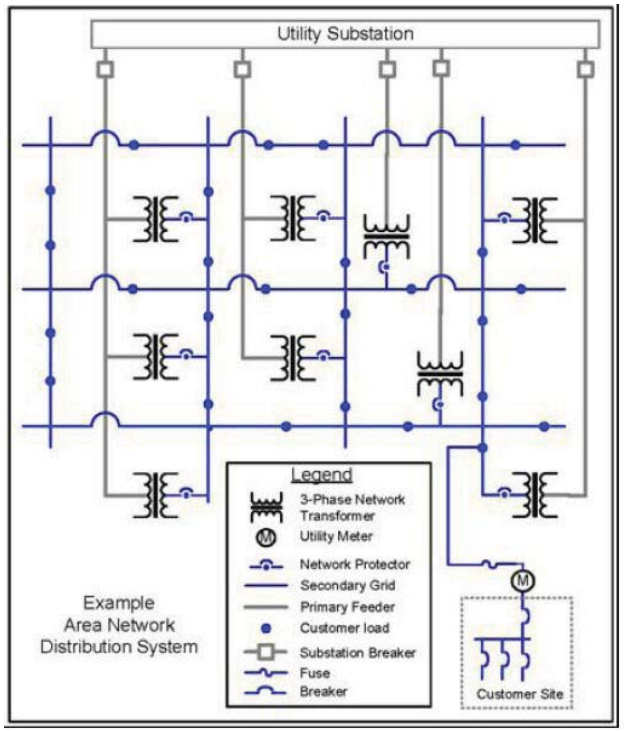
- Unlike radial distribution systems that deliver power to each customer in a single path from source to load, underground secondary area network systems deliver power to each customer through a complex and integrated system of multiple transformers and underground cables that are connected and operate in parallel.
- Area Networks consist 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) electric customers.



Technical Issues: (cont'd)
Limits on Distribution EPS - Network

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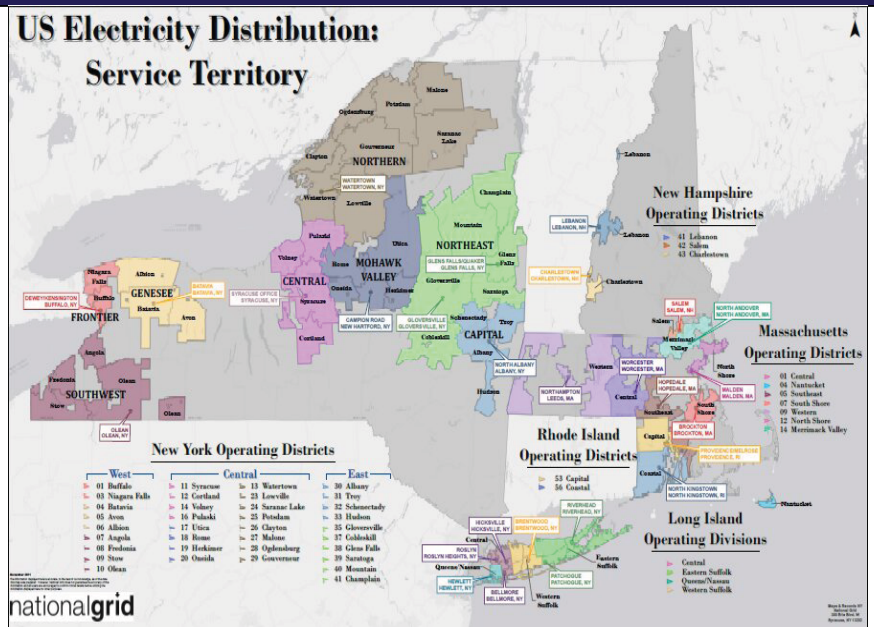
Portions of the following cities are served by area networks (customers in these areas should ask where the nearest radial system is located for possible tie-in):



- ✓ Albany, Buffalo, Cortland, Glens Falls, Niagara Falls, Schenectady, Syracuse, Troy, Utica, and Watertown in New York;
- ✓ Brockton, Lynn, and Worcester in Massachusetts; and
- ✓ Pawtucket and Providence in Rhode Island.

(*See Exhibit 3 in ESB 756 Appendix B, or C, or D.*)

Technical Issues: (cont'd)
Limits on Distribution EPS - Network

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- 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.

- To ensure network safety and reliability additional information will be required for the Company's engineering analysis such as:
  - ✓ Electric demand profile showing minimum load during peak generation time,
  - ✓ Expected generation profile shown for a 24-hour period and typical 7-day duration, and
  - ✓ Customer's complete electric service single-line diagram up to the service point supplied by the Company's secondary network EPS.

Technical Issues: (cont'd)
Limits on Distribution EPS - Network

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- Connecting customer generation to the low voltage network poses some issues for the Company.
  - ✓ 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.
  - ✓ Small induction and inverter-based generators are considered on the secondary voltage network systems on a case-by-case basis.
  - ✓ Connection of distributed generators on the spot networks may be 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.
- Costs can be significant to evaluate DG on the low voltage network including any mitigation measures.

Technical Issues:

Upgrades and System Modifications

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Typical Costs & Schedules for Upgrades

• Distribution Feeder		
– Regulator	$60-200K	2-6 mos.
– Cap move	$3-10K	1-3 mos.
– New Capacitor	$17-25K	1-6 mos.
– Re-conductor	$200-400k/mi	6-12 mos.
– Express Feeder	$350-600k/mi	8-18 mos.
• Transformer		
– Line Xfrmr	$2-25K	1-3 mos.
– Substation Xfrmr	$2-4 million	18-24 mos.

Technical Issues:
Technical Process End-to-End

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Refer to the appropriate Appendix of ESB 756 for the state jurisdiction where DG application is made.

- For example in NY, see **ESB 756 Appendix B:**
  - ***Section 3.0*** *for Customer Interface Procedures*
  - ***Exhibit 2*** *for Company milestone requirements for projects not covered by the simplified process (i.e. complex)*
  - ***Section 4.0*** *for Interconnection Requirements*
- Ensure all technical information required in the DG application under the applicable National Grid tariff is complete and legible. *Additional manufacturer technical data may be submitted for understanding the specified electric source's characteristics to perform the studies.*

Note -

- ✓ ***Interconnection costs*** *should be budgeted into the DG customer project*
- ✓ *A* ***large DG interconnection application takes longer*** *to study*
- ✓ ***Interconnection timeframes*** *do not apply to Electric Power System (EPS) construction if required.*

Not a simple process…

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Engineering, Procurement & Construction Process (Overview)

Form K Execution

- Payment Plan
- Kick-off Meeting
- Preliminary Engineering
- Milestone Plan

Design

- Field Investigation
- Detailed Design Sketches and Specifications
- Construction grade estimates

Procurement/ Permits

- Procuring Long Lead items
- Securing Easements, Right of Way access and/or Environmental permits/ licenses

Customer Interface: TSES, Regional Account Services, Program Manager

Engineering

- Recloser and Primary Meter
- Company System Updates
- Compliance Verification

Construction

- Advanced notice for scheduling
- Field Check
- Outage coordination
- Construction

Energization, Testing & Commissioning

- Field Commissioning and Energization
- Relay Test
- RTU Test
- Customer Commissioning

Not a simple process…

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Witness Testing

- The Company in general witness below tests as defined in IEEE 1547-2003 for an interconnection:
  - Relay Test
  - Functional Trip Test
  - In-Service Checks
  - Generator/ Inverter Test
- Pre-requisite to Schedule a Witness Test
  - Certificate of Completion and/or Municipal Inspection
  - Compliance Documentation (including revisions to submitted Schedule Z)
  - Witness test procedure & Energization plan, if applicable
  - Customer pre-testing results
- Witness Test Procedure
  - Contact information for the day of the witness test and brief project description
  - Visual inspection and equipment test results
  - Relay test, Functional trip test, In service checks, and Generator/inverter test
  - One-line and/or three-line diagram, if applicable control logic AC & DC elementary diagrams

DSIP Engagement Session

May 10, 2016
Syracuse, NY

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Development of National Grid's Initial Distributed System Implementation Plan

- 10:00am – 12:00pm
- An overview of the purpose of the plan and the contents under consideration.
- Stakeholders will be asked to share input, feedback and relative priorities.

Deeper Dive: System Data

- 1:00pm – 3:00pm
- Key deliverables in the DSIP concern the transparency of system information.
- National Grid will discuss it current capabilities
- Stakeholders will be asked to share their needs, intentions and priorities for enhanced system information.

National Grid Contacts

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Tom Higgins Eastern Division	315.798.5158
Tim Dzimian Western Division	716.831.7747
Nancie Orsini	518.433.3392

- Email: DistributedGeneration-NY@nationalgrid.com
- NYSERDA – nyserda.ny.gov
- NY SUN Initiative: nysun.gov

Appendix

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- 1. Net Metering Guide
- 2. Guidelines for Developers

New York Upstate – Net Metering Rules

Eligible Renewable /Other Technologies:	Solar (PSL 66-j)			Farm Waste (PSL 66-j)	Micro CHP (PSL 66-j)	Fuel Cells (PSL 66-j)		Micro-Hydroelectric (PSL 66-j)		Wind (PSL 66-l)	
Applicable Sectors:	Residential	Non-Residential	Residential Farm	Farm-Based Residential / Non-Residential Farms	Residential	Residential	Non-Residential	Residential	Non-Residential	Residential / Farm-Based	Non-Residential
Limit on System Size:	25 kW	Up to 2,000 kW (2 MW)	100 kW	1000 kW (1 MW)	Up to 10 kW	Up to 10 kW	Up to 2,000 kW (2 MW)	Up to 25 kW	Up to 2,000 kW (2 MW)	25 kW Residential/ 500 kW Farm Based	Up to 2,000 kW (2 MW)
Qualify for Remote Net Metering (3)	No	Yes	Yes	Yes	No	Residential customers who operate a farm operation and Non-Residential Customers		Residential customers who own/ or operate a farm operation and Non-Residential Customers		Residential-No Farm Based-Yes	Yes
Limit on Overall Enrollment [1]	6.0% of 2005 Peak Demand per IOU (392,160 kW for NMPC)									0.3% of 2005 Peak Demand per IOU (19,608 kW for NMPC)	
Treatment of Net Excess:	Residential - net excess will roll over monthly. At the end of 12 month period, any excess will be converted to a cash value and paid to the customer at SC6 avoided cost rates. Non-Demand Commercial customer's net excess will roll over monthly on an ongoing basis. Demand Commercial customer's excess is converted to its equivalent value and applied as a direct credit to the customer's current utility bill for outstanding energy, customer, demand and other charges on an ongoing basis. [2]			Residential/Non-Demand – net excess will roll over monthly. Demand customer's excess is converted to its equivalent value and applied as a direct credit to the customer's next utility bill for outstanding energy, customer, demand and other charges. For both demand and non-demand customers, at the end of the net metering year, any excess will be converted to a cash value and paid to the customer at SC6 avoided cost rates.	Net excess will be converted to a cash value calculated at SC6 avoided cost rates and applied as a direct credit to the customer's next bill for service. This dollar credit will be applied on the bill as a separate line item.	Net excess will be converted to a cash value calculated at SC6 avoided cost rates and applied as a direct credit to the customer's next bill for service. This dollar credit will be applied on the bill as a separate line item.		Residential and non-demand - net excess will be credited on the next bill for service with any remaining balance carried over to the next billing month and used to offset that month's energy consumption. Demand Commercial customer's excess is converted to its equivalent value and applied as a direct credit to the customer's current utility bill for outstanding energy, customer, demand and other charges on an ongoing basis. [2]		Residential/Farm-based – net excess will roll over monthly. At the end of 12 month period, any excess will be converted to a cash value and paid to the customer at SC6 avoided cost rates. Non-Demand Commercial customer's net excess will roll over monthly on an ongoing basis. Demand Commercial customer's excess is converted to its equivalent value and applied as a direct credit to the customer's current utility bill for outstanding energy, customer, demand and other charges on an ongoing basis.[2]	

- Net Metering is available on a "first come, first serve" basis determined by the date the utility notifies the DG Customer that it has received a complete project application.
- Demand customers will be subject to applicable actual metered demand charges consumed in that billing period. The Company will not adjust the demand charge to reflect demand ratchets or monthly demand minimums that might be applied to a standard tariff for net metering.
- Technologies that qualify for remote net metering must abide by the Rules of the applicable rules of PSC No. 220 regarding remote net metering (Rule No. 36.7 and Rule No. 37.10).

Guidelines for Developers
Form K

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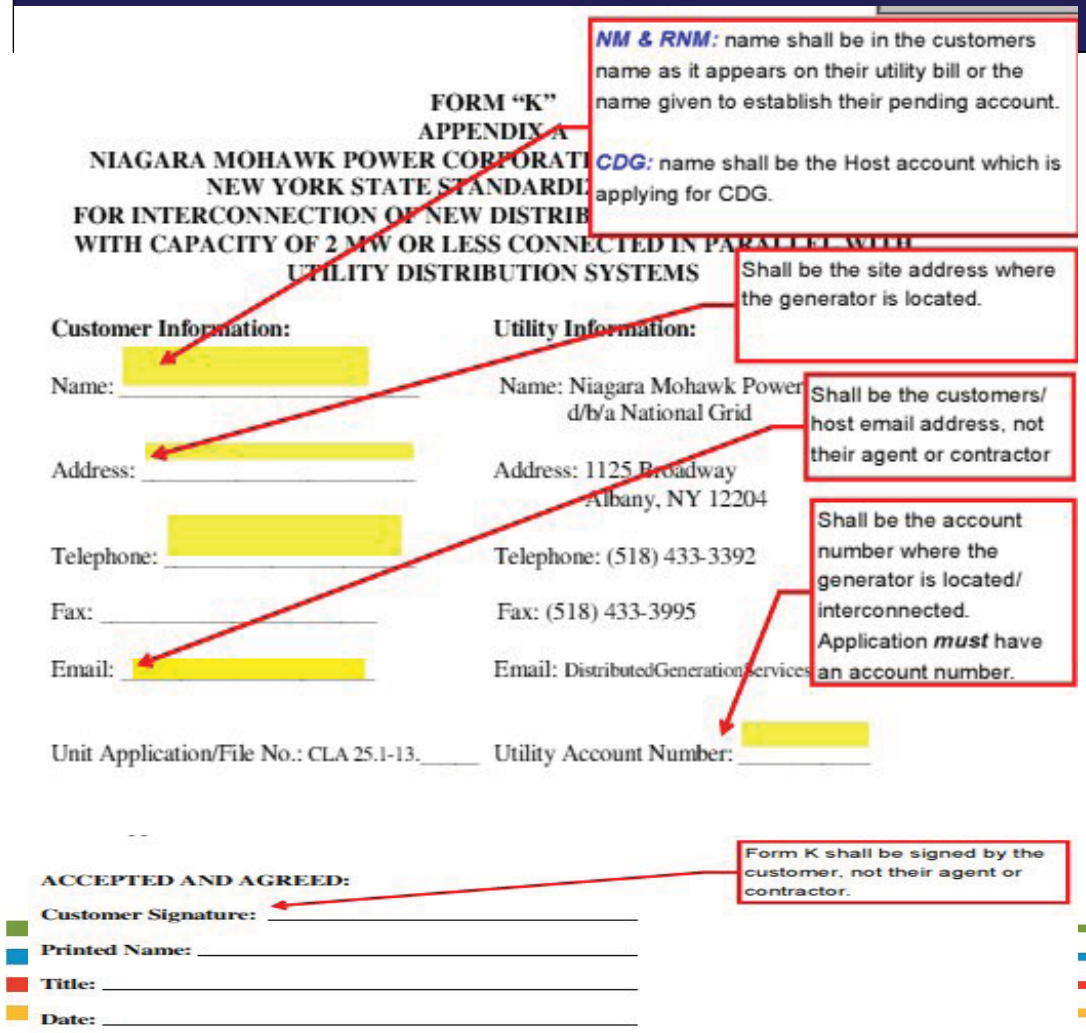

FORM "K"
APPENDIX A
NIAGARA MOHAWK POWER CORPORATI
NEW YORK STATE STANDARDI
FOR INTERCONNECTION OF NEW DISTRIB
WITH CAPACITY OF 2 MW OR LESS CONNECTED IN PARALLEL WITH
UTILITY DISTRIBUTION SYSTEMS

NM & RNM: name shall be in the customers name as it appears on their utility bill or the name given to establish their pending account.

CDG: name shall be the Host account which is applying for CDG.

Shall be the site address where the generator is located.

Shall be the customers/ host email address, not their agent or contractor

Shall be the account number where the generator is located/ interconnected. Application ***must*** have an account number.

Customer Information:

Name: _____

Address: _____

Telephone: _____

Fax: _____

Email: _____

Utility Information:

Name: Niagara Mohawk Power d/b/a National Grid

Address: 1125 Broadway Albany, NY 12204

Telephone: (518) 433-3392

Fax: (518) 433-3995

Email: DistributedGenerationServices

Unit Application/File No.: CLA 25.1-13._____ Utility Account Number: _____

Form K shall be signed by the customer, not their agent or contractor.

ACCEPTED AND AGREED:

Customer Signature: _____

Printed Name: _____

Title: _____

Date: _____

Guidelines for Developers
Appendix B

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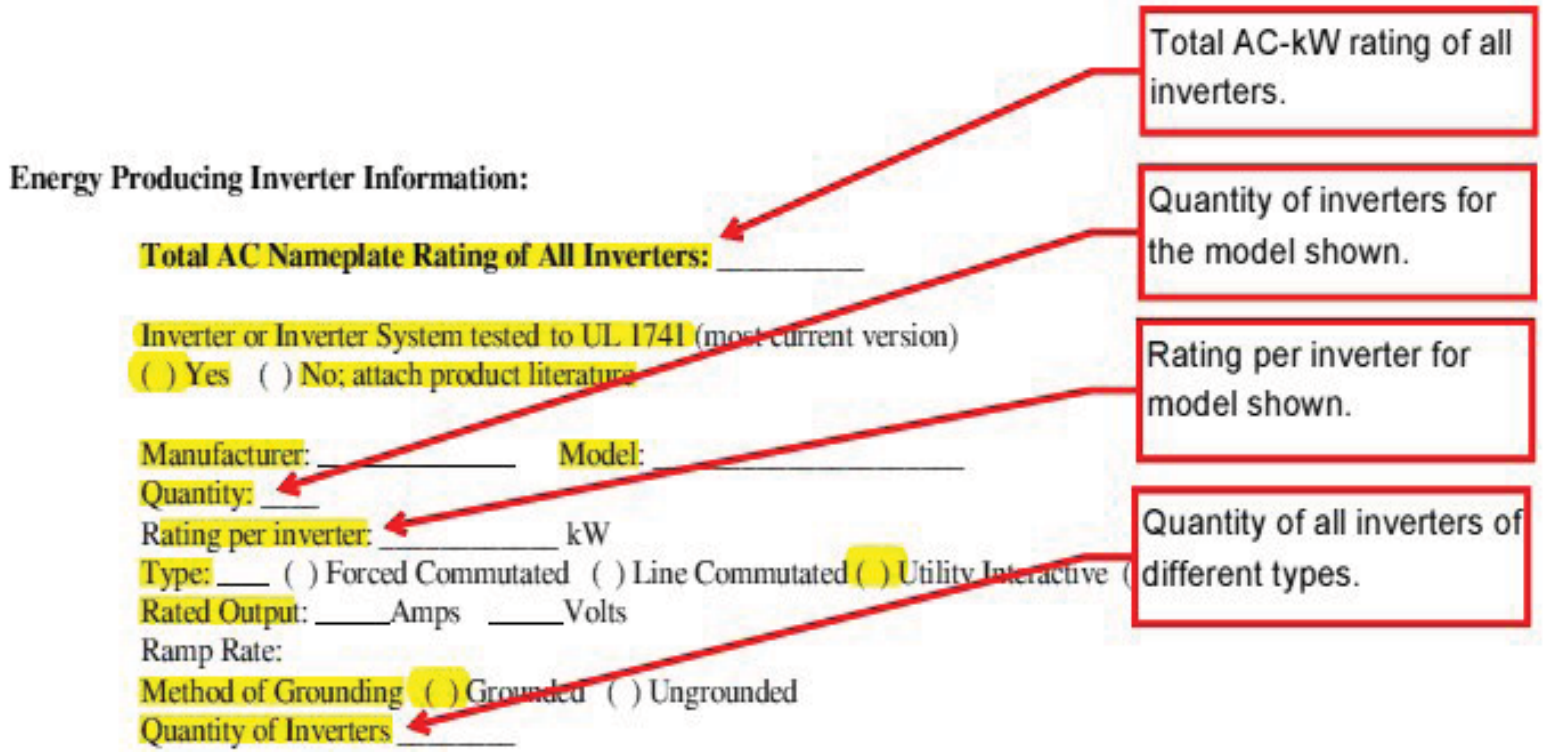
- Customer Info: shall match what's on the Form K.



Guidelines for Developers
3 Line Diagram

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- PCC
- Utility meter
- Utility disconnect
- Customer name & site address
- Total size of generation/inverter in AC-kW
- Generator/Inverter manufacturer and model numbers
- Total number of inverters
- Relay/redundant relay, if necessary

Guidelines for Developers

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- $750 Application fee clearly noting the project name
- Cut sheets for Inverters, Solar panels, Wind or other generation.
- Please refer to Appendix F of SIR for Application Check List
- *All applications* shall be email to: DistributedGenerationServices-NY @nationalgrid.com

APPENDIX F

APPLICATION PACKAGE CHECKLIST

Completed standard application form	√
Signed copy of the standard contract	√
Letter of authorization, signed by the Customer, to provide for the contractor to act as the customer's agent, if necessary	√
If requesting a new service, a site plan with the proposed interconnection point identified by a Google Earth, Bing Maps or similar satellite image. For those projects on existing services, account and meter numbers shall be provided	√
Description / Narrative of the project and site proposed. If multiple DG systems are being proposed at the same site/location, this information needs to be identified and	√
DG technology type	√
DG fuel source / configuration	√
Proposed project size in AC kW	√
Project is net metered, remote, or community net metered	√
Metering configuration	√
Copy of the certificate of compliance referencing UL 1741	√
Copy of the manufacturer' s data sheet for the interface	√
Copy of the manufacturer' s verification test procedures, if	√
System Diagram - A three line diagram for designs proposed on three phase systems, including detailed information on the wiring configuration at the PCC and an exact representation of existing utility service. One line diagrams shall be acceptable for single phase installations	√

Q&A

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Concluding Remarks

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THANK YOU FOR PARTICIPATING TODAY !