



ISO New England Overview and Regional Update

*Rhode Island Senate Committee on Environment and Agriculture
and Senate Committee on Commerce Joint Hearing*

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About ISO New England

- **Regulated by** the Federal Energy Regulatory Commission (FERC)
- **Reliability coordinator** for New England under the North American Electric Reliability Corporation (NERC)
- Nearly two decades of experience **overseeing** New England's restructured electric power system
- **Independent** of companies doing business in the marketplace



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

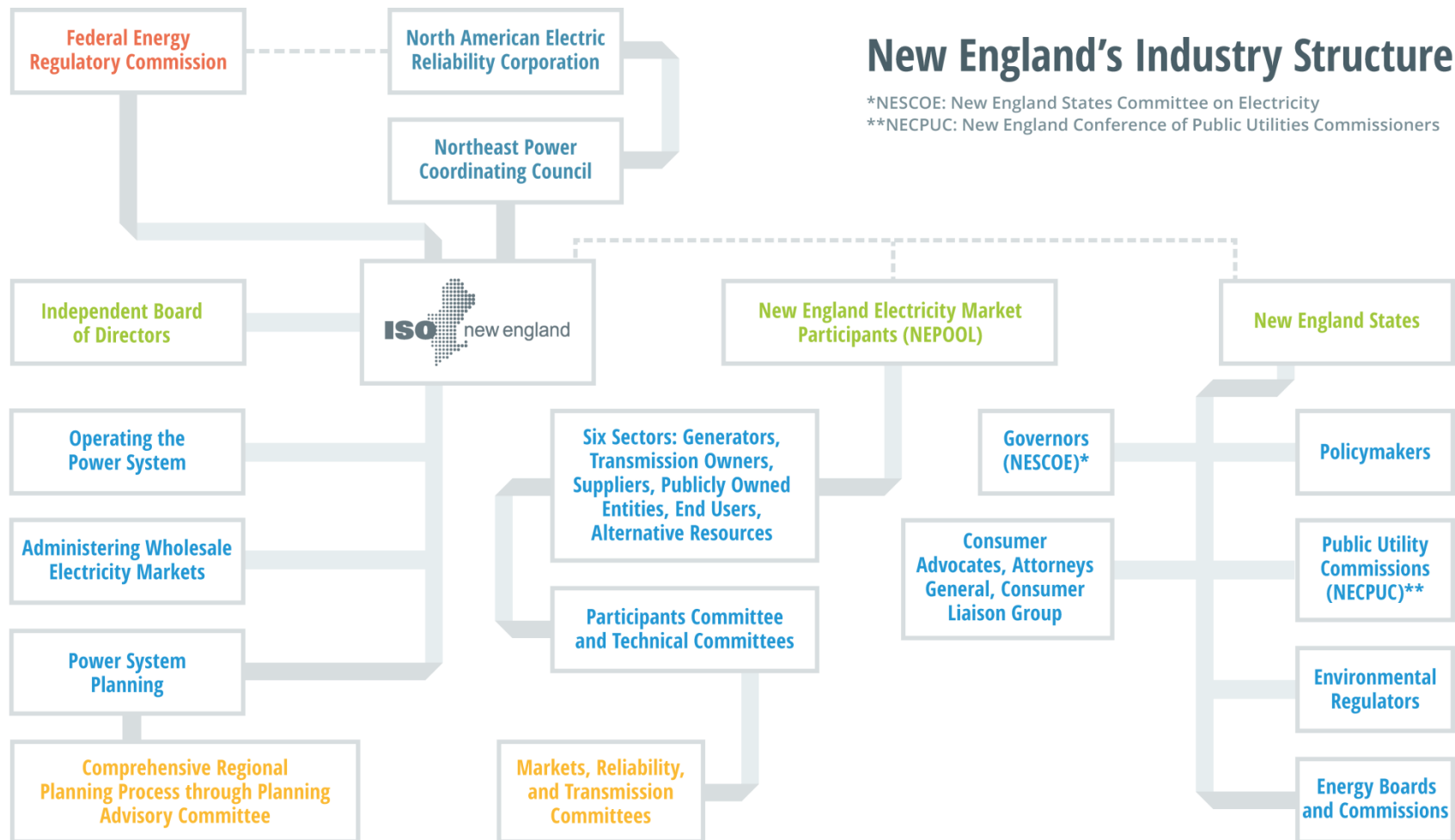
Managing
comprehensive
regional power
system planning

Developing and
administering the region's
competitive **wholesale
electricity markets**



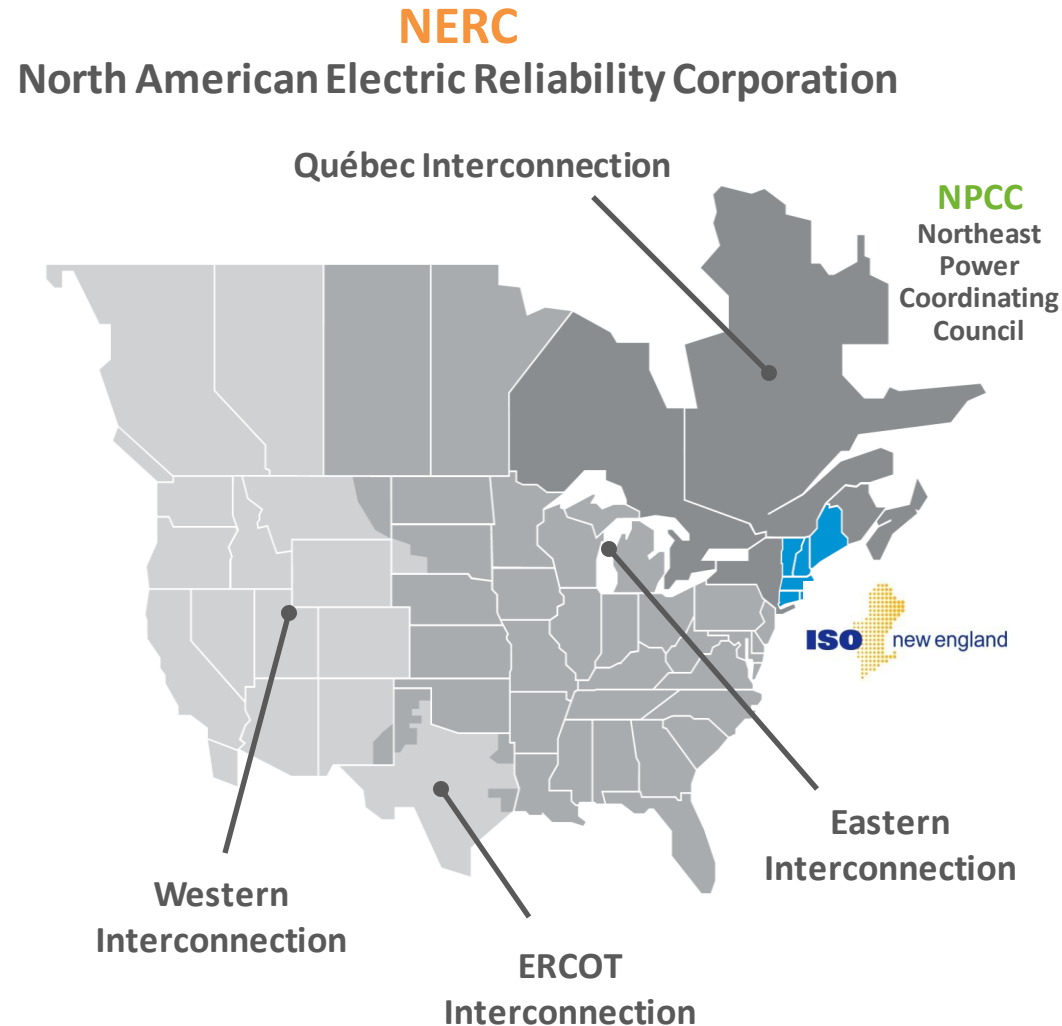
Federal Entities and an Independent Board Provide Oversight of ISO's Responsibilities

Robust stakeholder process for states and market participants informs ISO-NE



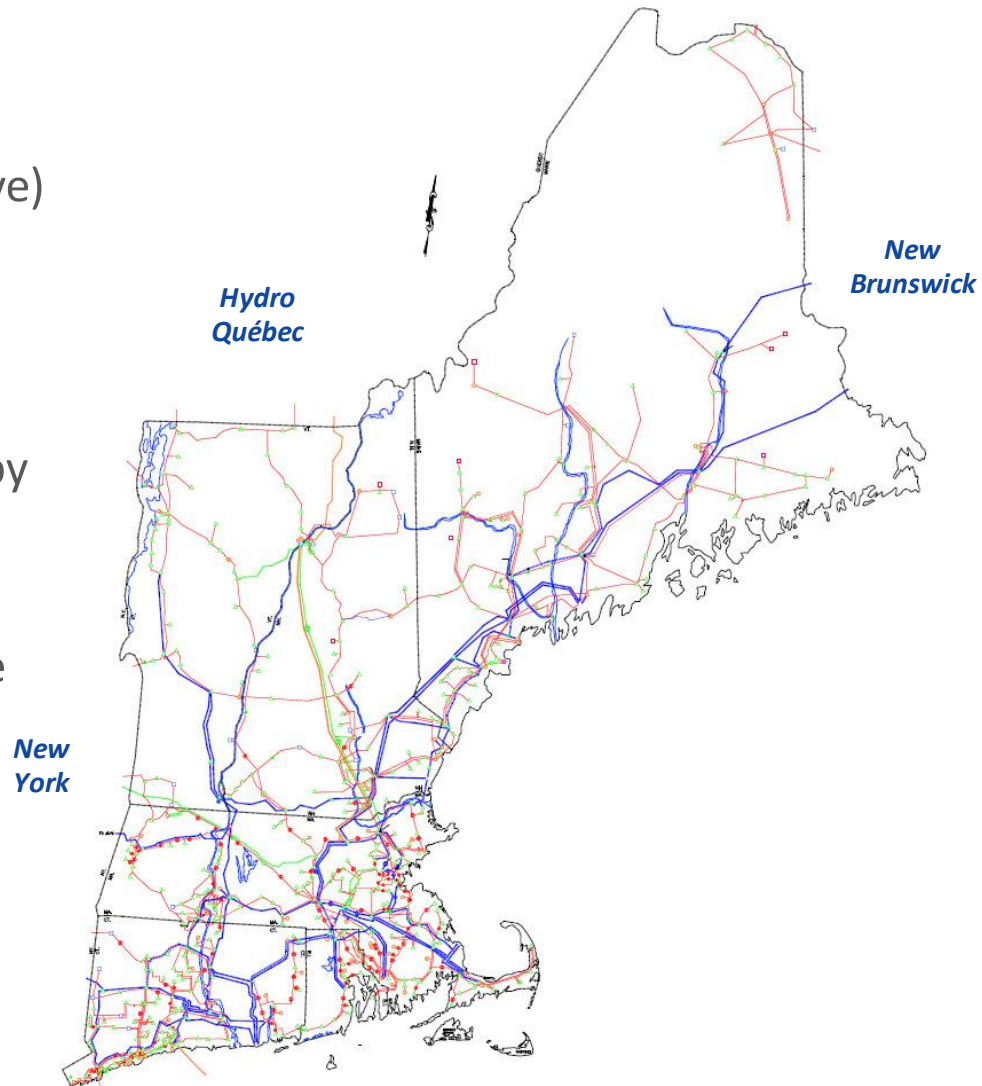
ISO New England is Part of a Larger Electric Power System

- Eastern Interconnection spans from Rocky Mountains to East Coast and Canadian Maritimes
 - Primarily alternating-current (AC) transmission
 - New England linked to rest of Eastern Interconnection via transmission ties to New York and New Brunswick
- Tied to Quebec only through direct-current (DC) transmission
- 2003 Blackout ushered in wide-area monitoring and mandatory reliability standards



New England's Transmission Grid at a Glance

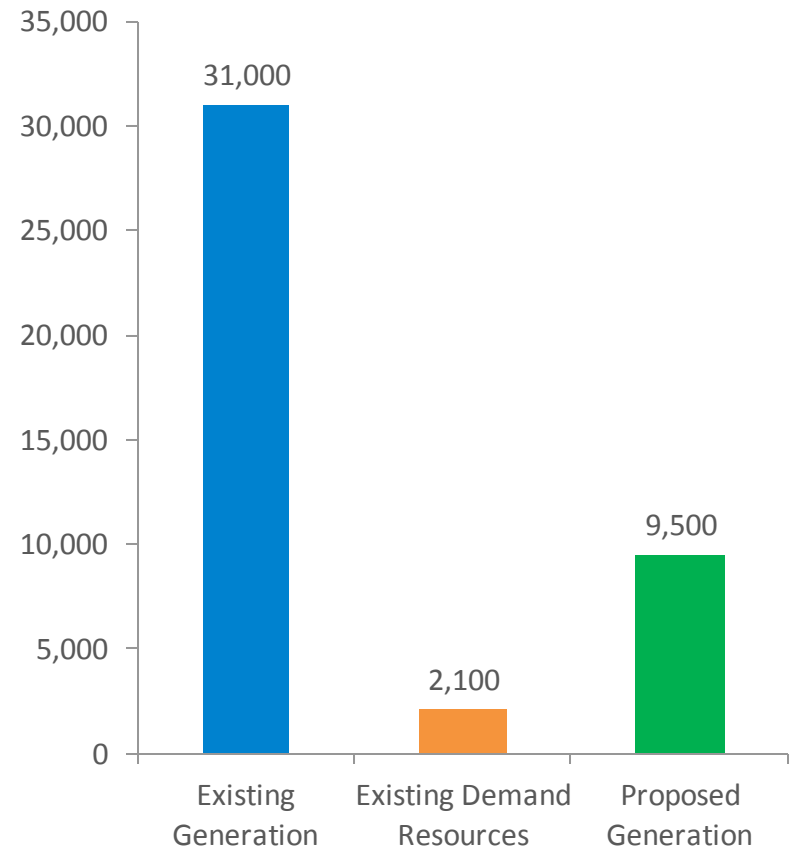
- **8,500 miles** of high-voltage transmission lines (115 kV and above)
- **13 transmission interconnections** to power systems in New York and Eastern Canada
- **16%** of region's energy needs met by imports in 2014
- **\$7 billion** invested to strengthen transmission system reliability since 2002; **\$4.5 billion** planned
- Developers propose multiple transmission projects to access non-carbon-emitting resources



New England's Generation and Demand Resources at a Glance

- **350** generators in the region
- **31,000 MW** of generating capacity
- **9,500 MW** of proposed generation
- **3,500 MW** of generation capacity retiring over the next five years
- **700 MW** of active demand response and **1,400 MW** of energy efficiency with capacity supply obligations

Existing and Future Resources (MW)



ISO New England's Strategic Planning Initiative

Focused on developing solutions to the region's top reliability risks

Reliability requires a flexible, high-performance fleet:

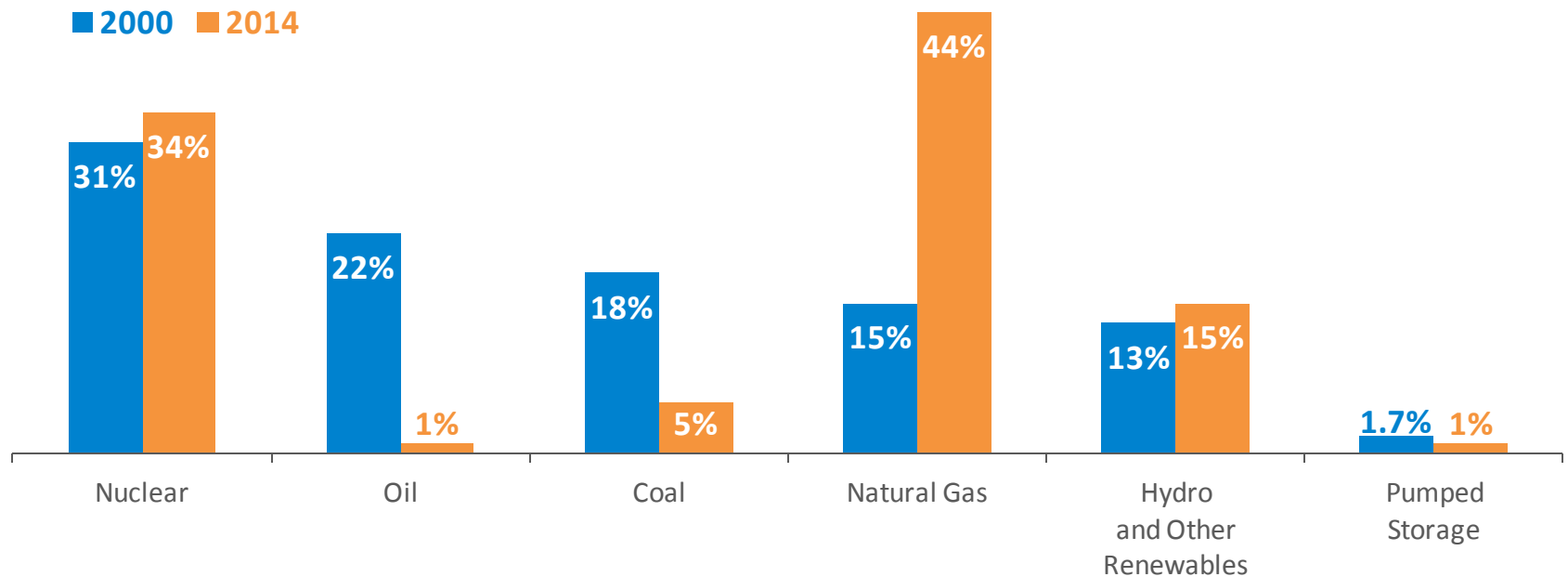
- Natural Gas Dependency
 - “Just-in-time” fuel delivery presents an immediate risk to reliability
- Power Plant Retirements
 - New England will need new ways to meet peak demand as aging plants close
- Renewable Resource Integration
 - Balancing variable generation with reliability will require changes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



Dramatic Changes in the Energy Mix

The fuels used to produce New England's electric energy have shifted as a result of economic and environmental factors

Percent of Total **Electric Energy** Production by Fuel Type
(2000 vs. 2014)



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

Power Plant Emissions have Declined with Changes in the Fuel Mix

Reduction in Aggregate Emissions (ktons/yr)

Year	NO _x	SO ₂	CO ₂
2001	59.73	200.01	52,991
2013	20.32	18.04	40,901
% Reduction, 2001–2013	↓ 66%	↓ 91%	↓ 23%

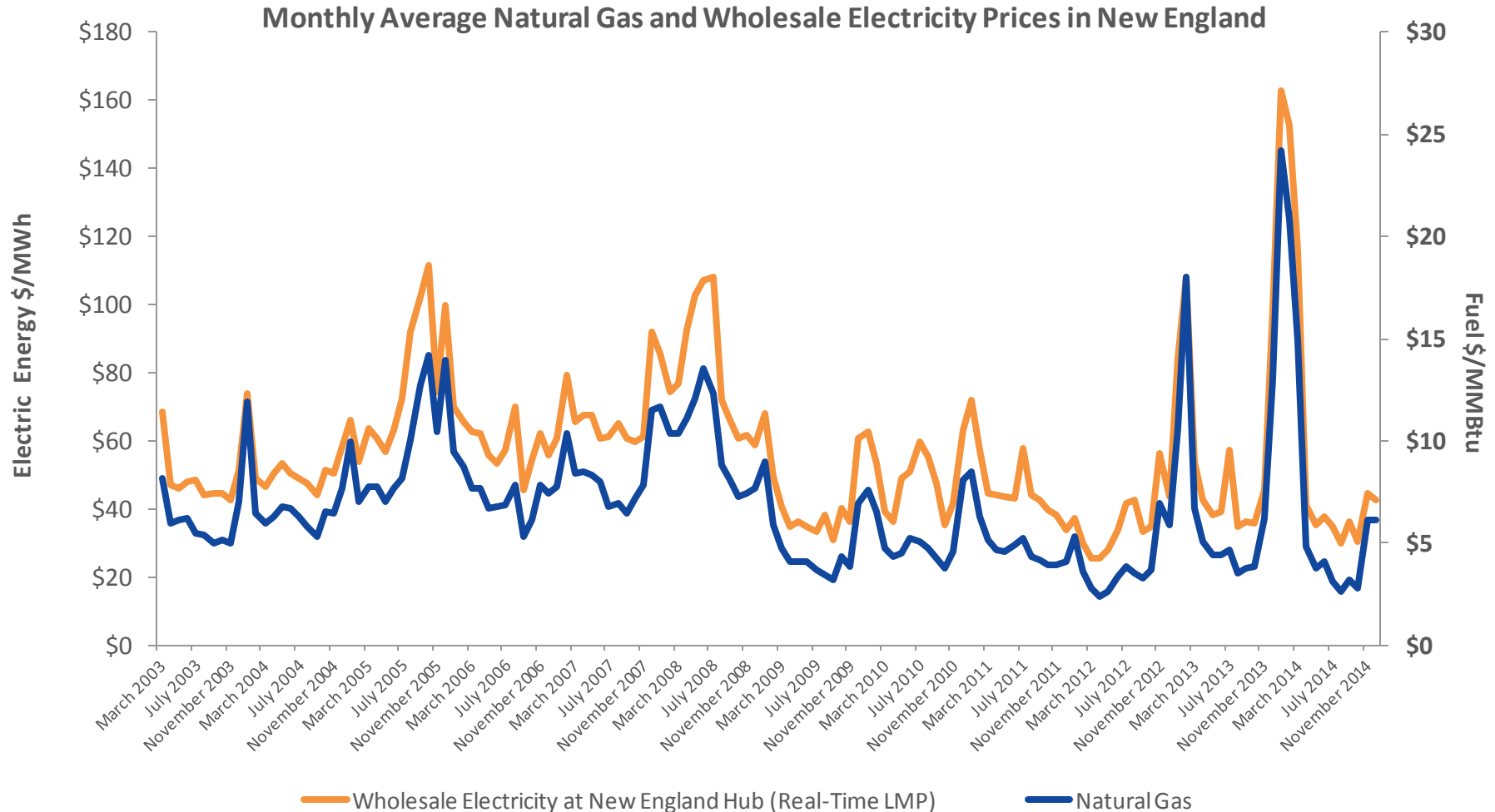
Reduction in Average Emission Rates (lb/MWh)

Year	NO _x	SO ₂	CO ₂
1999	1.36	4.52	1,009
2013	0.36	0.32	730
% Reduction, 1999–2013	↓ 74%	↓ 93%	↓ 28%

Source: [2013 ISO New England Electric Generator Air Emissions Report](#), December 2014

Natural Gas and Wholesale Electricity Prices Are Linked

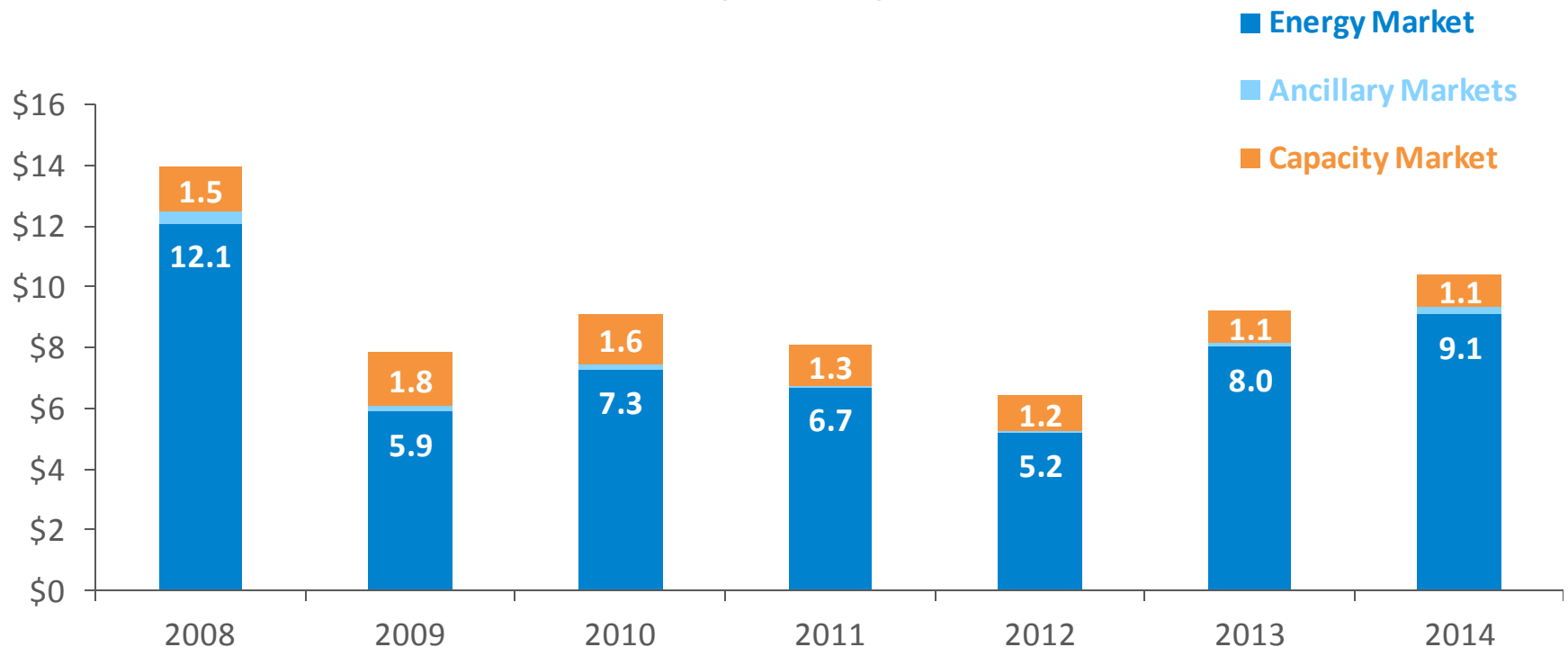
Because of New England's heavy reliance on natural gas as a fuel source, natural gas typically sets the price for wholesale electricity



Total Value of Markets Varies with Fuel Costs

Annual wholesale market costs have ranged from \$6 billion to \$14 billion

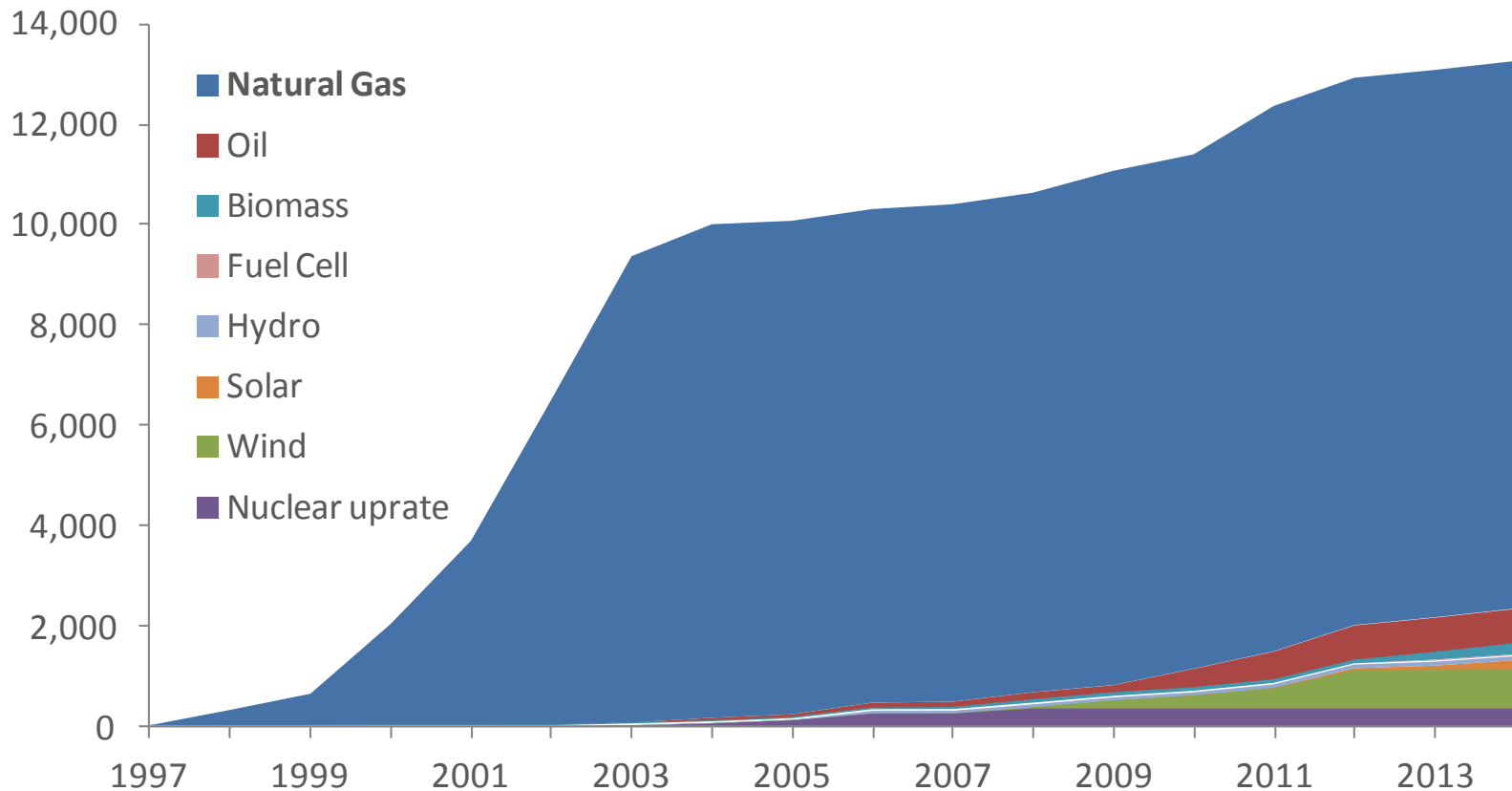
Annual Value of Wholesale Electricity Markets
(in billions)



Source: [2013 Report of the Consumer Liaison Group, Appendix C](#); 2014 data is still preliminary and subject to reconciliation

Region Has Not Developed Gas Pipeline Infrastructure to Keep Pace With Growth of Gas-fired Generation

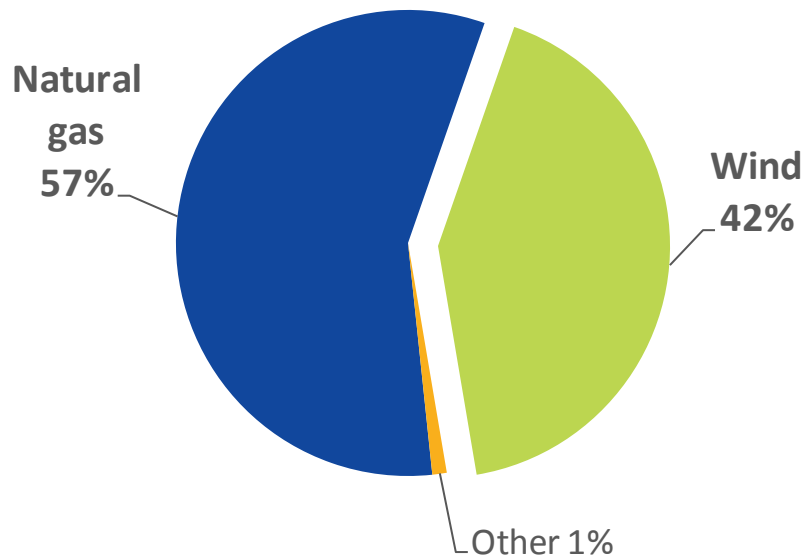
Cumulative New Generating Capacity in New England (MW)



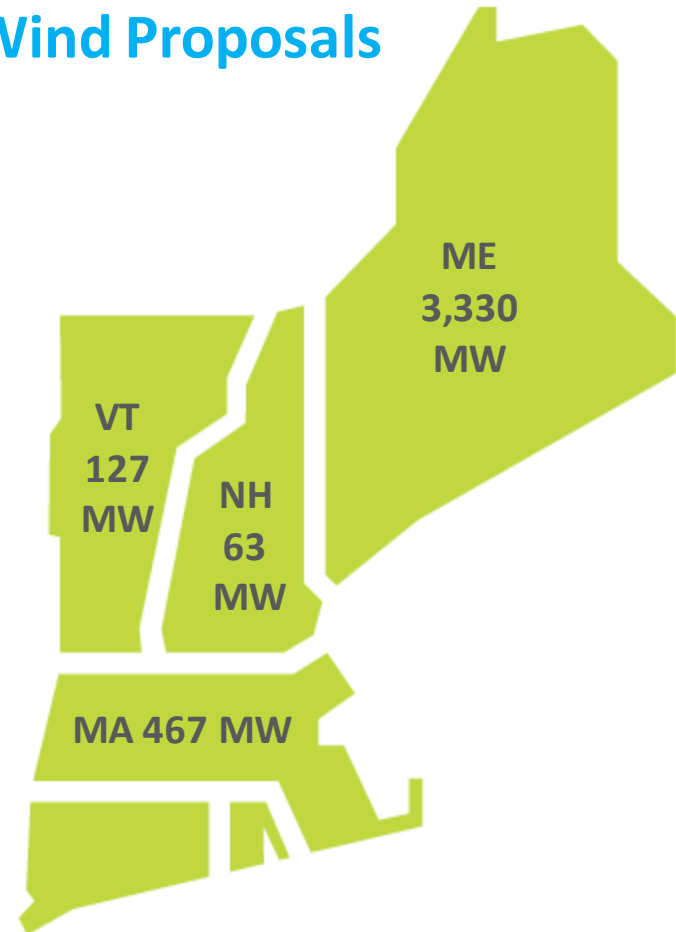
Proposed Generation Is Primarily Gas and Wind

All Proposed Generation

Developers propose >5 GW of gas-fired generation and approximately 4 GW wind; wind is mostly onshore in northern New England and offshore in southern New England



Wind Proposals

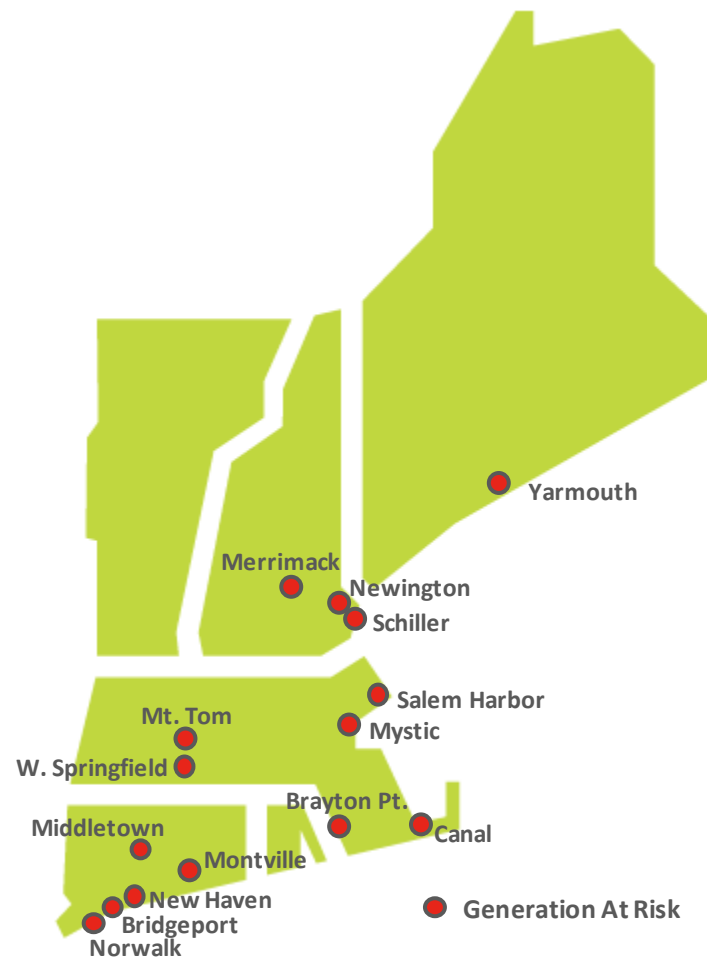


Source: ISO Generator Interconnection Queue (January 2015)
FERC Jurisdictional Proposals Only

Region Is Losing Non-Gas Resources

Major Retirements Underway:

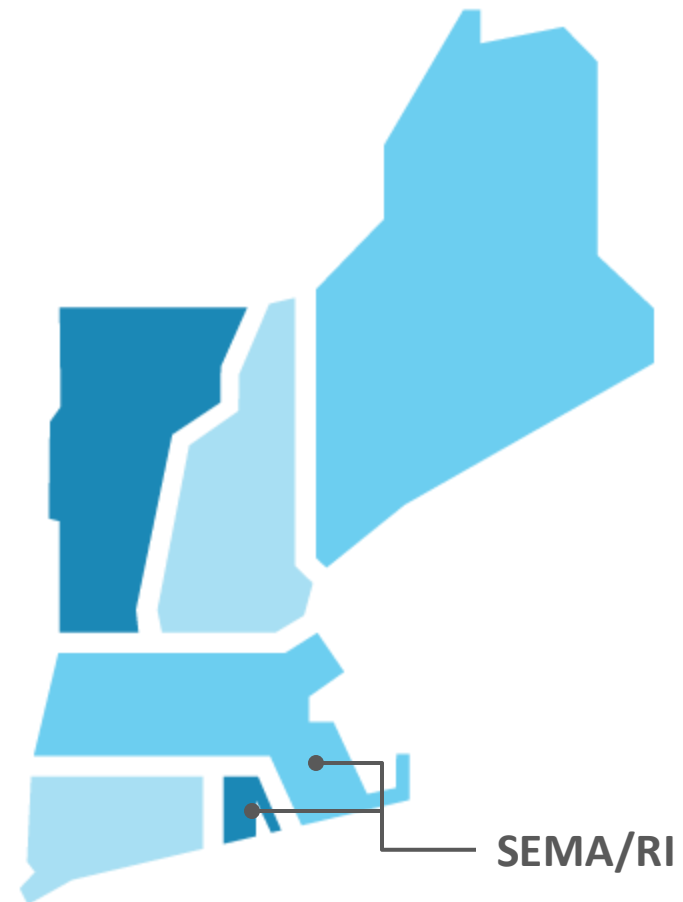
- Salem Harbor Station (749 MW)
 - 4 units (coal & oil)
- Vermont Yankee Station (604 MW)
 - 1 unit (nuclear)
- Norwalk Harbor Station (342 MW)
 - 3 units (oil)
- Brayton Point Station (1,535 MW)
 - 4 units (coal & oil)
- Mount Tom Station (143 MW)
 - 1 unit (coal)
- *Additional retirements are looming*



Source: *Generator Retirement Study*, ISO New England, 2012.

Southeastern Mass and Rhode Island Areas Need Resources and Transmission

- A SEMA/RI area study, led by the ISO, shows overloads of transmission facilities following contingencies, resulting in violation of reliability criteria
- Brayton Point retirement led ISO to restudy the area, and potential new FCM resources, if realized, could prompt further restudy
- ISO and stakeholders are reviewing needs and potential market resource alternatives



SEMA/RI is the area south of Boston, plus Cape Cod, and Rhode Island

U.S. Department of Energy Is Examining New England's Energy Infrastructure Challenges

- U.S. Department of Energy (DOE) is studying energy infrastructure challenges as part of its Quadrennial Energy Review (QER)
- ISO-NE has worked extensively with DOE throughout 2014 to articulate New England's challenges
 - ISO-NE has highlighted the region's increasing reliance on natural gas-fired resources and the need for additional energy infrastructure
- DOE's initial report is expected in February 2015 (focused on transmission, storage, and distribution of energy)



Questions



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