Distributed Generation in the New England Forward Capacity Market

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Today's Objective

- What is the Forward Capacity Market?
- What demand resource measures (i.e., programs, tariffs, or activities) have been implemented? Are any under consideration?
- What criteria are used for determining what measures to implement?
- What methods are used to determine if these measures are successful in providing the intended response?
- What methods are used to determine the value these measures produce for customers?

New England's Forward Capacity Market

- The Forward Capacity Market (FCM) procures capacity to meet New England's forecasted demand and reserve requirements three years into the future.
  - FCM Rules were filed with the FERC on **Feb. 15, 2007.**
- Generation and Demand Resources are selected through a competitive ***Forward Capacity Auction (FCA)*** process.
  - An auction is used to select resources needed to meet the Installed Capacity Requirement and to establish the market-clearing price.
  - To participate in the FCA, resources must pre-qualify.
  - The selected resources are paid the market-clearing price ($/kW-month), subject to performance incentives and penalties.
  - To encourage investment, new resources can receive a long-term (up to 5 year) commitment.

Demand Resources Defined

- Demand Resources are installed measures (i.e., products, equipment, systems, services, practices and/or strategies) ***that result in additional and verifiable reductions in end-use demand on the electricity network in the New England Control Area.***
  - Such measures include Energy Efficiency, Load Management, and Distributed Generation.

Define Demand Resource Types

- The proposed rules for the FCM defines Demand Resource Types *by the way in which they reduce load*, not by technology.
  - Different technologies – i.e., Energy Efficiency, Load Management, and Distributed Generation – reduce load in different ways.
- Demand Resource Types include:
  - On-Peak Demand Resources
  - Seasonal Peak Demand Resources
  - Critical Peak Demand Resources
  - Real-Time Demand Response Resources
  - Real-Time Emergency Generation Resources

Distributed Generation - Applicable as Demand Resources

- Generation resources directly connected to end-use customer load and located behind the end-use customer's billing meter.
- Less than 5 MW nameplate rating or nameplate rating lower than non-coincident peak at the host facility.
- Examples of DG applicable as demand resources:
  - 4.5 MW CHP unit,
    host facility non-coincident peak load is 4.5 MW.
  - 16 MW CHP unit,
    host facility non-coincident peak load is 22 MW

Distributed Generation - Applicable as Demand Resources (cont.)

- For individual Distributed Generation projects from a single facility with a Demand Reduction Value greater than or equal to 5 MW the critical path schedule requirements and the monitoring and milestones are the same as those required for New Generating Capacity Resources as set forth in Section III.13.1.1.2.2.2.

  Major Permits
  Project Financing Closing
  Interconnection Request
  Major Equipment Orders
  Substantial Site Construction
  Major Equipment Delivery
  Major Equipment Testing
  Commissioning
  Commercial Operation

On-Peak Demand Resources

- On-Peak Demand Resources measure their load reduction during the following hours:

  Summer On-Peak Hours: 1 p.m. to 5 p.m. Non-Holiday Week Days in June, July and August

  Winter On-Peak Hours: 5 p.m. to 7 p.m. Non-Holiday Week Days in December and January
- Designed for non-dispatchable measures that are *not weather sensitive* and reduce load across pre-defined hours (e.g., lighting, motors, etc.).

Seasonal Peak Demand Resources

- Seasonal Peak Demand Resources must reduce load during Non-Holiday Week Days when the ***Real-Time System Hourly Load*** is equal to or greater than **90%** of the most recent "50/50" System Peak Load Forecast for the applicable Summer or Winter Season.
- Designed for non-dispatchable, weather-sensitive measures such as energy efficient HVAC measures.

Critical Peak Demand Resources

- Critical Peak Demand Resources must reduce load across Forecasted Peak Hours and Shortage Hours.

  Forecast Peak Hours are hours when the ISO's ***Hourly Day-Ahead Forecasted Load*** (for non-holiday weekdays days) is equal to or greater than **95%** of the most recent 50/50 System Peak Load Forecast for the applicable summer or winter season.

  Shortage Hours are hours when the ISO implements OP-4 Actions in response to a capacity deficiency. *OP-4 Actions are called in real-time.*
- Designed for measures that can be dispatched by the project owner based on system conditions.

Real-Time Demand Response Resources

- The ISO will send Dispatch Instructions to Real-Time Demand Response Resources:

  They must curtail electrical usage within 30 minutes of receiving a Dispatch Instruction; and

  Continue curtailing usage until receiving a Dispatch Instruction to restore electrical usage.
- Designed for dispatchable measures with no binding air quality permitting restrictions on their use *during Critical Peak Hours*.

Real-Time Emergency Generation Resources

- The ISO will send Dispatch Instructions to Real-Time Emergency Generation Resources:
  - They must curtail electrical usage within 30 minutes of receiving a Dispatch Instruction; and
  - Continue curtailing usage until receiving a Dispatch Instruction to restore electrical usage.
- ***Designed for dispatchable Emergency Generators only.***
  - Distributed Generation whose Federal, State and/or Local air quality permit(s) limit the operation of these generators to OP-4, Action 12 – the action in which voltage reductions of five percent (5%) of normal operating voltage that require more than 10 minutes to implement.
- The amount of Emergency Generators used to meet the Installed Capacity Requirement is limited to **600 MW.**

Measurement & Verification (M&V) Plan

- All Demand Resource projects must have a M&V Plan that describes the methods, assumptions and measurements that will be used to determine monthly Demand Reduction Values.
- M&V Plans Address:
  1. Project Description
  2. M&V Methodologies
  3. Statistical Methods
  4. Measurement of Demand Resource Project Savings
  5. Data Collection, Validation and Management
  6. Reporting, Independence, Supplemental Information, Project Organization
  7. Special Requirements for Real-Time Demand Response and Real-Time Emergency Generation

Measurement and Verification Requirements for DG

- Distributed Generation must provide real time metering for determination of Monthly Demand Reduction Value
- Must measure and record electrical output of the generator during Performance Hours at a frequency of no less than one hour increments.
- Must report the most recent annual non-coincident peak demand (absent Generation output) and the monthly average hourly load of the end-use metered customer at the location where the DG resource is directly connected.
- Measurement, monitoring and data recording equipment directly measuring watt-hrs, volt-hrs, volt-ampere-hrs, reactive volt-ampere-hrs and associated demand components must conform to standards set by American National Standards Institute or equivalent standards.
- Any measurement or monitoring equipment that directly measures electrical demand (kW) must be a true RMS meter with accuracy of no less than +/- 2%
- Data recorders shall be synchronized in time with an accuracy of +/- 2 minutes per month.

Capacity Value

- If across Demand Resource performance hours, as defined by the Demand Resource type, a Distributed Generation resource's monthly average hourly output is greater than the monthly average hourly load of the end-use customer to which the resource is directly connected, the Capacity Value of the portion of output exceeding the customer's load for the month will be the Demand Reduction Value for that portion of the output.
- The Demand Reduction Value of a combined Demand Resource that reduces load and generates output simultaneously for a single facility shall be its Average Hourly Output or Weighted Average Hourly Output, depending on its Demand Resource type, which reflects the combined impact of the load reduction and Distributed Generation output on reducing overall end-use demand on the electricity network in the New England Control Area.

Capacity Payment Example: On-Peak Demand Resource

Distributed Generation

Capacity Obligation:	**8.000**	**MW**				
	June	**July**	**August**	**September**	**October**	**November**
Electrical Energy Output (kWh)	**540,000**	**555,000**	**580,000**			
On-Peak Hours	84	84	92			
Average Hourly Output (MW)	6.429	6.607	6.304			
Customer's Avg. Hourly Load (MW)	6.000	6.000	7.000	6.000	5.000	4.000
Demand Reduction Value (MW)	**6.429**	**6.607**	**6.304**	**6.447**	**6.447**	**6.447**
Reserve Margin Factor	1.15	1.15	1.15	1.15	1.15	1.15
T&D Factor	1.08	1.08	1.08	1.08	1.08	1.08
Demand Reduction Value =< Customer Load	6.000	6.000	6.304	6.000	5.000	4.000
Demand Reduction Value > Customer Load	0.429	0.607	0.000	0.447	1.447	2.447
Capacity Value (MW)	**7.881**	**8.059**	**7.830**	**7.899**	**7.657**	**7.415**
Performance Penalty (MW)	0.119	0.000	0.170	0.101	0.343	0.585
Performance Incentive (MW)	0.000	0.059	0.000	0.000	0.000	0.000
Clearing Price ($/kW-Month)	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00	$ 5.00
Capacity Payment	**$ 39,405**	**$ 40,000**	**$ 39,148**	**$ 39,493**	**$ 38,283**	**$ 37,073**
Performance Incentive Payment*	$ -	$ 295	$ -	$ -	$ -	$ -
Total Payment	**$ 39,405**	**$ 40,295**	**$ 39,148**	**$ 39,493**	**$ 38,283**	**$ 37,073**

FCA#1 Schedule

Dates	Actions
2/28/07	Project Sponsor submits Show of Interest Form for Demand Resources
3/1/07 to 10/1/07	ISO-NE Reviews Show of Interest Forms (Performs Interconnection Analysis for Distributed Generation Projects if required; determines need for additional resources to review Qualification Packages.)
6/15/07	Project Sponsor submits Qualification Package
6/16/07 to 10/1/07	ISO-NE Reviews Qualification Packages
10/1/07	Qualification Letter sent to Project Sponsor

FCA#1 Schedule (Continued)

Dates	Actions
2/1/08	1st Forward Capacity Auction (Exact Auction Date to be determined).
2/6/08 to 5/31/2010	Project Sponsor constructs Demand Resource Project (Projects achieving Commercial Operation before 5/31/2010 may qualify for Transition Payments as an ODR or through the Real-Time Demand Response Program.
6/1/2010	Commitment Period for FCA#1 Begins.

Where can I find the Show of Interest Form?

- Look on www.iso-ne.com under Markets > Other Markets Data > Forward Capacity Market > Qualification

Questions and Discussion