

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

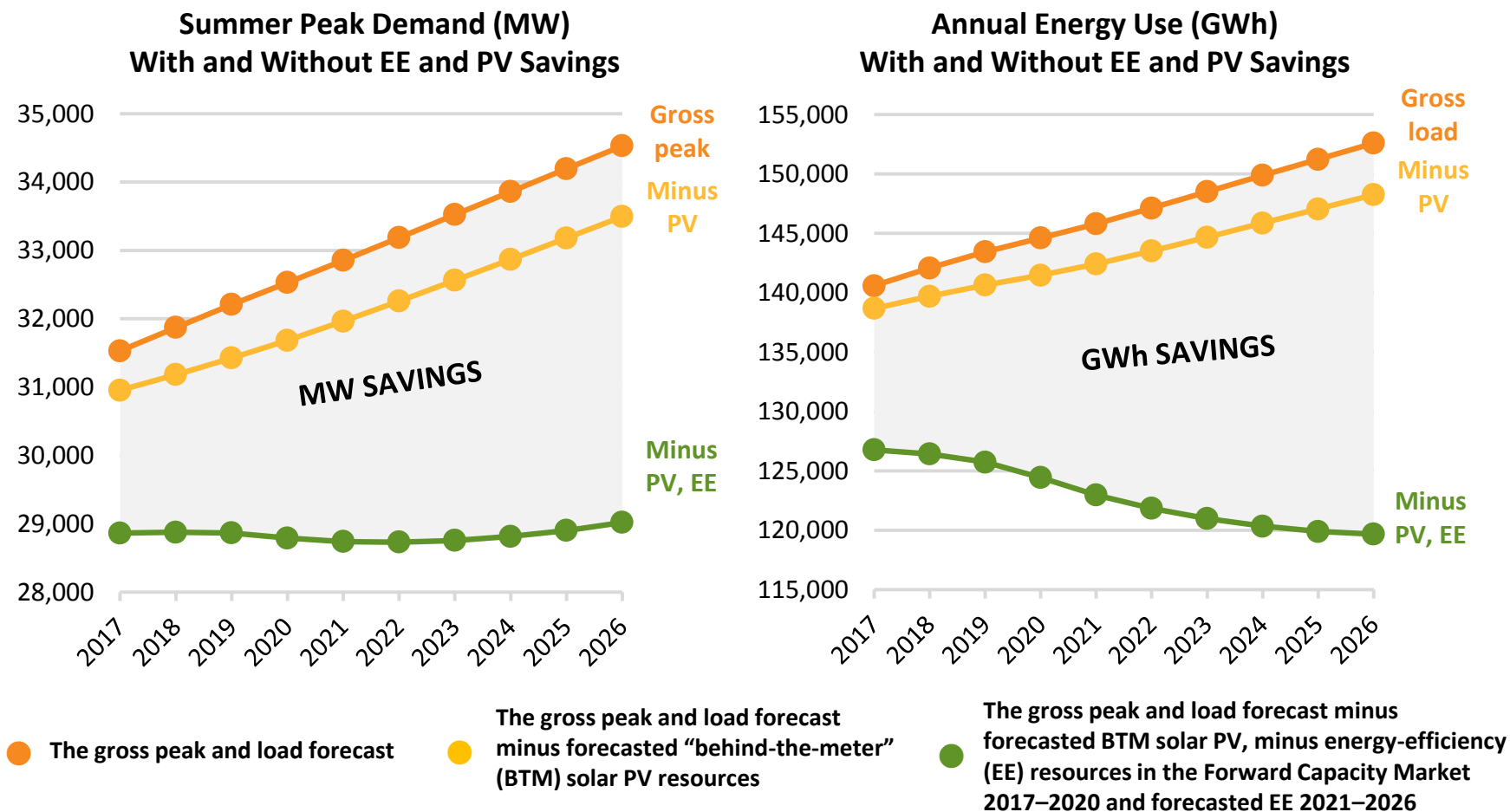
Short Term

- 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 incents 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



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).
 Source: [Final ISO New England Energy-Efficiency Forecast 2021-2026](#) and [Final 2017 Solar PV Forecast](#) (May 2017)

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

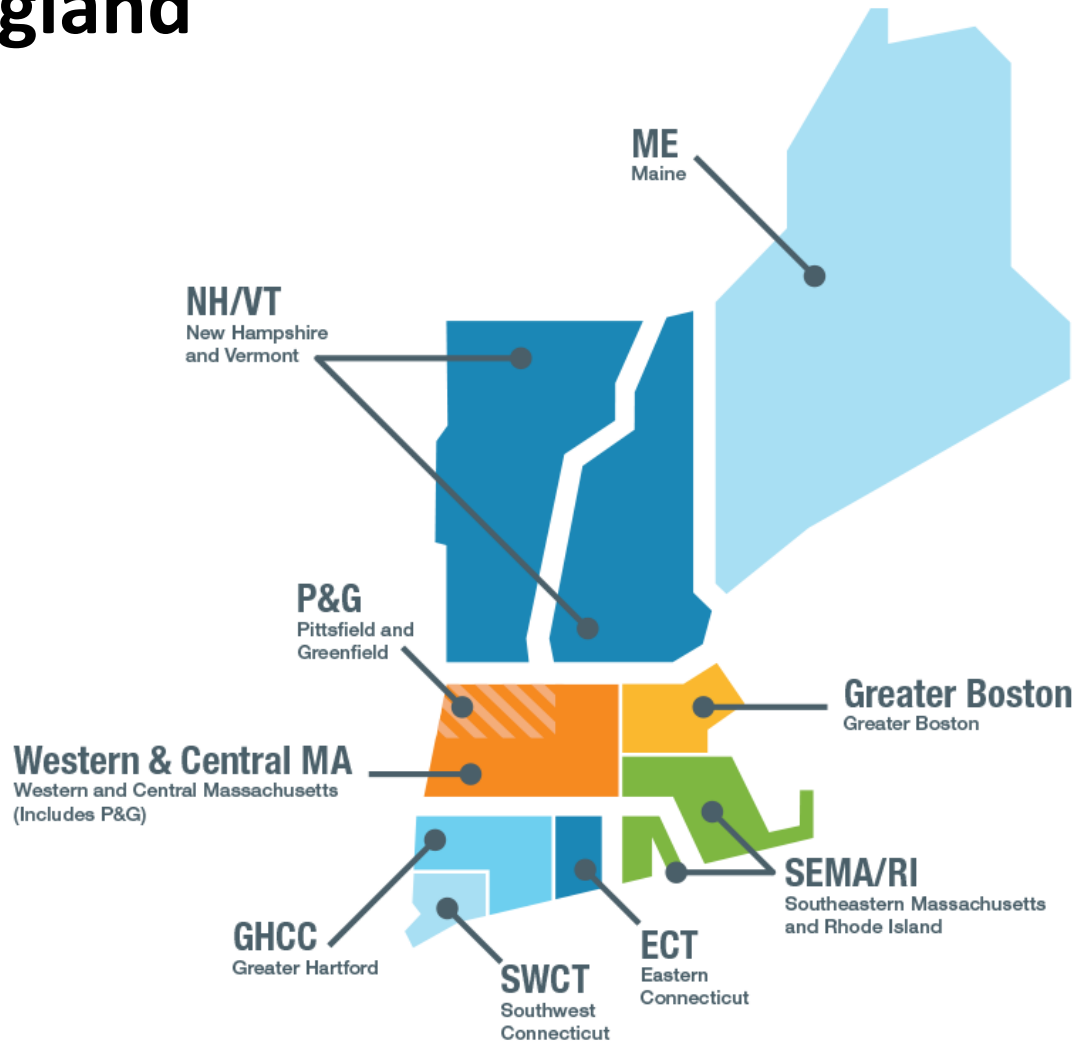
Large-Scale Development of Distributed Energy Resources Presents Challenges

- 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



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

