2017 Regional System Plan (RSP17)

2017 Regional System Plan Meeting

Stephen J. Rourke

Vice President, System Planning
Agenda: 2017 Regional System Plan Meeting
Seaport Hotel & Seaport World Trade Center, Boston, MA

11:30 a.m.  Registration
12:00 p.m.  Lunch
12:45 p.m.  Welcoming remarks
1:00  p.m.  **Keynote:** Gina McCarthy, Member of the Connecticut Green Bank Board of Directors and former Administrator of the U.S. Environmental Protection Agency
1:30 p.m.  ISO New England report on **2017 Regional System Plan** and Q&A
2:15 p.m.  Break
2:30 p.m.  **Panel:** Planning for the future hybrid grid: successfully integrating increasing levels of renewable energy, energy storage, and other distributed energy resources
4:00 p.m.  Closing remarks and adjourn
Panel Discussion

• Moderator
  – Paul Levy, ISO New England, Board of Directors

• Panelists
  – Katie Scharf Dykes, Chair, Connecticut Public Utilities Regulatory Authority
  – Chris Root, COO, VELCO
  – Stephen Pike, CEO, Massachusetts Clean Energy Center
  – Nicholas Miller, Senior Technical Director, Energy Consulting, GE Energy
2017 REGIONAL SYSTEM PLAN (RSP17)

RSP17 Process and Summary

Michael I. Henderson
DIRECTOR, REGIONAL PLANNING AND COORDINATION
RSP17 Satisfies Tariff Requirements

- The ISO carries out regional planning with the Planning Advisory Committee (PAC) as part of an open, transparent stakeholder process
- RSP17 reflects the results and findings of the ongoing ISO regional planning process
- RSP17 satisfies all tariff obligations and reports on all activities that satisfy all required planning procedures and criteria
Summary of Key Messages: Successes

• Markets and Planning
  – 20 years of competitive markets and transmission planning and development have significantly enhanced reliability and improved overall market efficiency

• Resource Adequacy
  – New England has the resource base and transmission system needed to meet consumer demand for power

• Transformation of the Grid
  – System is evolving to a cleaner, hybrid grid

• Stakeholder Input
  – The ISO seeks feedback from our stakeholders through an open planning process with the PAC
ISO New England Is Focused on Developing Solutions to Today’s Grid Challenges

• Fuel Security
  – Ensuring adequate fuel for the region’s generators, especially during winter

• Power Plant Retirements
  – Finding new ways to meet peak demand as aging plants close

• Renewable Resource Integration
  – Maintaining reliability as increasing levels of distributed generation and intermittent resources come online
ISO New England is Focused on Developing Solutions to the Region’s Top Reliability Risks

• Resolving fuel security concerns
  – New England is challenged to meet electricity demands with existing fuel infrastructure, particularly during the winter
  – In the absence of new gas infrastructure or adequate use of dual-fuel capability, changes to the market rules may need to be considered to ensure reliability through existing infrastructure and resources

• Ensuring resource adequacy through the competitive markets
  – As resources retire, additional resources will be needed to replace them, and these must be able to perform to ensure flexible, reliable, and economic operation of the system
  – Appropriate price formation is critical to resource retention, investment, and performance incentives
  – As states contract for new sponsored resources, changes will be required to the wholesale market rules to ensure efficient price formation

• Integrating renewable resources
  – Renewable resources provide clean energy but their output is variable
  – The ISO presented results for different megawatt scenarios for the Maine Resource Integration Study (MRIS) and cost estimates for the Cluster Enabling Transmission Upgrades
  – Transmission expansion is needed to connect renewables to demand centers
  – To assure reliability, the region needs fast-responding, flexible capacity resources that are not constrained in their operation
The Region is Addressing the Fuel-Security Issue

Short-term mitigation measures are in place, and long-term solutions are under consideration

**Short Term**
- Modifications to the day-ahead and real-time markets
- Procurement of additional reserves
- Improved coordination and communication among the ISO, generating units, and natural gas pipelines
- Energy market offer-flexibility enhancements
- Winter reliability program incentives resources to secure fuel (oil and liquefied natural gas) or demand resources ahead of the 2017/2018 winter season

**Additional and Long Term**
- Existing and new dual-fuel generator capability with adequate fuel storage
- Transmission additions to neighboring systems that provide access to diversified resources
- Increased use of wind and solar resources
- Greater efficiency gains in natural gas and electricity use
- Revisions to the wholesale market rules
Energy Efficiency and Behind-the-Meter Solar Reduce Peak Demand and Annual Energy Use

The gross peak and load forecast

The gross peak and load forecast minus forecasted “behind-the-meter” (BTM) solar PV resources

The gross peak and load forecast minus forecasted BTM solar PV, minus energy-efficiency (EE) resources in the Forward Capacity Market 2017–2020 and forecasted EE 2021–2026

Note: Summer peak demand is based on the “90/10” forecast, which accounts for the possibility of extreme summer weather (temperatures of about 94°F).

Resource Adequacy Criteria Met by Competitive Markets

• Retirements drive the need for new resources, and the Forward Capacity Market attracts new resources
  – Forward Capacity Auction #10 (FCA #10) and FCA #11 procured sufficient system resources to meet resource adequacy criteria, regionally and in import-constrained zones

• The most reliable and economic place for resource development remains in southern New England near load centers
  – New economic resources reduce congestion and the need for transmission development
  – Repowered generation at brownfield sites are favorably located and able to lock into FCA clearing prices for up to seven years
  – Fast-start resources near load centers in Greater Southwest Connecticut, Greater Connecticut, and Boston provide flexibility as procured through the Forward Reserve Market
Integrating Renewable Resources

- Economic studies have identified key issues with different resource futures for the region
  - Large-scale development of wind resources in Maine requires considerable transmission expansion to serve demand in southern New England
  - Southeastern Massachusetts offshore wind resources will require less transmission but are expensive to build

- The ISO is facilitating the addition of wind resources in northern New England through cluster studies and strategic transmission analysis, although overall transmission costs may remain a barrier to wind development in Maine
  - Major transmission infrastructure will also be required to access additional Canadian hydro

- Market enhancements will help New England as it transitions from a capacity-limited to an energy-limited system
  - Appropriate price formation is critical to resource retention, investment, and performance incentives
Large-Scale Development of Distributed Energy Resources Presents Challenges

- Storage, microgrids, and distributed generation may provide local reliability and flexibility
- Issues of observability, controllability, and infrastructure improvements must be addressed for the hybrid grid
- Proliferation of inverter-based resources (solar, wind, batteries) will require attention to interconnection standards and analysis of declining system inertia
  - Current voltage and frequency ride-through characteristics can be problematic for the system
  - Physical problems exacerbated by energy efficiency (EE) by increasing exposure to light load conditions
- Revisions to the IEEE 1547 standard for interconnecting distributed energy resources have been proposed
  - Implementation of the revised standard will improve system reliability and allow for increased development of distributed energy resources
  - The states and distribution companies are strongly urged to implement the revised IEEE 1547 standard, once adopted
Environmental Issues

• Regional and state environmental regulations likely have a greater potential impact on generating units in the region than national environmental requirements

• Existing and potential new environmental regulations will continue to affect the region’s generators
  – Over the past decade, average and marginal emissions rates have declined, in part due to the region’s increased use of natural gas
  – Compliance could lead to higher operating costs, reduced capacity, or reduced energy production
  – Additional capital improvements and resource retirements
  – Increased use of natural-gas-fired generation is likely
  – Relicensing of nuclear and hydro facilities could reduce output and flexibility
Key Transmission Planning Study Areas in New England

- NH/VT: New Hampshire and Vermont
- P&G: Pittsfield and Greenfield
- Western & Central MA: Western and Central Massachusetts (Includes P&G)
- GHCC: Greater Hartford
- SWCT: Southwest Connecticut
- ECT: Eastern Connecticut
- SEMA/RI: Southeastern Massachusetts and Rhode Island
- ME: Maine
- Greater Boston

[Map Diagram of New England showing study areas with labels for each region.]
Recent and Upcoming Changes in Long-Term Transmission Planning Assumptions and Criteria

• Criteria and assumptions used in long-term reliability assessments changed significantly
  – Planning Procedure No. 3, Reliability Standard for the New England Area Pool Transmission Facilities, now reflects the evolution of the NERC transmission planning standards
  – Probabilistic planning was incorporated for selecting generator dispatch
  – Material changes were made to the ISO’s planning process to account for FERC Order 1000
  – Transmission Planning Criteria and Assumptions were updated

• Incorporation of the above changes will likely result in fewer identified or delayed transmission system needs
Meeting Future Transmission System Needs

• Approximately $4B of new transmission upgrades is reported in RSP17
  – Many of these are in siting or under construction
• The need for reliability-based transmission upgrades is changing
  – Steady-state studies of peak demand indicate an expected decline in the need for additional reliability-based transmission
  – Generator retirements and studies reviewing system performance, which account for the integration of nonsynchronous resources and improved load modeling, may drive the need for additional reliability-based transmission upgrades
  – Aging infrastructure will likely require replacement
• Needs assessments showed market-efficiency transmission upgrades are not required
• A process has been implemented for “Planning for Public Policy” under Order 1000
Planning Activities Are Closely Coordinated with Neighboring Systems

• ISO-NE, NYISO, and PJM successfully implemented the Northeastern ISO/RTO Planning Protocol
• ISO-NE participates in the NPCC, NERC, and Eastern Interconnection Planning Collaborative (EIPC)
• New elective transmission upgrades that will form new ties between New England and Canada or New York are in various stages of study and development
• ISO-NE coordinates activities with the US Department of Energy, the EIPC, and ISO/RTO Council
Summary: Meeting Regional Challenges

• The planning process continues to evolve

• The need of future regional electrical power system infrastructure is driven by:
  – Mandatory national and regional reliability criteria
  – Low growth of net demand that accounts for EE and PV
  – Aging infrastructure
  – Resource retirements
  – Public policies
  – The large-scale addition of inverter-based resources

• Southern New England is a good place for developing new resources because of the proximity to load, transmission, and retiring resources

• The region has made progress addressing reliability concerns, but fuel security remains an issue
Summary: Meeting Regional Challenges, cont.

• Successfully integrating variable resources poses challenges the region is addressing
• As states contract for new resources, the wholesale market rules will need to be revised to ensure efficient price formation
• Transmission projects provide reliability, market efficiency, and environmental benefits, and additional projects are progressing throughout the region
• Interregional planning is increasingly important, and new ties are in various stages of study and development
• Stakeholders provide vital input to the ISO’s planning process
Special Thanks To:
The Planning Advisory Committee and all stakeholders involved in the development of the 2017 Regional System Plan
Questions