

# **Distributed Generation Installation Process Guide for Connections to National Grid Distribution Facilities per the New York Standardized Interconnection Requirements**

## **Introduction**

National Grid (“The Company”) strongly believes that promoting the installation of Distributed Generation (DG), in accordance with the New York State Standardized Interconnection Requirements (“The NY SIR” or “SIR”), is sound public policy. The purpose of this guideline document is to assist customers desiring to interconnect DG projects to National Grid’s upstate NY distribution system that only pertain to parallel generation covered by the NY SIR.

## **Application Process Overview**

This document outlines the process for a Customer to receive National Grid approval to interconnect DG facilities to the National Grid distribution electric power system (EPS). This process is intended for the following:

1. New distributed generation facilities with a nameplate rating of 2 MW or less (as aggregated on the Customer side of the point of common coupling (PCC)), that pertain to the NY SIR process and;
2. Review of any modifications affecting the National Grid distribution EPS and service connection interface at the PCC of existing Customer distributed generation facilities that have a nameplate rating of 2 MW or less as aggregated on the Customer side of the PCC, that pertain to the SIR process and that have been interconnected to the Company distribution system and where an existing contract between the Customer and the Company is in place and;
3. New distributed generation or modifications to existing distributed generation over 2 MW and up to 20 MW as aggregated on the Customer side of the PCC. Generation in this size range does not fall under the NY Public Service Commission’s mandated SIR guidelines. However, for larger customer generation (over 2 and up to 9MVA connected to the distribution system), the Company will follow the approval process time line 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 this document for SIR type generation. However, the time frames of the application process and level of requirements may be extended compared to those 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 system. For example, this process does not apply to emergency standby generators with break-before-make transfer switch and any other generation sources that operate independently of any connection to the 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 NY Public Service Commission for customer generation equipment up to 2 MW that will be connected to the Company distribution EPS on a full or part time basis; see NY State Standardized Interconnection Requirements at [http://www.dps.state.ny.us/Modified\\_SIR-Dec2010-Final.pdf](http://www.dps.state.ny.us/Modified_SIR-Dec2010-Final.pdf). These requirements are contained in National Grid’s New York Tariff, PSC No. 220 Electricity (<https://www2.dps.state.ny.us/ETS/jobs/display/download/4912540.pdf>), Rule 53: Standardized Interconnection Requirements and Application Process for New Distributed Generators 2 MW or Less Connected in Parallel to Utility Distribution Systems.

## **Objectives in the Application Process**

1. Parallel operation of a generator becomes a part of the Company 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 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 process should be completed in a timely manner that affords the lowest cost to the Customer as allowed by the need to preserve safety, reliability, power quality and operational efficiency of the Company distribution EPS.

2. Additional site-specific requirements may be requested once the supply voltage, service arrangement, location, and generation purpose is determined, which the purpose of generation 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, which requires 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 from the Company's PSC No. 220 tariff Service Class 6 and is a Power Purchase Agreement.*
3. For new 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 instance, 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 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 PSC's Standardized Interconnection Requirements (NY SIR) ([http://www.dps.state.ny.us/Modified\\_SIR-Dec2010-Final.pdf](http://www.dps.state.ny.us/Modified_SIR-Dec2010-Final.pdf)),
  - Attached **Exhibit 1** for the Company's 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 2MW Generator-Owner project schedule,
  - The Company's Distributed Generation Services department's **electronic mail address** as follows for inquiries: [DistributedGenerationServices-NY@us.ngrid.com](mailto:DistributedGenerationServices-NY@us.ngrid.com), and

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2 See [https://www.nationalgridus.com/niagaramohawk/business/energyeff/4\\_interconnection.asp](https://www.nationalgridus.com/niagaramohawk/business/energyeff/4_interconnection.asp) for DG interconnection.  
See <http://www.nationalgridus.com/electricalspecifications> for the Company's electric service requirements.

- The Company’s ([www.nationalgridus.com](http://www.nationalgridus.com)) “Distributed Generation” web site at [https://www.nationalgridus.com/niagaramohawk/business/energyeff/4\\_interconnection.asp](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](https://www.nationalgridus.com/niagaramohawk/non_html/Form_K.pdf)
      - Appendix B: [https://www.nationalgridus.com/niagaramohawk/non\\_html/Appendix\\_B.pdf](https://www.nationalgridus.com/niagaramohawk/non_html/Appendix_B.pdf)
      - Appendix C: [https://www.nationalgridus.com/niagaramohawk/non\\_html/Appendix\\_C.pdf](https://www.nationalgridus.com/niagaramohawk/non_html/Appendix_C.pdf)
    - Form G: [https://www.nationalgridus.com/niagaramohawk/non\\_html/Form\\_G.pdf](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 Public Service Commission, 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 they 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 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](http://www.nationalgridus.com/niagaramohawk/non_html/constr_esb750.pdf)).
  9. The following table summarizes the Company’s application of the NY SIR net metering rules ([https://www.nationalgridus.com/niagaramohawk/business/energyeff/4\\_net-mtrg.asp](https://www.nationalgridus.com/niagaramohawk/business/energyeff/4_net-mtrg.asp)):

New York – Solar, Farm Waste and Wind Net Metering Rules As of December 28, 2010						
Eligible Renewable/Other Technologies:	Solar (PSL 66-j)		Farm Waste (PSL 66-j)	Micro CHP/Fuel Cells (PSL 66-j)	Wind (PSL 66-j)	
Applicable Sectors:	Residential	Non-Demand-/Demand Commercial	Farm-Based Residential / Non-Residential Farms	Residential Up to 10 kW	Residential / Farm-Based	Non-Demand/Demand Commercial
Limit on System Size:	25 kW Residential	Up to 2,000 kW (2 MW)	1000 kW (1 MW)			25 kW Residential/ 500 kW Farm Based
Limit on Overall Enrollment <sup>1</sup>	1.0% of 2005 Demand per IOU (65,360 kW for NMPC)				0.3% of 2005 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. <sup>2</sup>		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.	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. <sup>2</sup>	

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

## Considerations During the Application Process

- 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 require study to ensure the DG does not degrade the reliability, power quality, safety, or operation of the 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](mailto: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 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 (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:

- 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 meters to determine the total demand of the network service when obtaining the service connection's electric demand profile.*

- For more technical information on parallel generator installations, please refer to the Company's ESB 756 and its Appendix B on the Company's web site at: [http://www.nationalgridus.com/non\\_html/shared\\_constr\\_esb756.pdf](http://www.nationalgridus.com/non_html/shared_constr_esb756.pdf).
- 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 tariff and the NY SIR.

### DG Projects >200kW and ≤ 2MW where no EPS upgrades are expected:

Item No.	Typical Company Support Activities Attributed to DG Customer's Project	Common PSC No. 220 Tariff Rule References
1	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.	24, 28, 36, 37, 53
2	Revenue metering equipment changes/additions.	25, 28, 36, 37, 53
3	Field audit of DG Customer installation to accepted design.	24, 28, 36, 37, 53
4	Field compliance verification - witness tests of DG Customer protective devices coordinating with the Distribution EPS.	24, 28, 36, 37, 53

4 See [https://www.nationalgridus.com/niagaramohawk/business/energyeff/4\\_interconnection.asp](https://www.nationalgridus.com/niagaramohawk/business/energyeff/4_interconnection.asp) for DG interconnection. See <http://www.nationalgridus.com/electricalspecifications> for the Company's electric service requirements.

Item No.	Typical Company Support Activities Attributed to DG Customer's Project	Common PSC No. 220 Tariff Rule References
5	DGS Project Management	53

**Complex DG Projects >200kW and ≤ 2MW:**

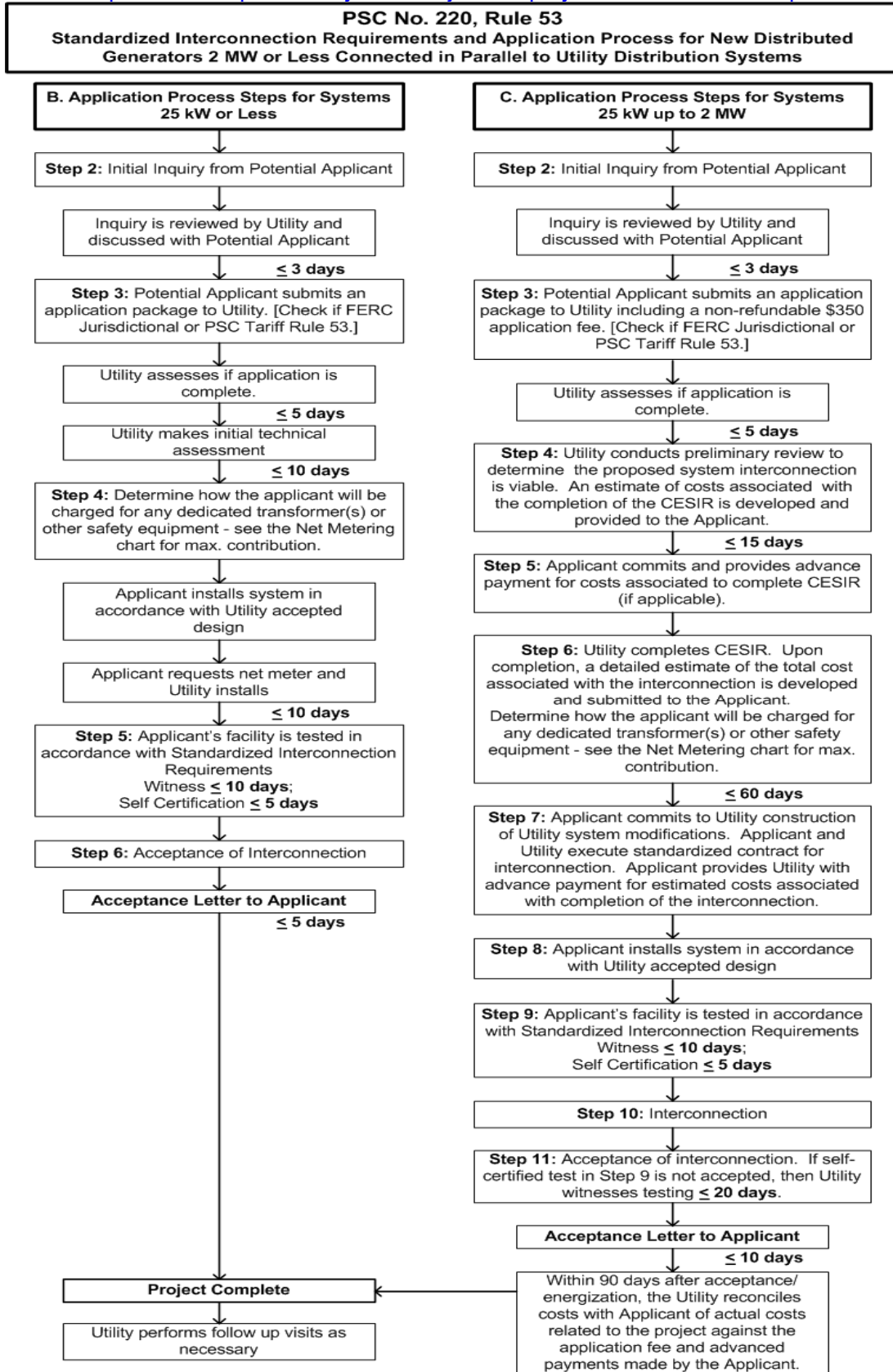
Item No.	Typical Company Support Activities Attributed to DG Customer's Project	Common PSC No. 220 Tariff Rule References
1	Distribution EPS upgrades (e.g. Current Limiting Fuses, Primary Conductors, Line Reclosers, Switches, Voltage Regulators, Capacitors, etc.) as a result of DG impact.	15-18, 28, 36, 37, 53
2	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.	28, 36, 37, 53
3	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.	28, 36, 37, 53
4	Where Local EPS feeder selectivity may require prompt control measures for DG impact on distribution feeder operations, EMS-RTU (status & control) addition at Generation Facility.	28, 36, 37, 53
5	Service Connection modifications and additions for DG impact on Distribution EPS.	19-23, 28, 36, 37, 53
6	Revenue metering equipment changes/additions.	25, 28, 36, 37, 53
7	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.	24, 28, 36, 37, 53
8	Field audit of DG Customer installation to accepted design.	24, 28, 36, 37, 53
9	Field compliance verification - witness tests of DG Customer protective devices coordinating with the Distribution EPS.	24, 28, 36, 37, 53
10	Project Management (DGS, Distr. Line, Distr. Station, etc.)	28, 53

**Revision History**

<u>Version</u>	<u>Date</u>	<u>Description of Revision</u>
1.0	07/29/11	New document according to Dec. 2010 NY SIR.

# EXHIBIT 1: Niagara Mohawk Power Corp. Tariff PSC No. 220 Rule 53

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



**Note:** "days" are "business days"

## **EXHIBIT 2: Company Milestone Requirements for Greater than 200kW and up to 2MW Customer DG Project Schedule**

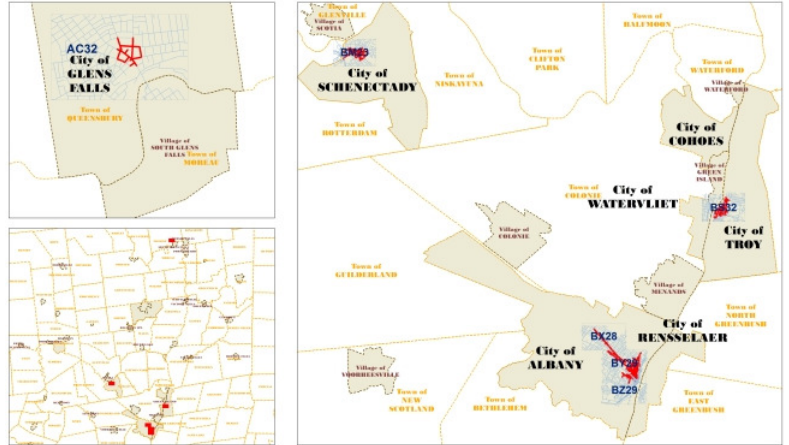
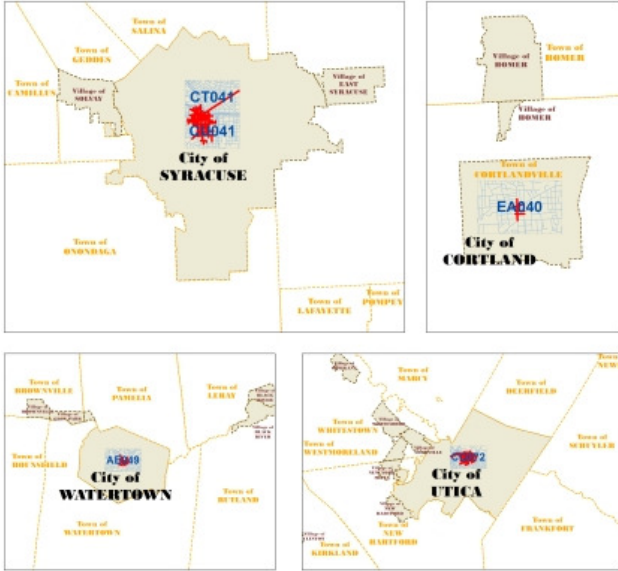
These are Company items to be considered in the Customer's DG Project Schedule.

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

## EXHIBIT 3: Reference Maps of National Grid upstate NY Secondary Network EPS Areas

### NY Central Division

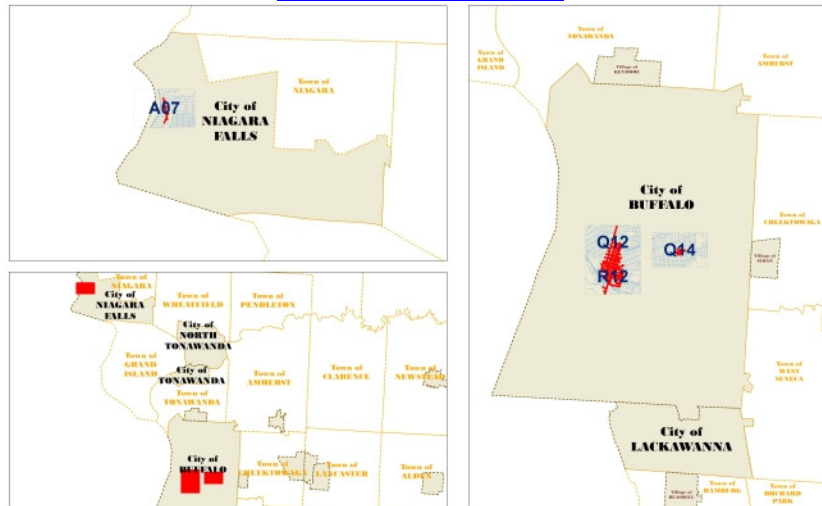
### NY Eastern Division



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/niagamohawk/home/energyeff/network/5\\_networkmap.asp](https://www.nationalgridus.com/niagamohawk/home/energyeff/network/5_networkmap.asp)

### NY Western Division



## **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**

