ISO New England Overview and Regional Update on the Growth of Renewables

National Conference of State Legislatures

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ISO New England (ISO) Has Two Decades of Experience Overseeing the Region’s Restructured Electric Power System

• **Regulated by** the Federal Energy Regulatory Commission

• **Reliability coordinator** for New England under the North American Electric Reliability Corporation

• **Independent** of companies in the marketplace and neutral on technology
Reliability Is the Core of ISO New England’s Mission

*Fulfilled by three interconnected and interdependent responsibilities*

- Overseeing the day-to-day operation of New England’s electric power generation and transmission system
- Managing comprehensive regional power system planning
- Developing and administering the region’s competitive wholesale electricity markets
Energy Use Is Growing in New England, But Energy Efficiency Is Slowing the Growth Rate

- **7.1 million** retail electricity customers; **14.7 million** population
- **28,130 MW** all-time summer peak demand set on August 2, 2006
- **22,818 MW** all-time winter peak demand set on January 15, 2004
- Region’s *peak* demand forecasted to grow **1.3%** annually
- Region’s *overall* electricity demand forecasted to grow **1.0%** annually
- Energy efficiency slows the growth in peak demand to **0.7%** annually and flattens the growth in overall electricity demand to **0.1%** annually *

* Growth rates in peak demand and overall electricity demand are also slowed by behind-the-meter solar photovoltaics (PV)
A Range of Generation and Demand Resources Are Used to Meet New England’s Energy Needs

- **350** generators in the region
- **31,000 MW** of generating capacity
- **13,000 MW** of proposed generation
- **4,200 MW** of generation has retired or will retire in the next five years
- **600 MW** of active demand response and **1,700 MW** of energy efficiency with capacity supply obligations
New England Has Seen Dramatic Changes in the Energy Mix

The fuels used to produce the region’s electric energy have shifted as a result of economic and environmental factors.

Percent of Total Electric Energy Production by Fuel Type (2000 vs. 2015)

Source: ISO New England Net Energy and Peak Load by Source

Other renewables include landfill gas, biomass, other biomass gas, wind, solar, municipal solid waste, and miscellaneous fuels.
More Than 4,200 MW of Non-Gas Generation Have Recently Retired or Announced Plans to Retire

- More than 25% of the generating fleet is "at risk" for retirement.
- In December 2012, ISO-NE identified 28 generators "at risk" for retirement (did not include nuclear).
- In one year (2014) 10% of the fleet announced plans to retire by 2017 (FCA #8 – 3,135 MW).
- Major Retirements:
  - Salem Harbor
  - Vermont Yankee
  - Norwalk Harbor
  - Brayton Point
  - Mount Tom
  - Pilgrim Nuclear

- Retired 1997 - 2012
  - Primarily oil, coal and nuclear: 3,200 MW

- In December 2012, ISO-NE identified 28 generators "at risk" for retirement (did not include nuclear):
  - 2,300 Coal
  - 6,000 Oil

- Retired 2013 – 2015 or announced retirements through the FCM for 2016 and beyond:
  - Oil, coal and nuclear: 4,200 MW

- In one year (2014) 10% of the fleet announced plans to retire by 2017 (FCA #8 – 3,135 MW).
State Policy Requirements Drive Proposals for Renewable Energy

State Renewable Portfolio Standard (RPS)*
for Class I or New Renewable Energy by 2020

* State Renewable Portfolio Standards (RPS) promote the development of renewable energy resources by requiring electricity providers (electric distribution companies and competitive suppliers) to serve a minimum percentage of their retail load using renewable energy. Vermont’s new Renewable Energy Standard has a ‘total renewable energy’ requirement (reflected above), which recognizes large-scale hydro and all other classes of renewable energy.
Renewable and EE Resources Are Trending Up

**Wind (MW)**
- Existing: 800
- Proposed: 4,200

**Solar (MW)**
- PV thru 2014: 900
- PV in 2024: 2,400

**Energy Efficiency (MW)**
- EE thru 2014: 1,500
- EE in 2024: 3,600

Nameplate capacity of existing wind resources and proposals in the ISO-NE Generator Interconnection Queue; megawatts (MW).

*2015 ISO-NE Solar PV Forecast*, nameplate capacity, based on state policies.

*2015 CELT Report*, EE through 2014 includes EE resources participating in the Forward Capacity Market (FCM). EE in 2024 includes an ISO-NE forecast of incremental EE beyond the FCM.
Infrastructure Will Be Needed to Deliver Energy from Proposed Resources

All Proposed Generation
Developers are proposing to build 13,000 MW of generation, including nearly 8,200 MW of gas-fired generation and more than 4,200 MW of wind.

- Natural gas 63%
- Wind 33%
- Other 4%

Source: ISO Generator Interconnection Queue (January 2016)
FERC Jurisdictional Proposals Only
ISO New England Forecasts Strong Growth in Solar PV

Cumulative Growth in Solar PV through 2024 (MW*)

Megawatts (MW)

- January 2010: 40
- Thru 2014: 900
- 2024: 2,400

Source: Final PV Forecast (April 2015); Note: MW values are AC nameplate
Solar Power Has a Significant Impact on New England’s Electricity Demand

Solar Power’s Effect on Regional Electricity Demand
May 23, 2015

Megawatts (MW)

1:00 AM  3:00 AM  5:00 AM  7:00 AM  9:00 AM  11:00 AM  1:00 PM  3:00 PM  5:00 PM  7:00 PM  9:00 PM  11:00 PM

Estimated Electricity Needs Served by Solar Power  Demand Without Solar Power  Electricity Demand Seen in Real Time

9,000  9,500  10,000  10,500  11,000  11,500  12,000  12,500  13,000  13,500
Transmission Developers Are Proposing to Move Renewable Energy to New England Load Centers

- As of January 1, 2016, eleven elective transmission projects had been proposed in the ISO Interconnection Queue, totaling more than 7,000 MW of potential transfer capability
  - Primarily large-scale hydro resources from eastern Canada and wind resources from northern New England
- These projects seek to address public policy goals, not reliability needs

Source: ISO Interconnection Queue (January 2016)
http://www.iso-ne.com/system-planning/transmission-planning/interconnection-request-queue
In June, the ISO Released a Discussion Paper on the Capacity Market and a Renewable Energy Future

- Described the magnitude of renewable energy coming onto the system and the interaction of state policies with the region’s wholesale electricity markets

- Discussed the impact of increasing levels of renewable resources (i.e., wind and solar) on other resources participating in the wholesale electricity markets

The Importance of a Performance-Based Capacity Market to Ensure Reliability as the Grid Adapts to a Renewable Energy Future (June 2015)

The Energy and Capacity Markets are Linked; Changes in One Market Will Affect the Other

- Because the resources the states are supporting have **no fuel costs**, they are often dispatched ahead of conventional generation (gas, coal, and oil), putting downward pressure on energy-market prices.

- But this action is **not without consequence**: it will put upward pressure on prices in the capacity market.
What Are the Potential Consequences?

• With increasing levels of renewables, the capacity market will play a key role in ensuring resource adequacy

• The shift in revenues from the energy to the capacity market will affect the resource mix, putting additional financial pressure on energy-market dependent resources like nuclear and coal-fired units
New England States Are Working Together on Energy Infrastructure Challenges

- November 2015: Massachusetts, Connecticut, and Rhode Island release final Request for Proposals (RFP) for clean energy and transmission
- April 2015: Region’s governors meet to discuss their continued work on energy infrastructure challenges at regional energy forum
- February 2015: Massachusetts, Connecticut, and Rhode Island release draft Request for Proposals (RFP) for clean energy and transmission
- January 2014: Governors, through NESCOE, request ISO technical support and tariff filings at FERC to support their objectives to expand energy infrastructure
- December 2013: Region’s governors announce the need for strategic investments in energy resources and infrastructure
Conclusions

- The New England power system is undergoing a rapid transformation
- The ISO has worked with New England stakeholders to integrate renewables into its markets and planning
- The electric grid will look very different in the next five to ten years with grid-connected and distributed resources, and a continued shift toward natural gas and renewable energy
For More Information...

• Subscribe to the **ISO Newswire**
  – **ISO Newswire** is your source for regular news about ISO New England and the wholesale electricity industry within the six-state region

• Log on to **ISO Express**
  – **ISO Express** provides real-time data on New England’s wholesale electricity markets and power system operations

• Follow the ISO on **Twitter**
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Questions