

2015 Regional System Plan (RSP15)

2015 Regional System Plan Meeting



Stephen J. Rourke

VICE PRESIDENT, SYSTEM PLANNING



Agenda: 2015 Regional System Plan Meeting

Seaport Hotel & Seaport World Trade Center, Boston, MA

- 11:00 a.m. Registration
- 11:30 a.m. Lunch
- 12:15 p.m. Welcoming remarks
- 12:30 p.m. **Keynote:** Massachusetts Governor Charlie Baker
- 1:00 p.m. ISO New England report on **2015 Regional System Plan** and Q&A
- 2:00 p.m. Break
- 2:30 p.m. **Panel:** Public Policy and Economically Efficient Outcomes: How can the region achieve both goals?
- 4:00 p.m. Closing remarks and adjourn



Panel Discussion: Public Policy and Economically Efficient Outcomes: How can the region achieve both?

- Moderator
 - **Chris Wilson**, ISO New England, Board of Directors
- Panelists
 - **Katie Scharf Dykes**, Deputy Commissioner for Energy Connecticut Department of Energy and Environmental Protection
 - **Bob Hayes**, Vice President – Natural Gas Trading Calpine Corporation
 - **Edward Krapels**, Founder and Director Anbaric Transmission
 - **Tanya Bodell**, Executive Director Energyzt



2015 Regional System Plan (RSP15)

Process and Summary

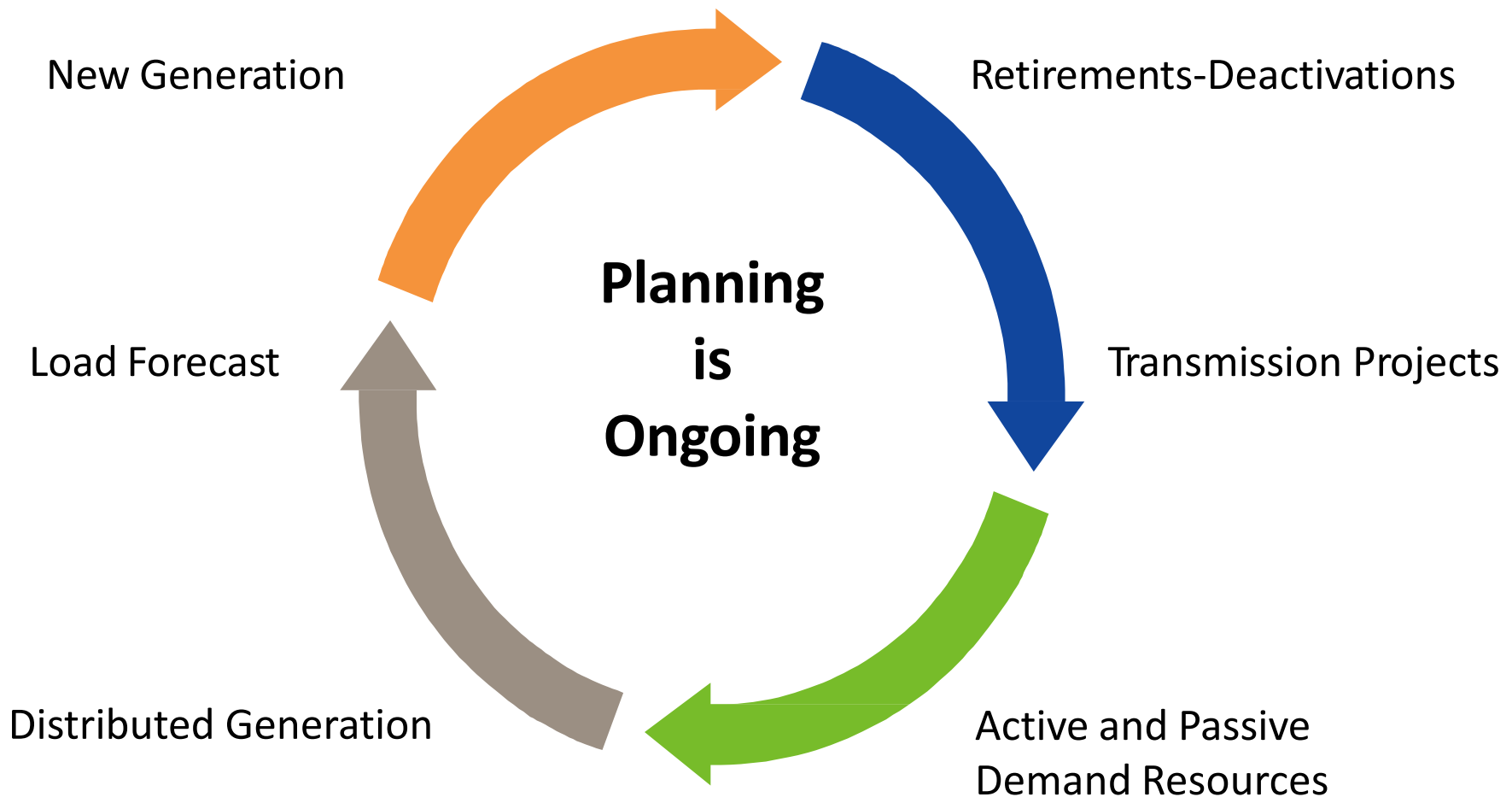


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ISO New England System Planning Process



Planning Process: Objectives and Overview

Objectives

- Meet reliability criteria
- Provide opportunities for market solutions
 - e.g., generation, demand-side measures, and elective or merchant transmission
- Provide a regulated transmission plan as a backstop for identified reliability needs
 - Can be modified based on market solutions that develop

Overview

- Summarizes system planning activities and updates RSP14
- Presents system needs over a 10-year horizon
- Summarizes information on the amounts, types, and locations of resources required to meet future system needs
- Provides status of transmission projects in the plan throughout the year, consistent with national, regional, and ISO New England requirements
- Summarizes interregional planning activities



RSP15 Satisfies Tariff Requirements

- The ISO carries out regional planning with the Planning Advisory Committee (PAC) as part of an open, transparent stakeholder process
- RSP15 reflects the results and findings of the ongoing ISO regional planning process for 2015
- RSP15 meets all required planning procedures and criteria
 - North American Electric Reliability Corporation
 - Northeast Power Coordinating Council
 - ISO New England



Meeting FERC Order 1000 Requirements

- Changes are underway!
 - Competitive process to determine longer-term transmission infrastructure projects
 - Transmission projects for meeting public policy objectives
 - Build on the interregional planning process and change interregional cost allocation for transmission projects

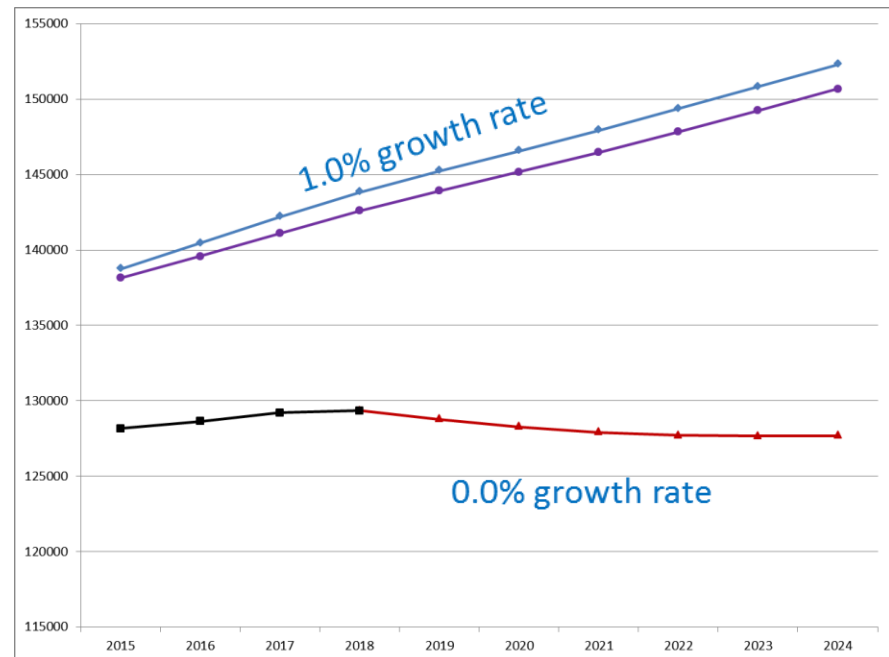
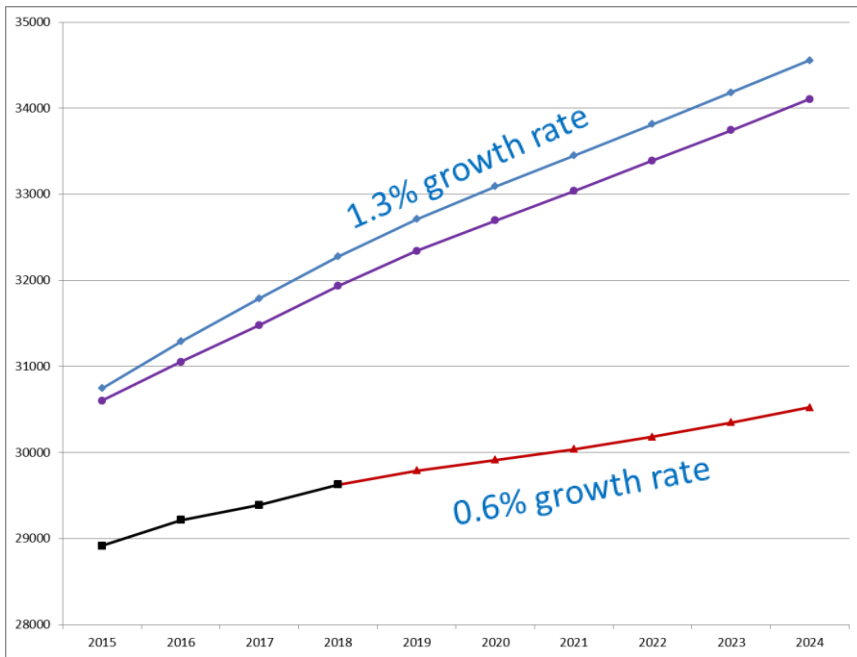


Photovoltaic and Energy-Efficiency Investments Reduce Demand

Net peak demand growth is over 50% lower; net energy use is flat

New England: Summer 90/10 Peak (MW)

New England: Annual Energy Use (GWh)



— RSP15 — RSP15-PV — RSP15-PV-FCM-EEF — RSP15-PV-FCM



Forecasts of Region's Annual and Peak Use

- The net summer and winter peak forecasts and the annual energy use forecast have been reduced to fully reflect the energy efficiency (EE) and photovoltaic (PV) forecasts
 - The gross annual growth rates are 1.3% for the summer peak, 0.7% for the winter peak, and 1.0% for annual energy use
 - The gross forecast accounts for historical naturally occurring EE, federal appliance standards, and behind-the-meter distributed generation (DG)
 - The net forecast fully accounts for the rapid growth of behind-the-meter PV
 - The forecasted annual average savings from EE for total energy use from 2015 through 2024 is 210 MW/year for peak load and 1,443 GWh/year
 - The net peak load grows annually at 0.6% during the summer and net energy grows at 0%
 - The winter peak is decreasing at 0.1% annually



Final 2015 PV Forecast

Nameplate (MW_{ac})

States	Annual Total MW (AC nameplate rating)											Totals
	Thru 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
CT	118.8	70.9	89.9	45.8	43.1	40.4	40.4	26.9	26.9	26.9	26.9	556.8
MA	666.8	197.0	229.8	51.4	48.4	45.4	45.4	30.2	30.2	30.2	30.2	1,405.1
ME	10.4	2.2	2.2	2.0	1.8	1.7	1.7	1.7	1.7	1.7	1.7	28.9
NH	12.7	4.3	4.3	3.8	3.6	3.4	3.4	2.3	2.3	2.3	2.3	44.4
RI	18.2	9.7	20.4	27.2	31.0	29.0	20.6	7.1	5.4	5.4	5.4	179.3
VT	81.9	40.4	40.4	22.3	13.9	6.3	6.3	6.3	6.3	6.3	4.2	234.7
Regional - Annual (MW)	908.8	324.3	386.9	152.4	141.7	126.2	117.8	74.6	72.9	72.9	70.8	2,449.1
Regional - Cumulative (MW)	908.8	1233.1	1620.0	1772.4	1914.1	2040.3	2158.1	2232.6	2305.5	2378.4	2449.1	2,449.1

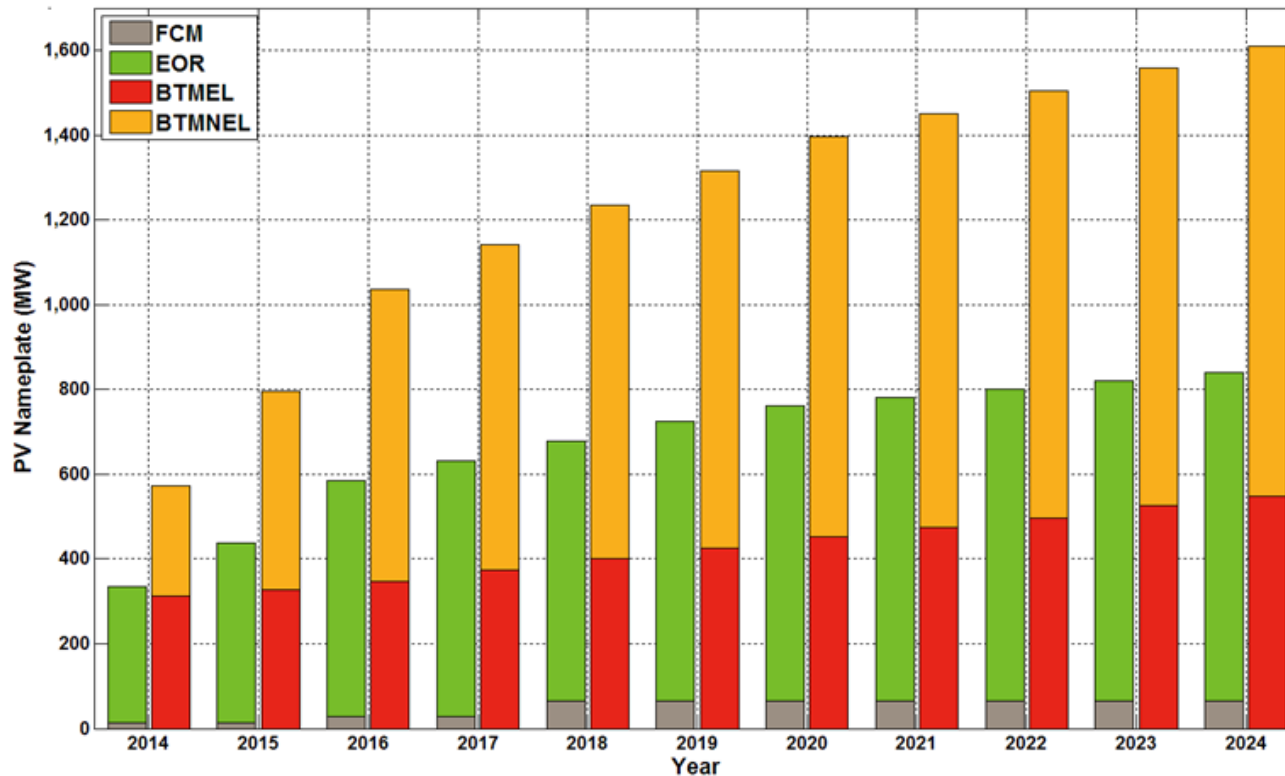
Notes:

- (1) Forecast values include FCM resources, non-FCM energy-only generators, and behind-the-meter PV resources
- (2) All values represent end-of-year installed capacities
- (3) ISO worked with stakeholders to determine the appropriate use of the forecast



ISO-NE's Interim Distributed Generation Forecast Predicts Steady Growth in Solar PV through 2024

Behind-the-Meter Not Embedded Load PV Reduces the Gross Load Forecast



Distributed Resources in the Planning Process

Already in use; issues being resolved

- RSP studies account for load reductions due to:
 - Forward Capacity Market (FCM) passive and active demand resources
 - The EE forecast
 - DG as either resources or as reductions in demand embedded in historical load trends
- Use the EE and PV forecasts in:
 - Economic studies
 - Transmission planning studies
 - Resource adequacy studies, including Forward Capacity Auction #10 (FCA10)
- Improve the net demand forecast used by system operations
 - Continue analyzing the potential impacts of growing DG on system operations, including ramping, reserve, and regulation requirements
- Enhance the PV planning forecast and continue monitoring the growth of other types of DG
- Work to improve interconnection standards through IEEE and the states



Supply and Demand Options Help Meet Needs

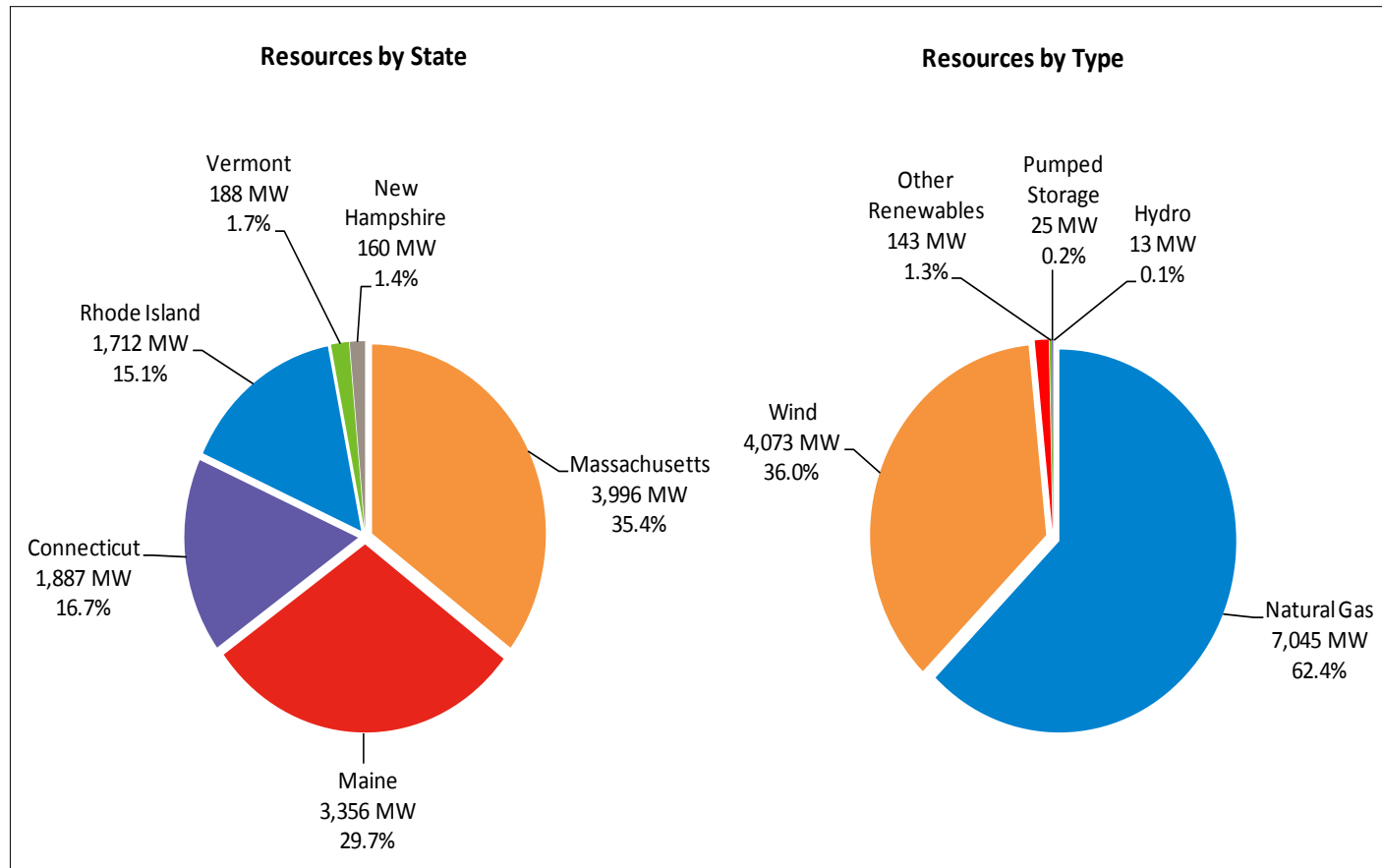
Region requires sufficient quantities of supply and demand resources

- The wholesale markets are providing needed resources
 - FCA9 attracted 1,060 MW of new generation resources and 367 MW of new demand resources
- Assuming all FCA9 resources remain in service, regional projections show sufficient resources through 2023
 - Up to 2,712 MW of OP 4 actions could be required over the planning horizon
- Additional retirements would accelerate resource needs
 - FCM resources will be procured in FCA10 and in the annual reconfiguration auctions, if needed
- Fast-start resources, in-merit generation, and transmission system improvements are satisfying the operating-reserve requirements of major load pockets
 - Further infrastructure development in Greater Southwest Connecticut, Greater Connecticut, Boston, and SEMA/RI benefits system performance



Natural Gas and Wind Remain the Dominant Fuels in the ISO Generation Interconnection Queue

A mix of these resources, distributed resources, and energy efficiency are projected to meet future system needs, even with retirements



RSP15 Provides Information on the Locations and Types of Needed Resources

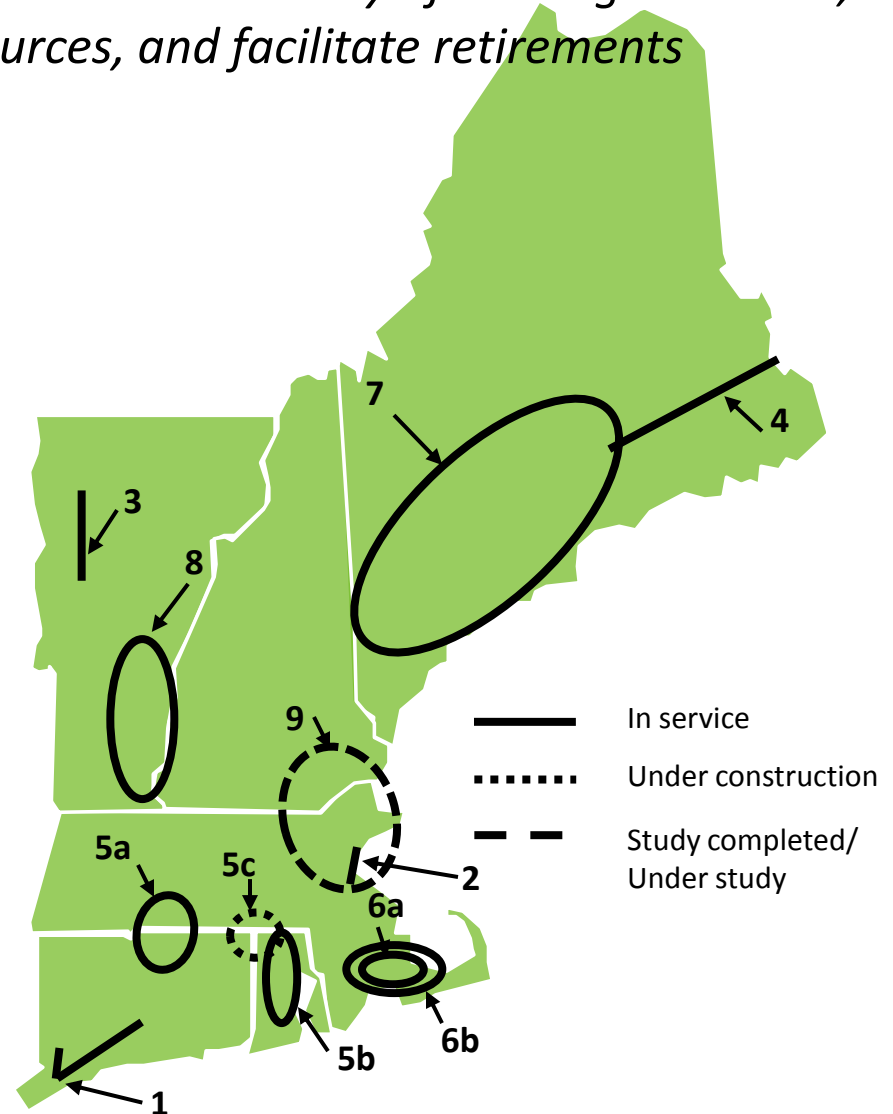
- NEMA/Boston/SEMA/RI is the best place for new resource development as shown by
 - Recent FCA results
 - Identified as a single import zone for FCA10
 - Market Resource Alternative Analysis
- Economic studies summarize scenario analyses
 - Identify potential transmission constraints and the effects of relieving those constraints
 - Show the most-suitable locations for developing various types of resources without causing congestion and the least-suitable locations for unit retirements
 - Indicate the effects of specific higher loss-of-source limits in New England and wind development
- The ISO provides critical load levels as part of transmission needs analyses



Transmission Development

Regional transmission projects will improve deliverability of existing resources, provide flexibility for locating new resources, and facilitate retirements

1. Southwest CT Reliability Project, Phases 1 & 2
2. Boston 345 kV Transmission Reliability Project, Phases 1 & 2
3. Northwest Vermont Reliability Project
4. Northeast Reliability Interconnection Project
5. New England East-West Solution
 - a. Greater Springfield components
 - b. Rhode Island components
 - c. Interstate Reliability Project
6. Southeast Massachusetts
 - a. Short-term Lower SEMA upgrades
 - b. Long-term Lower SEMA Project
7. Maine Power Reliability Program
8. Vermont Southern Loop
9. Greater Boston upgrades



Interregional Planning and Coordination Activities

U.S. Department
of Energy Studies

Eastern
Interconnection
Planning
Collaborative (EIPC)

Electric Reliability
Organization (ERO)

Northeast Power
Coordinating
Council (NPCC)

ISO/RTO Council
(IRC)

Northeastern
ISO/RTO Planning
Coordination
Protocol



ISO New England Is Focused on Developing Solutions to the Region's Top Reliability Risks

Reliability requires a flexible, high-performance fleet:

- Natural Gas Dependency
 - “Just-in-time” fuel delivery presents an immediate risk to reliability
- Power Plant Retirements
 - New England will need to meet peak demand as aging plants close
- Renewable Resource Integration
 - Balancing variable generation with reliability will require changes in system operations



The Region is Addressing the Fuel-Certainty Issue

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

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
- Expanded winter reliability program includes liquefied natural gas and dual-fuel conversions

Additional and Long-term

- Natural gas pipeline expansion
- Firm natural gas contracts, including liquefied natural gas contracts
- Existing and new dual-fuel generator capability with adequate fuel storage
- Transmission additions to Canada that provide access to diversified resources
- Increased use of wind and solar resources
- Greater efficiency gains in use of natural gas and electricity



Environmental Issues and Renewable Integration

- Existing and upcoming 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
 - Higher operating costs, reduced capacity or 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
- Public policy and regulation are driving the development of renewable resources, EE, and DG
- Expanded interconnections with Canada could provide access to hydro resources and diversify the supply
- The successful integration of variable energy resources continues posing challenges that the region is working to overcome



Meeting the Challenge of Integrating Variable Resources

- New wind projects that interconnect to weak portions of the system are at risk of curtailment unless the transmission system is expanded
- To facilitate operations and planning, the ISO:
 - Began incorporating wind forecasting into ISO processes, scheduling, and dispatch services
 - Implemented an improved process for Elective Transmission Upgrades
 - Is working with regional stakeholders to improve interconnection processes and procedures
- DG, especially PV, presents challenges that are also being addressed
 - Observability, controllability, and interconnection issues



Strategic Transmission Analysis and Economic Studies

Studies have assessed potential transmission issues with retirements and wind development in the region

At-Risk Unit Retirements



Integration of Variable Resources



Summary: Meeting Regional Challenges

- The planning process reflects the use of the PV forecast and is changing as a result of FERC Order 1000
- The need of future regional electrical power system infrastructure is driven by:
 - Low growth of net demand that accounts for EE and PV
 - Resource retirements
 - Public policies
 - Use of advanced technologies
- The most reliable and efficient place for developing new resources is the NEMA/SEMA/RI area
- Fuel assurance remains a key issue, but the region has made progress addressing reliability concerns



Summary: Meeting Regional Challenges, cont.

- Successfully integrating variable resources poses challenges that are being addressed by the region
- 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 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
*2015 Regional System Plan***



Questions

