Federal Utility Partnership Working Group Interconnect Issues in NE

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Agenda

- About National Grid and Service territories
- Scope and definitions
- Interconnection Process Overview
- Time Frames and Fees
- Governmental Entity Exceptions
- Net Metering Limit
- Technical Issues
- Observations and recommendations
- Questions and Answers

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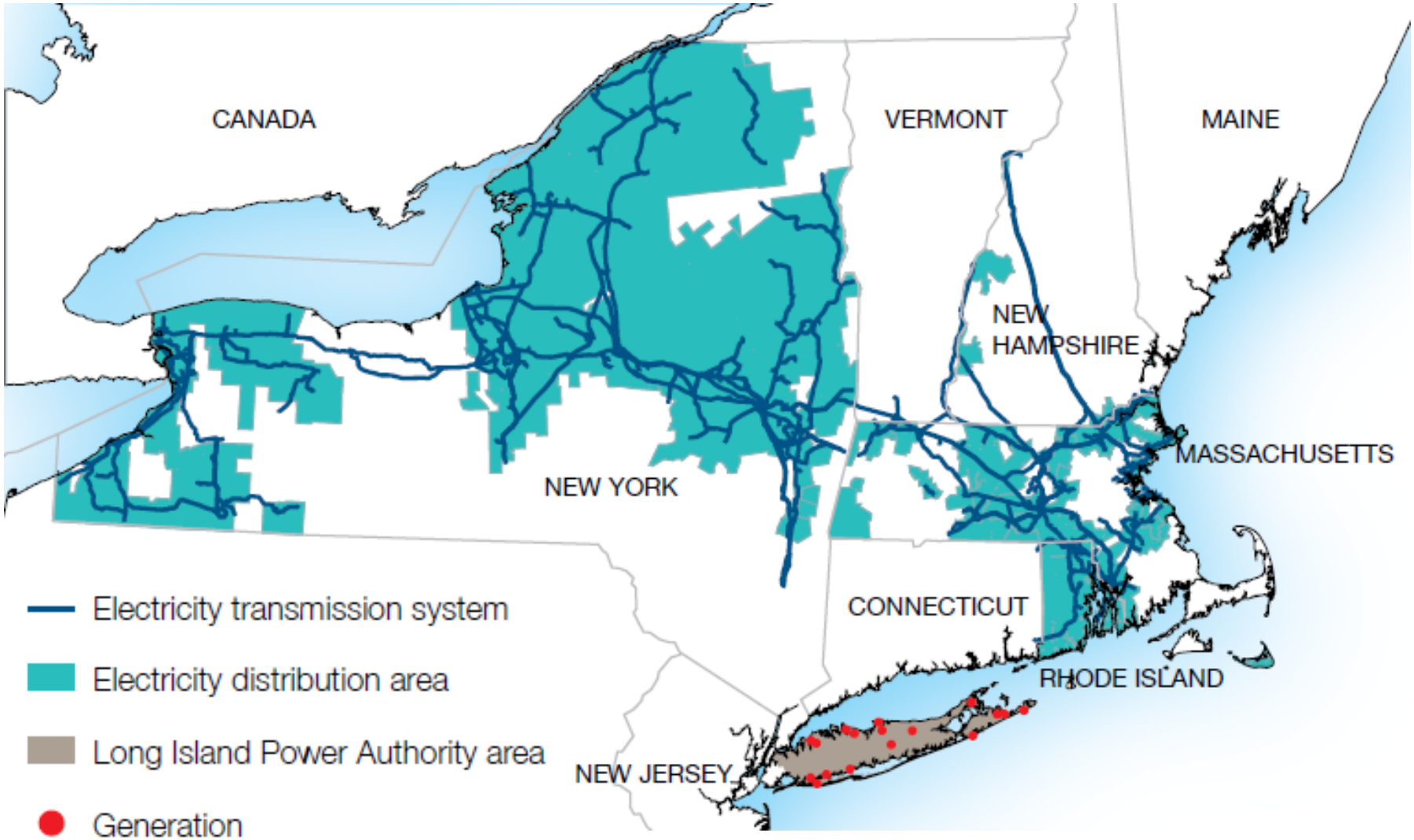
Service Territories Map



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Scope and definitions

- The Distributed Generation Group at National Grid process interconnection applications on the distribution system typically 10 MW and under with a few exceptions.
- ISO-NE process larger interconnection applications on the transmission system. Their timelines and procedures vary from National Grid's Distributed Generation process.
- Governmental Entity : 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 , or the State of Rhode Island and the Providence Plantations, or any other governmental subdivision thereof subject to the claims limits of R.I.G.L. Chapter 9-3.
- Days: 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.

Interconnection Process Overview NH, MA and RI

- **Simplified** – This is for Listed inverter-based Facilities with a power rating:
  - 10 kW or less on single phase
  - 25 kW or less on three-phase installed on radial circuits.

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

- **Standard** – This is for all facilities not qualifying for either the Simplified or Expedited interconnection processes.

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Time Frames and Fees

Review Process	Simplified	Expedited	Standard	Simplified Spot Network
Eligible Facilities	**Listed Small Inverter**	**Listed DG**	**Any DG**	**Listed Inverter ≤ 15 kW**
Total Maximum Days	**15 days**	**60 days**	**150 days**	**100 days**
Application Fee (covers Screens)	$ 0	$3/kW, minimum $300, maximum $2,500		≤3 kW $100, >3 kW $300
Studies	N/A	Up to 10 engineering hours at $125/hr ($1,250 maximum)	Actual cost	N/A
Facility Upgrades	**Actual cost**			N/A
O&M	N/A	TBD		N/A
Notice/ Witness Test	< 1 day with 10 days notice or by mutual agreement	1-2 days with 10 days notice or by mutual agreement	By mutual agreement	1 day with 10 days notice or by mutual agreement
Witness Test	$0	Actual cost, up to $300 + travel time	Actual Cost	$0

Governmental Entity Exceptions

- Net Metered Facility Size
  - Class II Net Metering Facility (MA): a generating capacity of more than 60 kW but less than or equal to 1MW **per unit**.
  - Class III Net Metering (MA): a generating capacity of more than 1 MW but less than or equal to 2MW **per unit**.
  - Net-Metering Facility (RI):
    - A generating capacity up to 2.25 MW if developed but not owned by cities or towns, but are located on city or town owned land and provide power solely to the city or town that the project is located in
    - A generating capacity up to 3.5 MW if entirely owned by cities and towns of Rhode Island, state agencies and the Narragansett Bay Commission

Governmental Entity Exceptions (continued)

- Governmental Entity is not required to obtain liability insurance in MA for:
  - PV facilities with a Gross Nameplate Rating in excess of 60 kW up to 500 kW.
- At the Governmental Entity request in MA, National Grid will obtain a liability insurance and charge the customer for:
  - PV facilities with a Gross Nameplate Rating in excess of 500 kW up to 5 MW.
  - Wind facilities with a Gross Nameplate Rating in excess of 60 kW up to 5 MW.
  - CHP facilities with a Gross Nameplate Rating in excess of 60 kW up to 5 MW.

Net Metering Limit

- 1% of a utility's historical peak load in MA
  - Mainland reached 19 MW of 50.67 MW limit
  - Nantucket Island 266 kW of 390 kW limit

- 2% of a utility's historical peak load with 1% reserved for projects under 1 MW in RI
  - Reached 2.4 MW of 38.64 MW limit for projects under 1 MW.
  - Reached 1.5 MW of 19.32 MW limit for projects over 1 MW.

- 1% of a utility's historical peak load in NH
  - Reached 65 KW of 1,880 KW limit

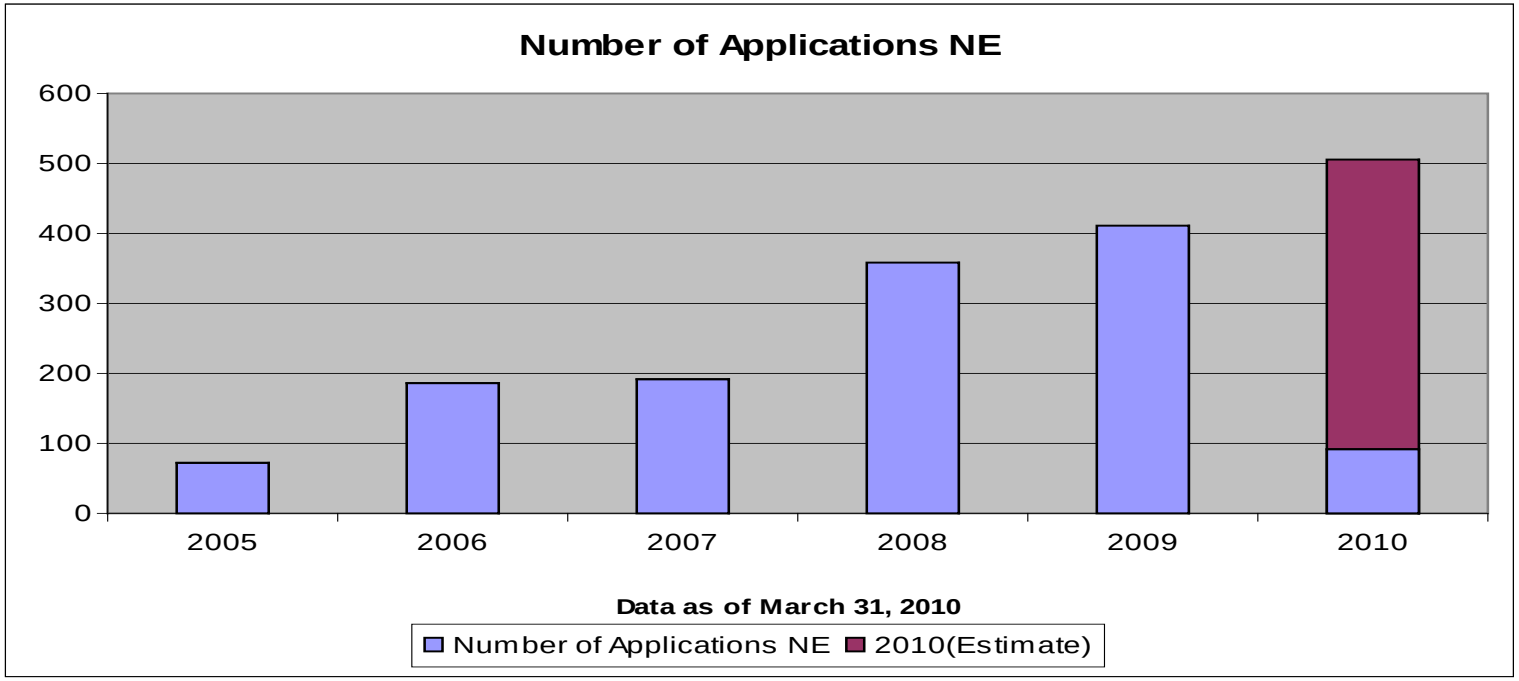
Technical Issues - Size

- Interconnections Applications on non dedicated circuits
  - Largest wind application is 3.3 MW on 13 kV class circuits
  - Largest Solar application is 6 MW on 23 kV class circuits
- Interconnections Applications on dedicated circuits
  - Largest wind application is 30 MW on ?? kV class circuits
  - Largest Solar application is 10 MW on 13 kV class circuits

- The distribution system was not designed with Distributed Generation in mind. Large Generation at the system fringes cause problems (i.e. protection, power regulation…)

Technical Issues – Quantity and Aggregate Size

- Number of interconnection
  - Received over 400 applications worth more then 80 MW of interconnection applications in 2009
  - Received over 90 applications worth more then 42 MW in the first 3 months of 2010 and we anticipate to surpass 130 MW by years end
- Small (<100kW) Interconnection application are triggering large studies because of the aggregate generation on the circuit.
- Some circuit have over 20 interconnected generators



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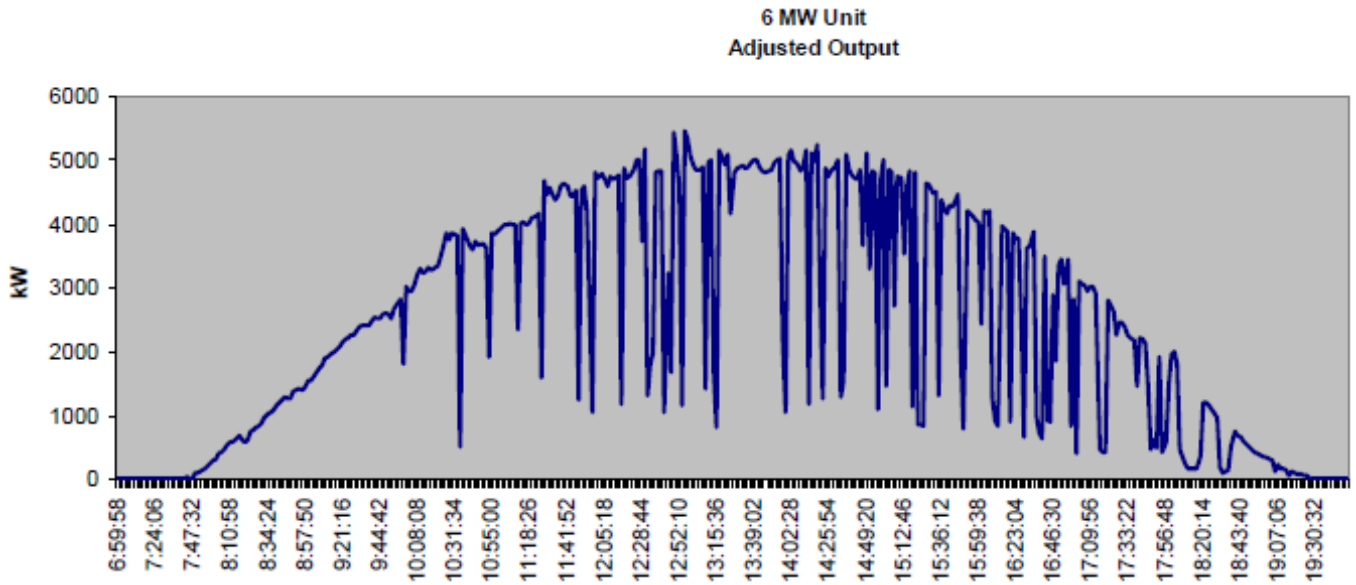
Technical Issues - Large intermittent generators

- Ramp rates of intermittent generators at high penetration can affect electric power system operations.
- Geographic diversity effects not yet fully understood.
- National Grid is installing monitoring equipments on it's 1 MW PV generating facility in Sutton to gather important data on large PV connected to distribution systems



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Technical Issues – Metering and Data acquisition

- Metering with remote data access required for all installation that will export power onto National Grid's EPS
  - Over 60 kW in MA
  - Over 10 kW in RI
- Installation over 1 MW will also require a recloser with remote data access to be installed to
  - Monitor voltage, current …
  - Act as a utility controlled redundant protection system.

Observations and recommendations

- Apply for interconnection with national grid early, during conception phase before committing to buy no matter how simple or small the DG might be.
- You can always request general utility information about a specific location from distributed.generation@us.ngrid.com
- Large interconnection application take longer to study
- Stand alone (no load behind the meter) interconnection application take longer to study
- Interconnection timeframes do not apply to Electric Power System construction if required.

Links to National's Grid Interconnection pages

- MA
  - https://www.nationalgridus.com/masselectric/business/energyeff/4_net-mtr.asp
  - https://www.nationalgridus.com/masselectric/home/energyeff/4_net-mtr.asp
  - https://www.nationalgridus.com/nantucket/business/energyeff/4_net-mtr.asp
  - https://www.nationalgridus.com/nantucket/home/energyeff/4_net-mtr.asp
- RI
  - https://www.nationalgridus.com/narragansett/business/energyeff/4_net-mtr.asp
  - https://www.nationalgridus.com/narragansett/home/energyeff/4_net-mtr.asp
- NH
  - https://www.nationalgridus.com/granitestate/business/energyeff/4_net-mtr.asp
  - https://www.nationalgridus.com/granitestate/home/energyeff/4_net-mtr.asp

Questions for Serge Khalife?

Interconnection Standard?

Studies?

Net Metering?

Simplified Application?

Standard Application?

Insurance?

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