

JANUARY 21, 2015

# State of the Grid: Managing a System in Transition



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*ISO on Background*

Gordon van Welie

PRESIDENT AND CEO

# About the *ISO on Background Series*

- Informal opportunity for media to learn more about trends affecting New England's electricity industry
- Hosted by ISO New England senior management
- Content is **on-the-record**
- Please hold questions until the Q&A session at the end of the presentation
- Presentation and remarks will be posted at [www.iso-ne.com](http://www.iso-ne.com)>About Us>News and Media>Press Releases

# Agenda

11:00-11:10 a.m.

## **Welcome; About ISO New England**

Ellen Foley, Director, Corporate Communications

11:10-11:50 a.m.

## **State of the Power Grid 2015: Managing a System in Transition**

Gordon van Welie, President and CEO

11:50-12:15 p.m.

## **Question and Answer Session**

# Presentation Overview

- About ISO New England
- State of the Power Grid: Managing a System in Transition
  - Winter operational experiences highlight natural gas dependency, and risks from resource retirements
- Wholesale Energy and Capacity Market Price Signals
- Identifying Risks, Developing Solutions
- Conclusions

# ABOUT ISO NEW ENGLAND

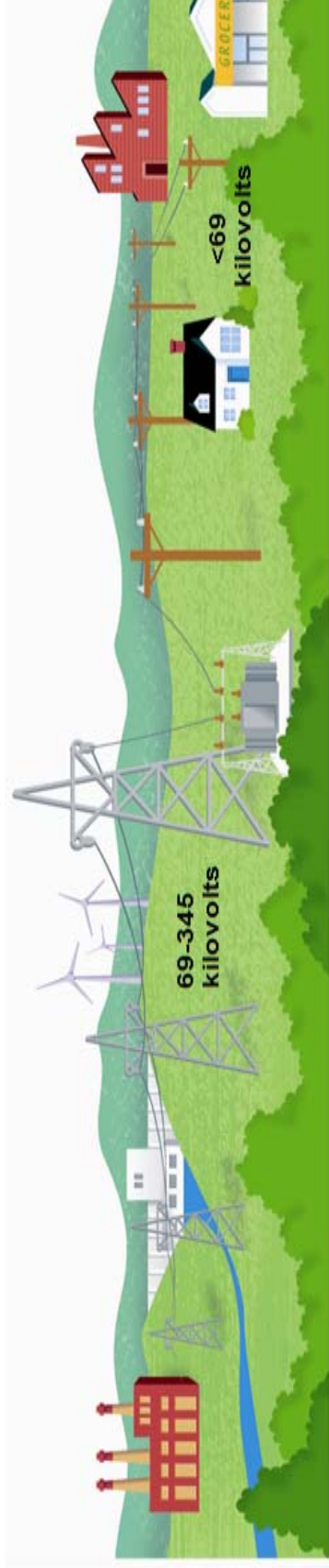
# About ISO New England

- **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



# Transmission System

# Distribution System



- Electricity produced by more than 350 generators
- Generators sell the electricity through either wholesale markets managed by ISO-NE or contracts with utilities and competitive suppliers
- Region's 8,500 miles of high-voltage transmission lines move electricity to substations where it is stepped down in voltage to feed into distribution lines
- Federal regulation (FERC)
- ISO New England operates
- Region's 6.5 million homes and businesses create demand
- Utilities and competitive suppliers buy electricity via markets or supply contracts
- Utilities distribute electricity to businesses and homes
- State regulation (public utilities commissions)
- Utilities own and operate

# 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**





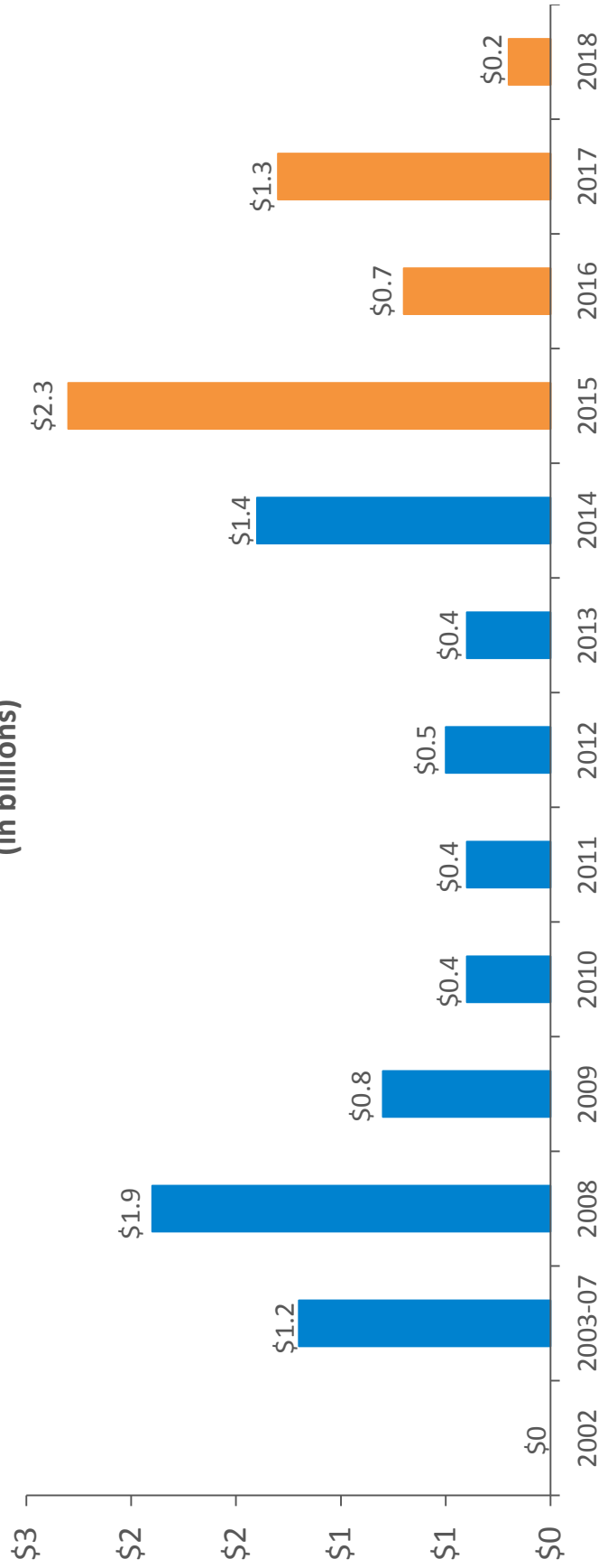
# STATE OF THE POWER GRID: MANAGING A SYSTEM IN TRANSITION

# The Big Picture

- Regional investment in high-voltage transmission system upgrades has brought significant reliability and market efficiency benefits
  - Robust transmission grid is the foundation for further investment in resources, including renewables
- Competitive wholesale electricity markets have led to a more efficient bulk electric system
  - Billions of dollars in private investment in generation
  - More than 15,000 megawatts in generation developed in the past 18 years
  - Market prices have revealed areas of need
- New England's power plant fleet is undergoing a major transition
  - Most power plants developed in the last 18 years use natural gas; lower prices, lower emissions
  - Retirements of coal- and oil-fired units, and a nuclear unit
  - Public policies are encouraging renewable energy – wind and solar – and energy efficiency; but those additions offset only a small portion of the need for more traditional sources of electrical energy
- Region is challenged by a lack of natural gas pipeline infrastructure, and is losing non-gas power plants, resulting in serious threats to power system reliability
- Additional energy infrastructure (generation, transmission, gas pipeline, fuel storage) needed
- Electricity prices are on an upward trajectory until the needed energy infrastructure is added

# New Transmission Investment in New England

Annual Investment in Transmission to Maintain Reliability  
(in billions)

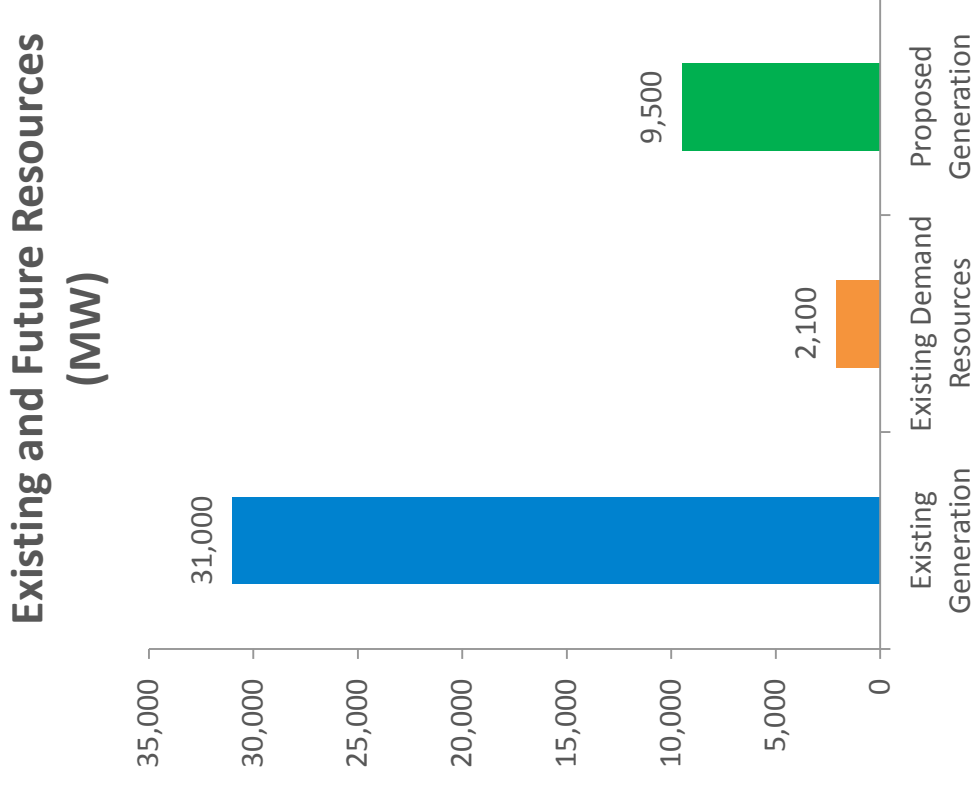


<b>Cumulative Investment through 2014</b>	<b>\$7.0 billion</b>
<b>Estimated Future Investment through 2018</b>	<b>\$4.5 billion</b>

Source: ISO New England RSP Transmission Project Listing, October 2014  
Estimated future investment includes projects under construction, planned and proposed

# New England's Generation and Demand Resources at a Glance

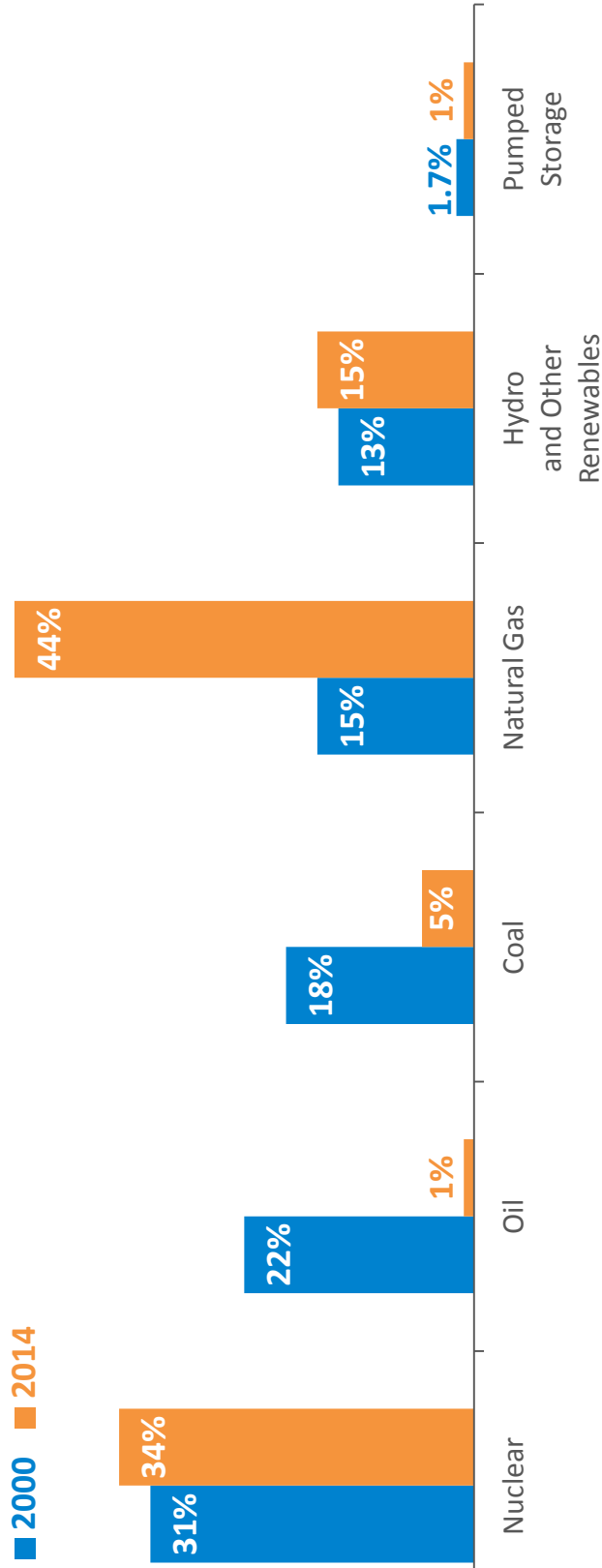
- 350 generators in the region
- **31,000 MW** of generating capacity
- **9,500 MW** of proposed generation
- **3,500 MW** of generation capacity retiring over the next five years
- **700 MW** of active demand response and **1,400 MW** of energy efficiency with capacity supply obligations



# 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*

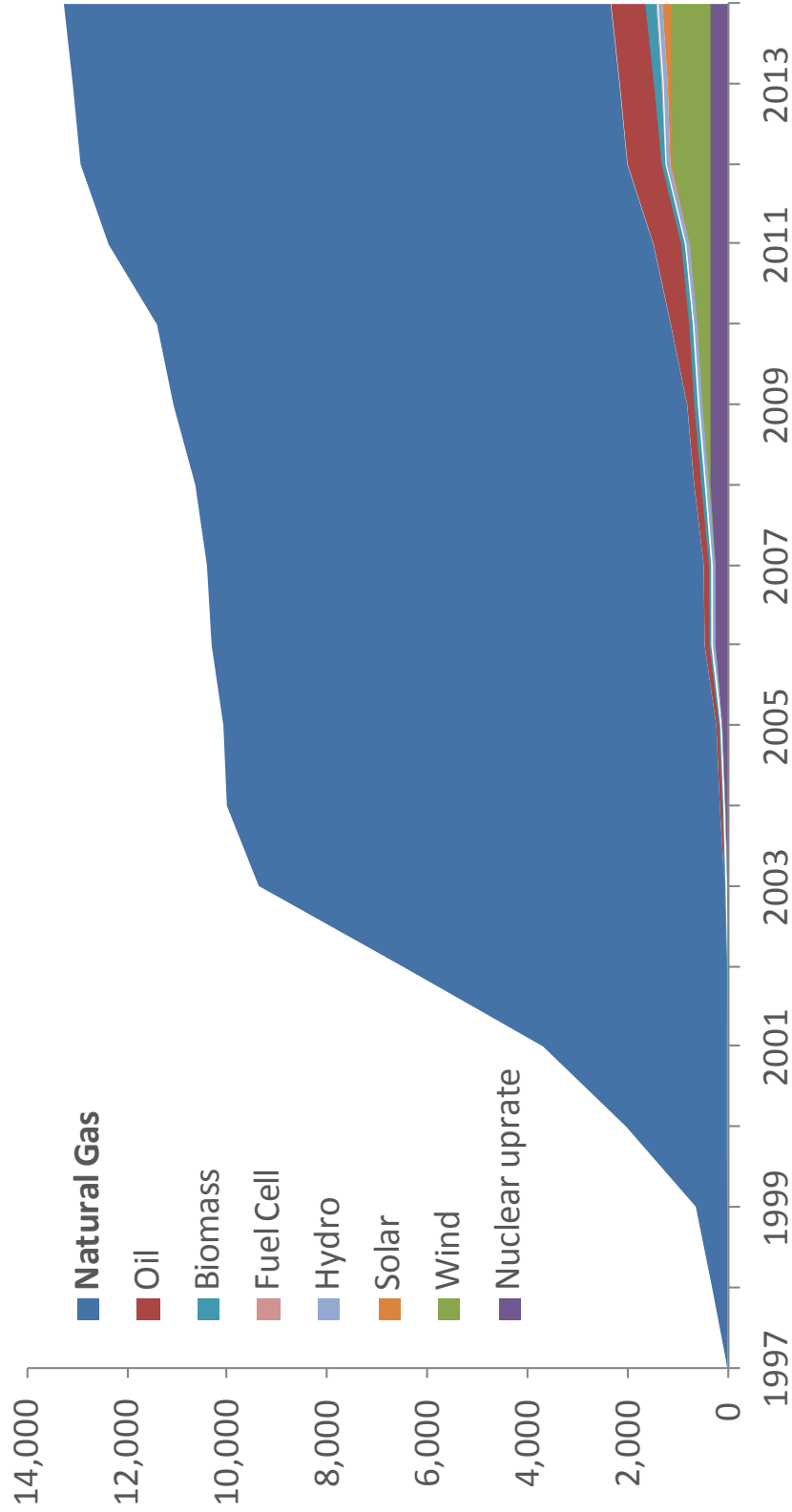
Percent of Total Electric Energy Production by Fuel Type  
(2000 vs. 2014)



Source: ISO New England [Net Energy and Peak Load by Source](#)

# Most of the New Generation Added Since 1997 is Fueled by Natural Gas

Cumulative New Generating Capacity in New England



# While Demand for Natural Gas has Increased, the Pipeline Infrastructure has not Kept Pace

- Why? Unlike electric transmission, new pipelines will not be built without customers signed up for long-term contracts for capacity
- Historically, natural gas generators have not entered into long-term contracts for pipeline capacity
- Several developers have proposed expansion of pipeline and/or storage capacity in region; however, the added capacity is under contract to natural gas local distribution companies (LDCs), not electric generators
- Gas LDCs cannot contract for gas infrastructure expansion beyond the needs of their commercial and residential natural gas customers
- A variety of factors, including economics and legal and regulatory restrictions, hamper private investment in more natural gas infrastructure. The question becomes, how will this infrastructure get built, and who will pay for it?

# Region is Losing Non-Gas Resources

3,500 MW of generation has retired or will in the coming years

## 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*



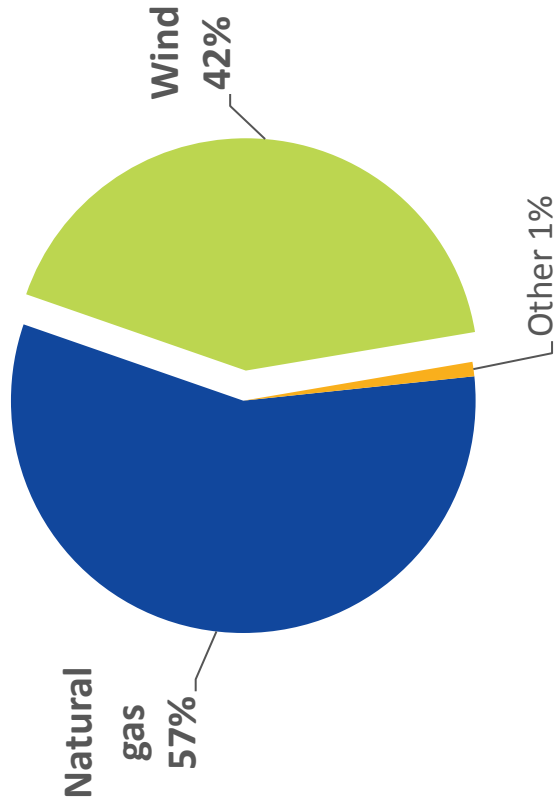
Source: Generator Retirement Study, ISO New England, 2012.



# 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

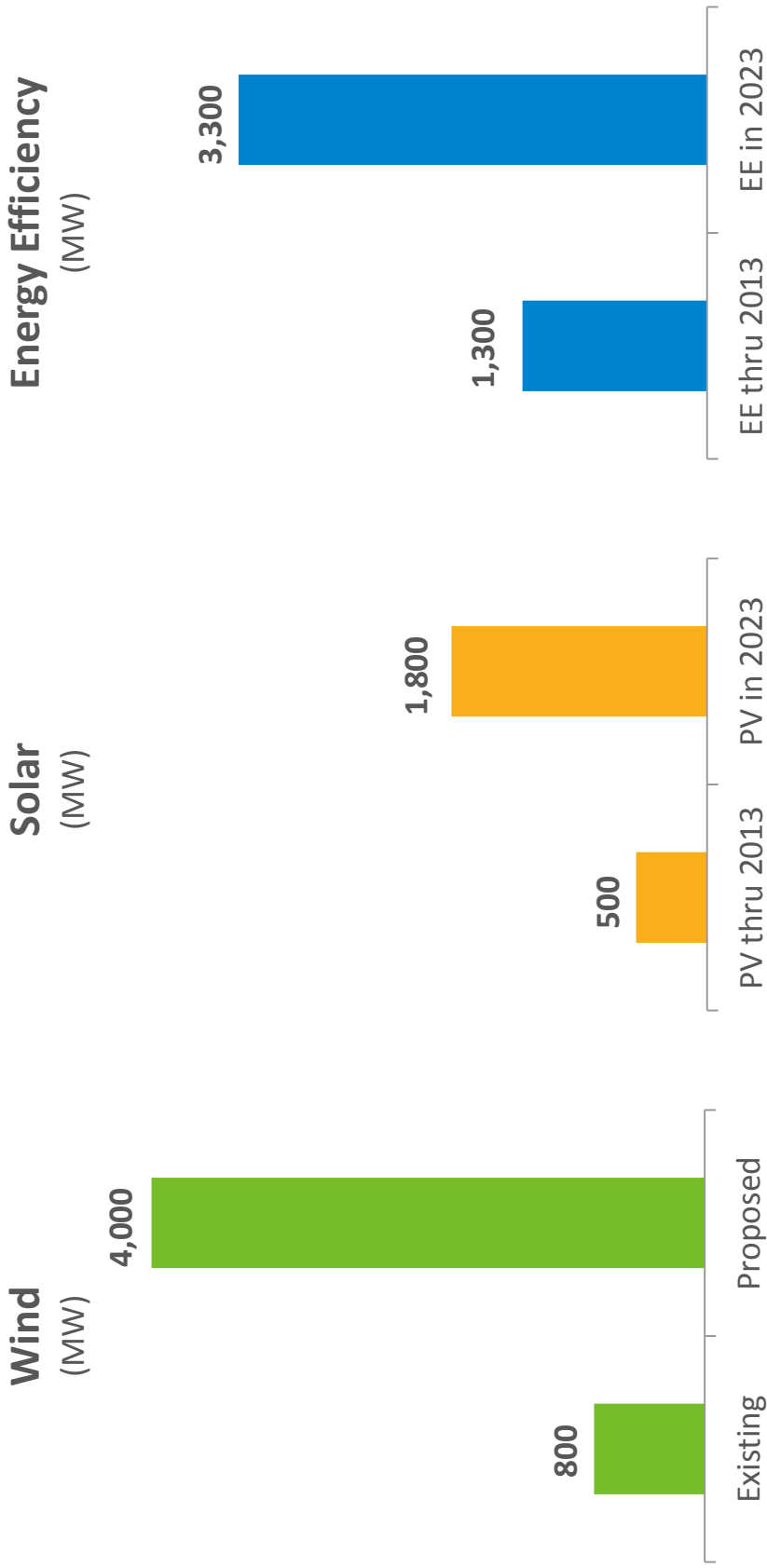


Source: ISO Generator Interconnection Queue (January 2015)  
FERC Jurisdictional Proposals Only

## Wind Proposals



# Renewable and EE Resources Are Trending Up



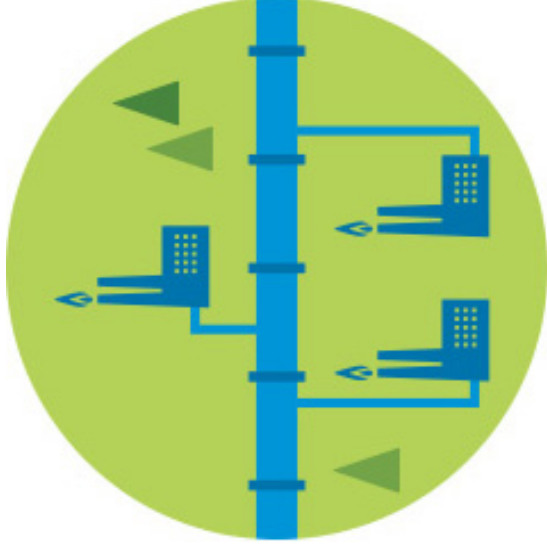
Nameplate capacity of existing wind resources and proposals in the ISO-NE Generator Interconnection Queue; megawatts (MW).

2014 Final Interim ISO-NE Solar PV Forecast, nameplate capacity, based on state policies.

2014 CELT Report, EE through 2013 includes EE resources participating in the Forward Capacity Market (FCM). EE in 2023 includes an ISO-NE forecast of incremental EE beyond the FCM.

# Resource Shift Creates Reliability Challenges

- New England’s generation fleet is changing rapidly – older, fossil-fired units are retiring and reliance on natural gas for power generation is rising
- ISO-NE must rely increasingly on resources with uncertain performance and availability
  - Intermittent resources (wind, solar) may not produce power at the times it is needed most
  - Natural gas resources lack fuel storage and rely on “just-in-time” fuel
  - Coal, oil-steam fleet is aging, prone to mechanical problems, subject to increasingly stringent environmental regulations
- Reliable operation of the New England power system is challenged by these developments, particularly in winter



# Observations from Winter Operations

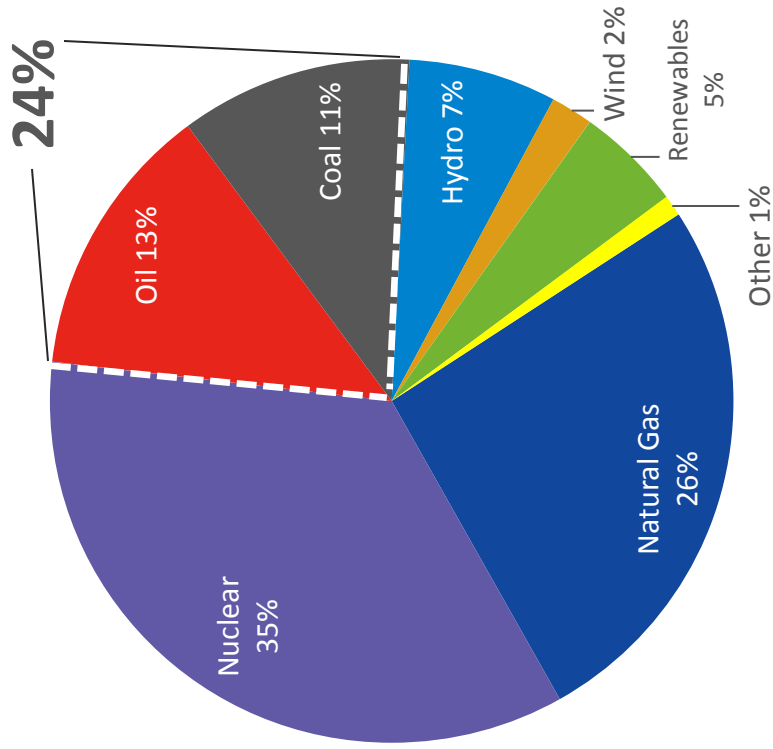
*Operational options are limited and becoming more constrained*

- Gas pipelines are severely constrained when weather is very cold, sometimes limiting gas generation to minimal levels
- Oil-fired generators were vitally important to reliability last winter
  - Oil-supply chain is fragile, unable to respond quickly during adverse weather conditions and/or when demand is high; shows importance of sufficient oil in tanks before winter starts
  - Post-winter retirements of non-gas generators in 2014 removed capability (2.6 million megawatt-hours) greater than that procured through the 2013/2014 Winter Reliability Program (1.9 million MWh)
- Winter reliability programs and recent market enhancements will help improve power system operations
- The region is highly vulnerable to the loss of large non-gas generators during cold weather (e.g., nuclear units)

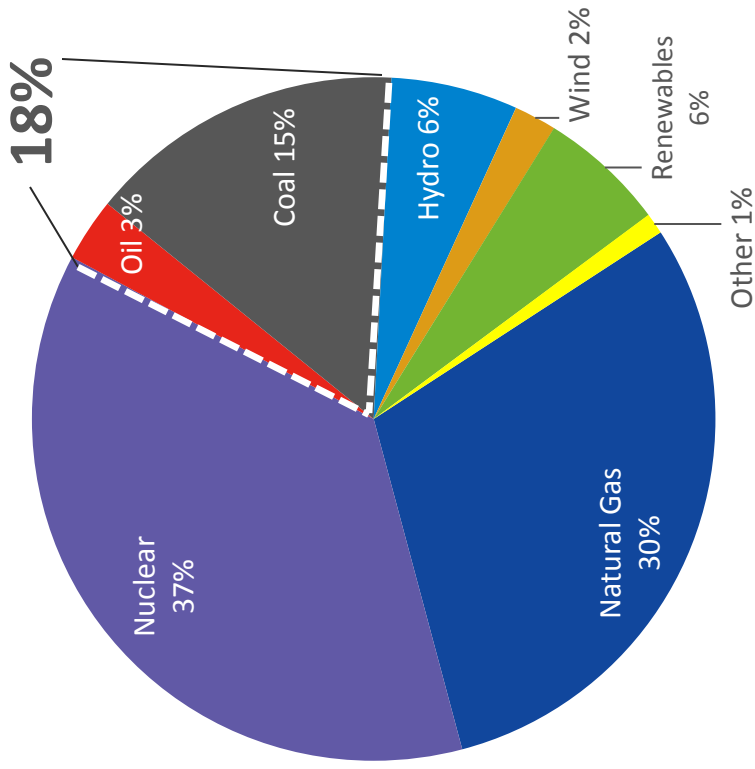


# Use of Oil and Coal for Electric Energy Is Generally Low, but High in Cold Winter Months

January 2014



February 2014



For comparison, combined use of oil and coal totaled 7% in 2013.

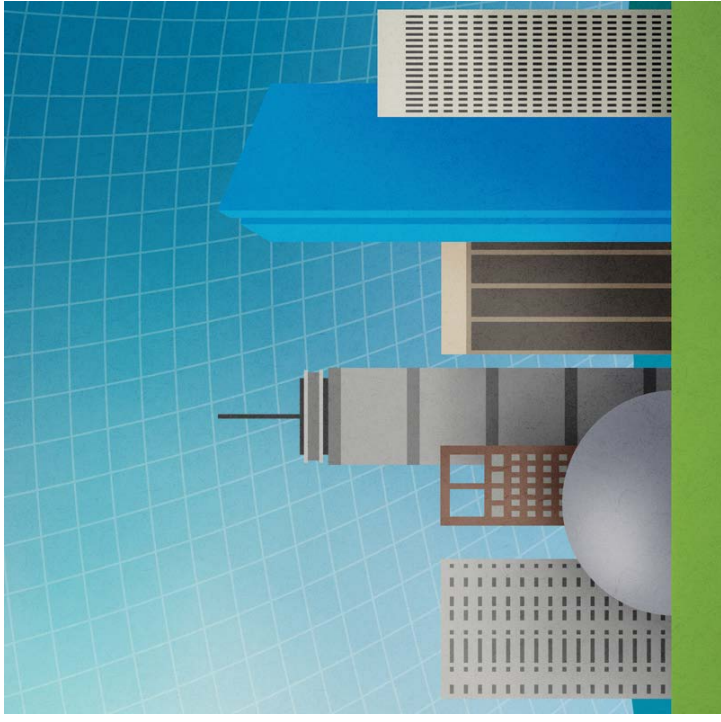
# ISO Developed a New Reliability Program for Winter 2014/2015

- **Key Drivers:**
  - Generators' difficulty in replenishing oil supplies mid-winter
  - Gas pipelines have been more constrained than anticipated
  - Retirement of a significant amount of non-gas generation
- **Objective:** Augment scarce pipeline gas and improve the region's overall fuel adequacy
- **Solution:**
  - Create an incentive for generators to secure fuel supply and delivery arrangements going into the winter
  - Offset costs for generators to commission dual-fuel capability
  - Offset part of the carrying costs of firm fuel purchased by generators (fuel oil and LNG) that is unused at the end of the winter season
  - Compensation for new demand-response services

# WHOLESALE ENERGY AND CAPACITY MARKET PRICE SIGNALS

# New England's Wholesale Markets at a Glance

- More than **400** buyers and sellers in the markets
- **\$10.4 billion** traded in wholesale electricity markets in 2014\*
  - **\$9.1 billion** in energy markets
  - **\$1.3 billion** in capacity and ancillary services markets
- Forward and spot markets
- Prices vary by time and location, and by changes in demand and available resources



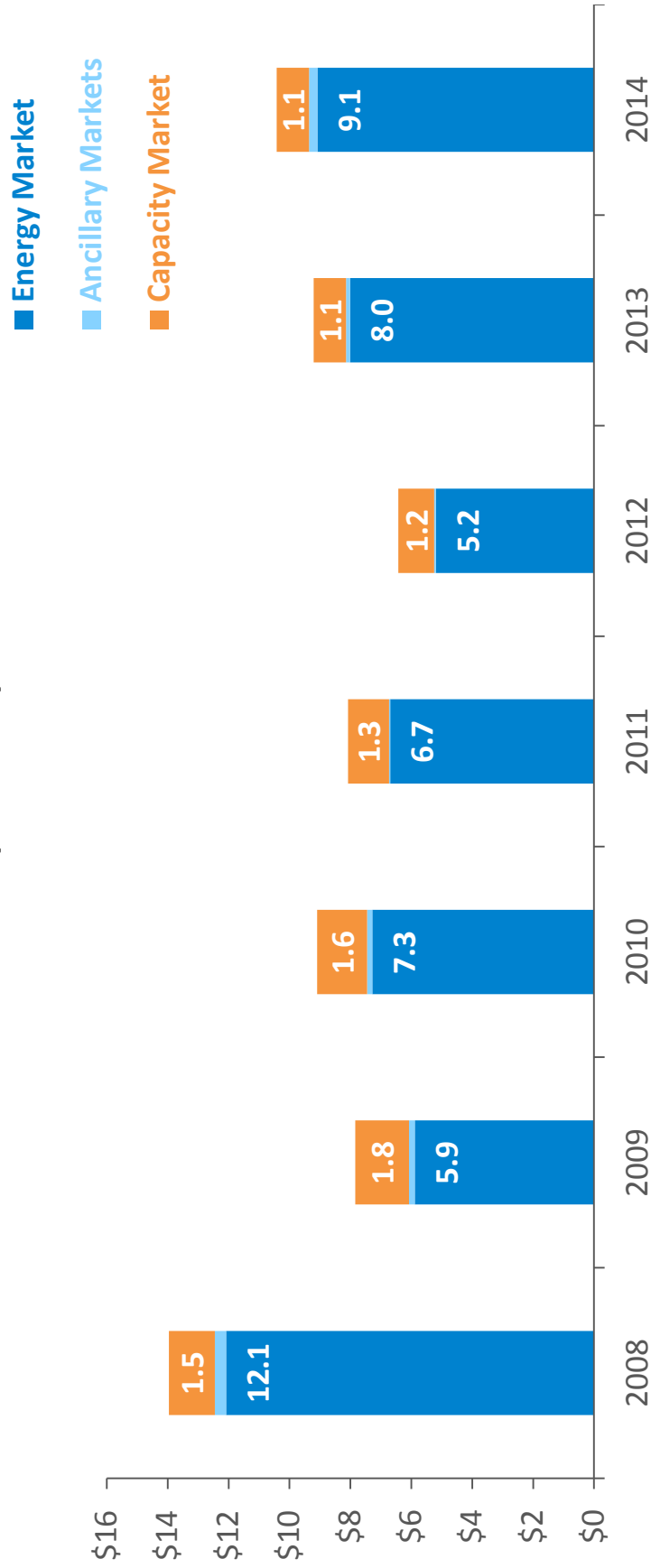
\* **Note:** 2014 wholesale electricity market data is still preliminary and subject to reconciliation



# Total Value of Markets Varies with Fuel Costs

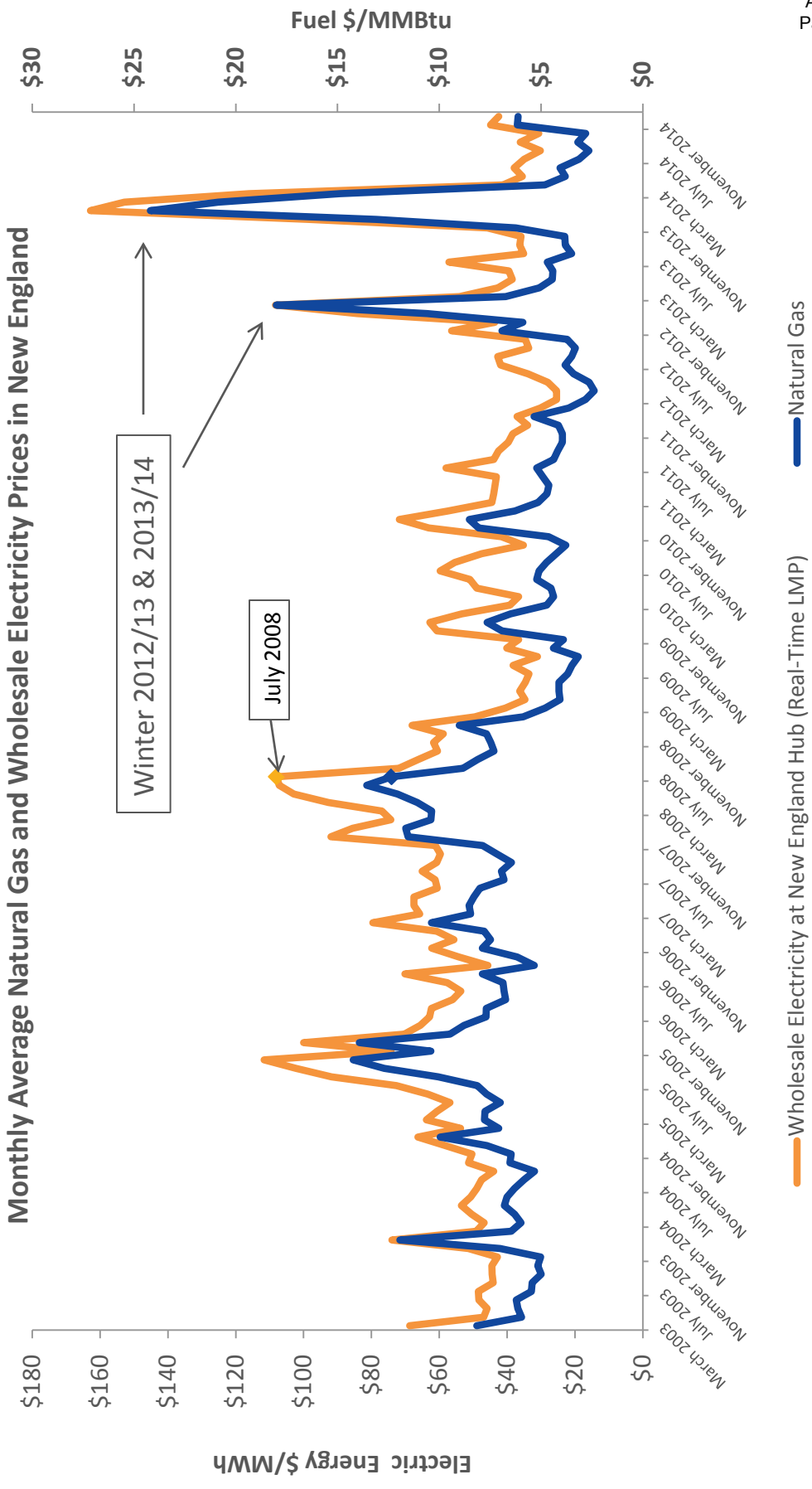
Annual wholesale market costs have ranged from \$6 billion to \$14 billion

Annual Value of Wholesale Electricity Markets  
(in billions)



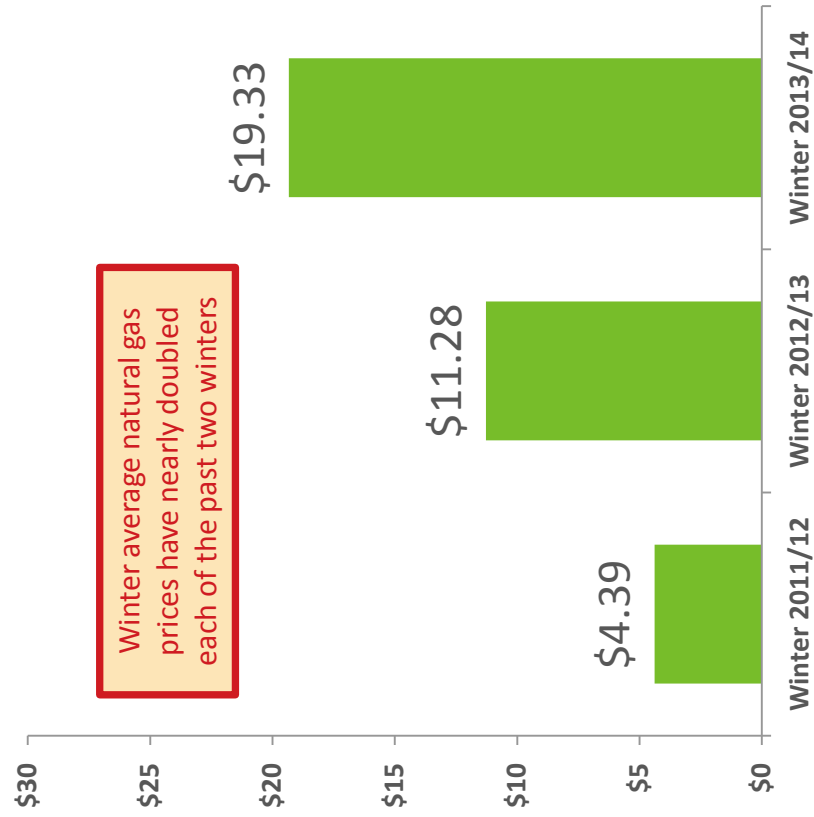
Source: [2013 Report of the Consumer Liaison Group, Appendix C](#)  
Note: 2014 data is still preliminary and subject to reconciliation

# High Natural Gas Prices Drove Wholesale Electricity Prices in New England Prices to Record Monthly Highs

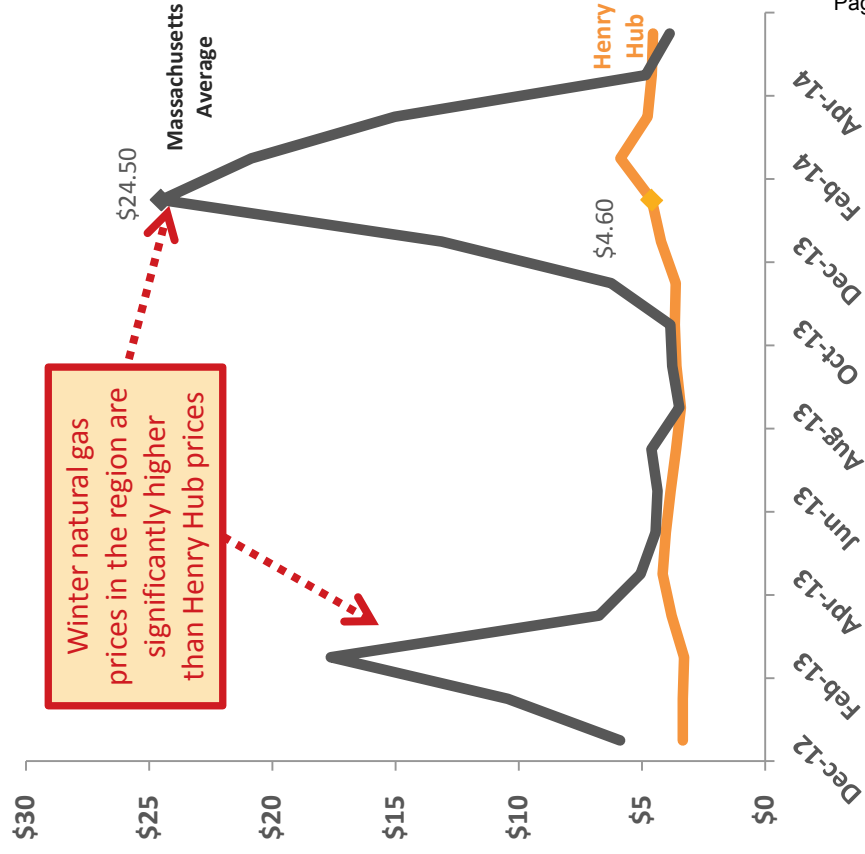


# Natural Gas Prices Have Spiked in Recent Winters; Above Henry Hub Price

## Winter Averages \$/MMBtu

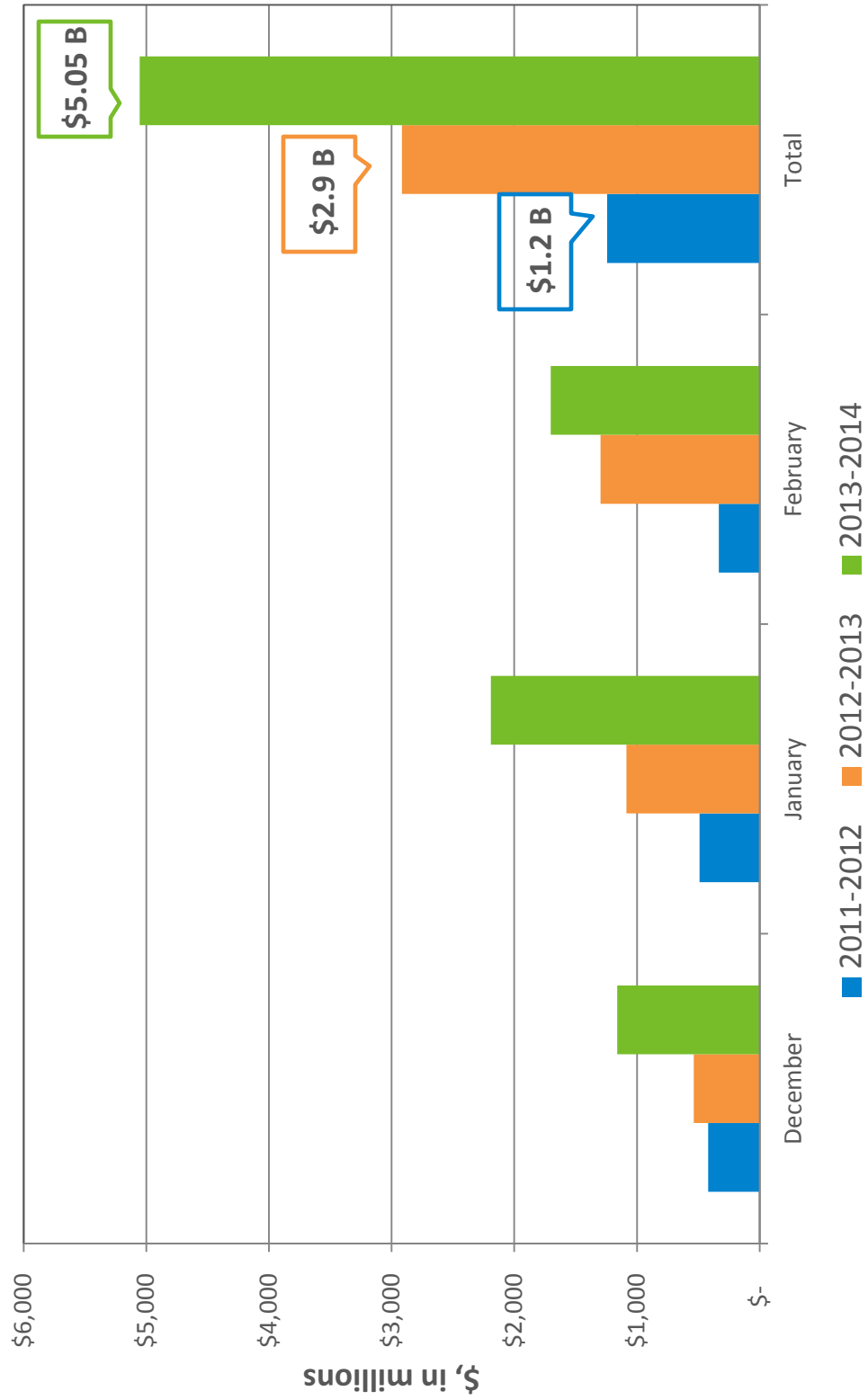


## Monthly Average \$/MMBtu



# Total Cost of Wholesale Electricity Rose Each of the Last Three Winters

*\$1.2 billion in 2011/12; \$2.9 billion in 2012/13; \$5.1 billion in 2013/14*

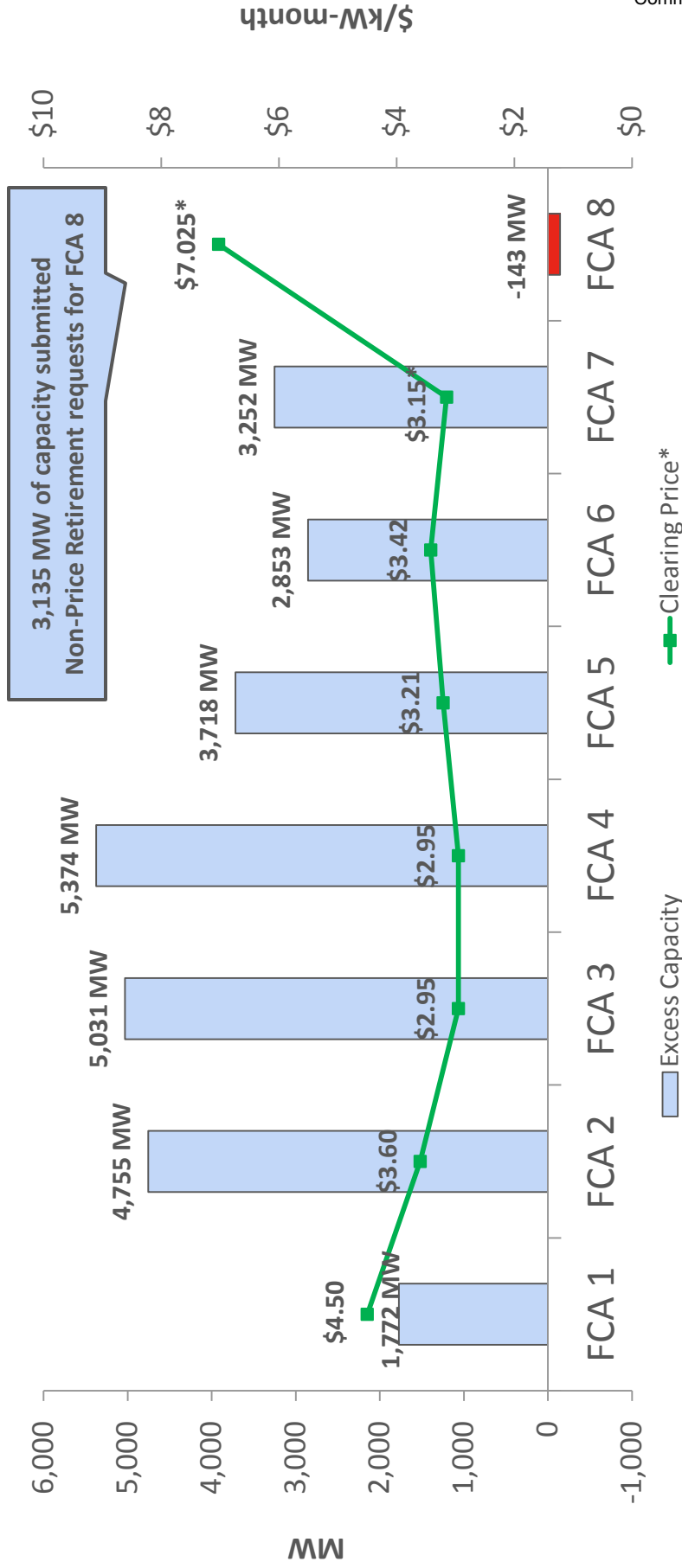


# Forward Capacity Market Objectives and Results

- Forward Capacity Market (FCM) has two main objectives:
  - Ensure sufficient resources to meet New England’s electricity demand and reliability standards, and
  - Ensure that sufficient resources are procured in a cost-effective manner on a level playing field for different technologies, existing and new
- Eight Forward Capacity Auctions (FCA) have been conducted and four commitment periods completed
  - Each auction has procured sufficient resources with a surplus, except for a slight shortfall in FCA #8 (for 2017/2018)
  - Market has generated participation from diverse types of resources
    - Including demand-response and energy-efficiency resources
  - Lowest-cost resources have been developed and brought to market
    - FCM has eliminated reliance on reliability arrangements with generators

# Capacity Prices Vary with Changes in Supply

Capacity Surplus or Deficit (MW) and Auction Clearing Prices (\$/kWh-month)



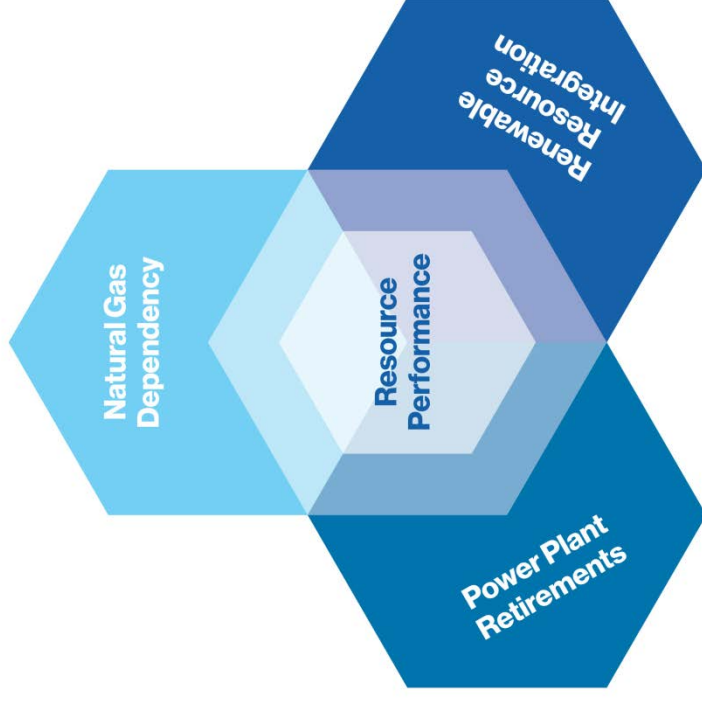
\* Prices cleared at the floor price in the first seven auctions due to excess capacity; therefore, resources were paid a slightly lower prorated price. The clearing price in NEMA/Boston was \$14.999/kWh-month for FCA 7 (new capacity received \$14.999/kWh-month and existing capacity received an administrative price of \$6.66/kWh-month). The clearing price in FCA 8 was \$15.00/kWh-month (new capacity in all zones and existing capacity in NEMA/Boston received \$15.00/kWh-month and existing capacity in other zones received an administrative price of \$7.025/kWh-month).

# IDENTIFYING RISKS, DEVELOPING SOLUTIONS

# Identifying Risks to Continued System Reliability

## 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

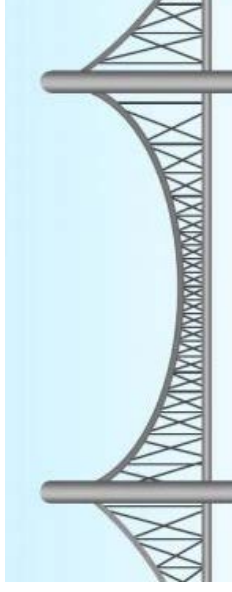




# Developing Solutions in Markets and Operations to Improve Reliability

## Recent Improvements

- Day-Ahead Energy Market timeline shift
- Increased level of reserves
- Better information-sharing with natural gas pipeline operators
- Energy Market Offer Flexibility project
  - Hourly offers
  - Negative pricing to -\$150/MWh



## Longer-Term

- Capacity Market
  - Pay for Performance
  - Sloped demand curve
  - Improved zonal modeling
- Winter Programs
  - 2013/14
  - 2014/15
  - 2015/16 & beyond

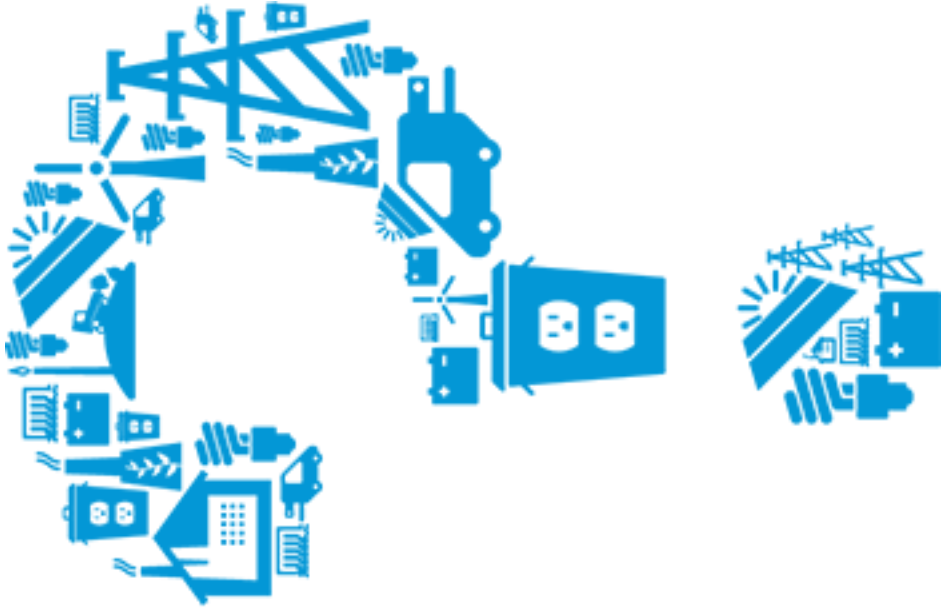
# ISO-NE/ICF International Research Confirms Need for New Pipeline Infrastructure or Significant, Timely Investments in Alternative Sources of Electrical Energy

- Demand for gas for home heating continues to limit gas supply for power generation
- Lower than anticipated LNG supplies reduces available relief from gas imports
- Constraints limit gas supplies and compromise electric reliability, especially in winter season
  - Outages or unplanned events create reliability concerns year-round as well
- All other studies have yielded similar findings: need for additional energy infrastructure



# Conclusions

- Rapid change is transforming New England's power generation fleet
  - Increasingly dependent on natural gas for power, affecting grid reliability & wholesale energy prices
  - Public policy goals are driving a second wave of transformation toward more renewables, distributed generation, & energy efficiency; more high-voltage transmission will be needed for new wind facilities
  - Retiring resources are non-natural-gas-fired; their replacements will be natural gas and wind
- New resources are needed to replace retiring resources, particularly in Greater Boston and Southeastern Mass. and Rhode Island
- Reliability will be threatened, and prices will spike, until the effects of natural gas pipeline constraints are alleviated with additional investments in fuel infrastructure (gas pipelines, fuel storage, more transmission to bring in energy)
- ISO-NE has spearheaded numerous market enhancements to provide greater reliability and efficient pricing, but these alone are not likely to spur investment in additional pipeline infrastructure
- The ISO will take steps to ensure continued reliability



# Questions

# APPENDIX

# Appendix Contents

- For More Information....
- Links to EIA Reports Regarding New England Prices & Pipeline Constraints
- New England's Energy Use at a Glance
- New England's Electricity Use Varies by Season
- Transmission Projects to Maintain Reliability Have Progressed in Each State
- ISO Continuously Studies Transmission System Needs to Maintain Reliability
- On- and Off-shore Merchant Transmission Proposals Vie to Move Renewable Energy to New England Load Centers
- Greater Boston Area Needs Resources and Transmission
- Southeastern Mass and Rhode Island Areas Need Resources and Transmission
- FERC's Winter Market Assessment Found NE had Highest Winter Power and Natural Gas Futures
- Energy Market Offer Flexibility Enhancements
- Reserve Constraint Penalty Factor Changes
- Problems with Existing Capacity Market Design
- Pay for Performance

# 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**
  - [@isonewengland](#)
- Download the **ISO to Go App**
  - [ISO to Go](#) is a free mobile application that puts real-time wholesale electricity pricing and power grid information in the palm of your hand



# Links to EIA\* Reports Regarding New England Prices & Pipeline Constraints

- 1/20/2015 – EIA, NERC assessment examines winter power system reliability, fuel diversity  
<http://www.eia.gov/todayinenergy/detail.cfm?id=19631#>
- 1/12/2015 – EIA, Wholesale power prices increase across the country in 2014  
[http://www.eia.gov/todayinenergy/detail.cfm?id=19531#tabs\\_SpotPriceSlider-2](http://www.eia.gov/todayinenergy/detail.cfm?id=19531#tabs_SpotPriceSlider-2)
- 11/24/2014 – EIA, Boston, New York City winter natural gas prices expected to remain high  
<http://www.eia.gov/todayinenergy/detail.cfm?id=18931>
- 8/11/2014 – EIA, Northeast natural gas spot prices particularly sensitive to temperature swings  
<http://www.eia.gov/todayinenergy/detail.cfm?id=17491>
- 2/21/2014 – EIA, New England spot natural gas prices hit record levels this winter  
<http://www.eia.gov/todayinenergy/detail.cfm?id=15111>
- 1/21/2014 – EIA, Northeast and Mid-Atlantic power prices react to winter freeze and natural gas constraints  
<http://www.eia.gov/todayinenergy/detail.cfm?id=14671>
- 1/9/2014 – EIA, Energy Market Alert: Northeastern Winter Natural Gas and Electricity Issues  
[http://www.eia.gov/special/alert/east\\_coast/](http://www.eia.gov/special/alert/east_coast/)

\*US Energy Information Administration: [www.eia.gov](http://www.eia.gov)



# Links to EIA Reports, continued

- 1/7/2014 – EIA, Energy Market Alert: Northeastern Winter Natural Gas and Electricity Issues; [http://www.eia.gov/special/alert/east\\_coast/pdf/energy\\_market\\_alert\\_Jan\\_7\\_2014.pdf](http://www.eia.gov/special/alert/east_coast/pdf/energy_market_alert_Jan_7_2014.pdf)
- 12/6/2013 – EIA, December natural gas prices spike in Boston <http://www.eia.gov/todayinenergy/detail.cfm?id=14071>
- 4/12/2013 – EIA, Winter natural gas price spikes in New England spur generation from other fuels <http://www.eia.gov/todayinenergy/detail.cfm?id=10791>
- 3/25/2013 – EIA, Over half of US natural gas pipeline projects in 2012 were in the Northeast (New England remains isolated); <http://www.eia.gov/todayinenergy/detail.cfm?id=10511>
- 1/18/2013 – EIA, Constraints in New England likely to affect regional energy prices this winter [http://www.eia.gov/forecasts/steo/special/pdf/2013\\_sp\\_01.pdf](http://www.eia.gov/forecasts/steo/special/pdf/2013_sp_01.pdf)
- 1/23/2012 – EIA, Spot natural gas prices at Marcellus trading point reflect pipeline constraints <http://www.eia.gov/todayinenergy/detail.cfm?id=7210>
- 9/29/2011 – EIA, Markets indicate possible natural gas pipeline constraints in the Northeast this winter <http://www.eia.gov/todayinenergy/detail.cfm?id=3290>
- 2/17/2011 – EIA, Pipeline constraints raise average spot natural gas prices in the Northeast this winter <http://www.eia.gov/todayinenergy/detail.cfm?id=170>

# New England's Energy Use at a Glance

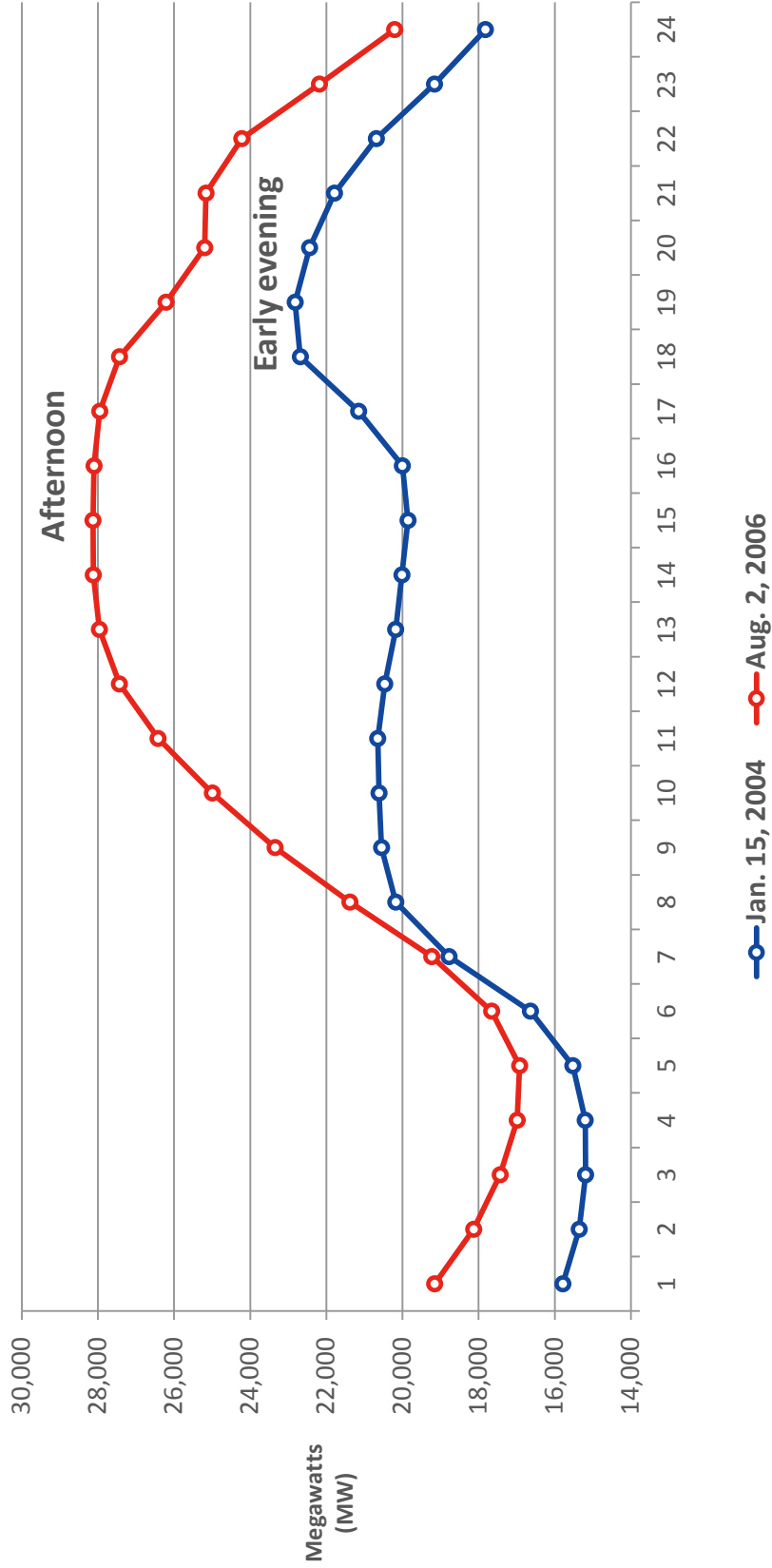
- **6.5 million** households and businesses;  
**14 million** population
- **28,130 MW** all-time summer peak demand set on August 2, 2006
- **22,818 MW** all-time winter peak demand set on January 15, 2004
- Region's *peak* demand forecasted to grow **1.3%** annually
- Region's *overall* electricity demand forecasted to grow **1.0%** annually
- Energy efficiency slows growth in peak demand and flattens overall electricity demand



# New England's Electricity Use Varies by Season

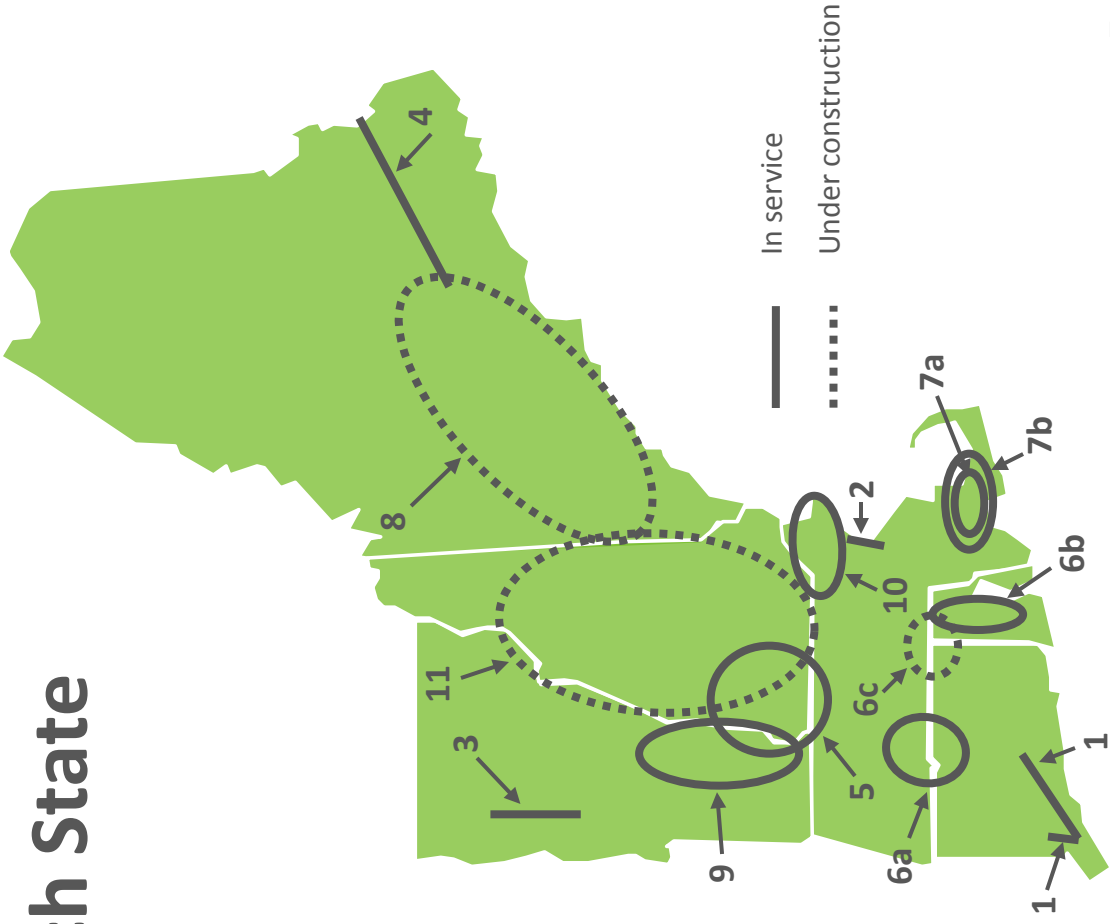
*Air-conditioning and lighting loads drive seasonal peaks*

## New England Peak-Day Hourly Load



# Transmission Projects to Maintain Reliability Have Progressed in Each State

1. Southwest CT Phases I & II
2. Boston NSTAR 345 kV Project, Phases I & II
3. Northwest Vermont
4. Northeast Reliability Interconnect
5. Monadnock Area
6. New England East-West Solution
  - a. Greater Springfield Reliability Project
  - b. Rhode Island Reliability Project
  - c. Interstate Reliability Project
7. Southeast Massachusetts
  - a. Short-term upgrades
  - b. Long-term Lower SEMA Project
8. Maine Power Reliability Program
9. Vermont Southern Loop
10. Merrimack Valley/North Shore Reliability
11. New Hampshire/Vermont Upgrades



Source: RSP Transmission Project Listing, October 2014; (does not include "concept" projects)

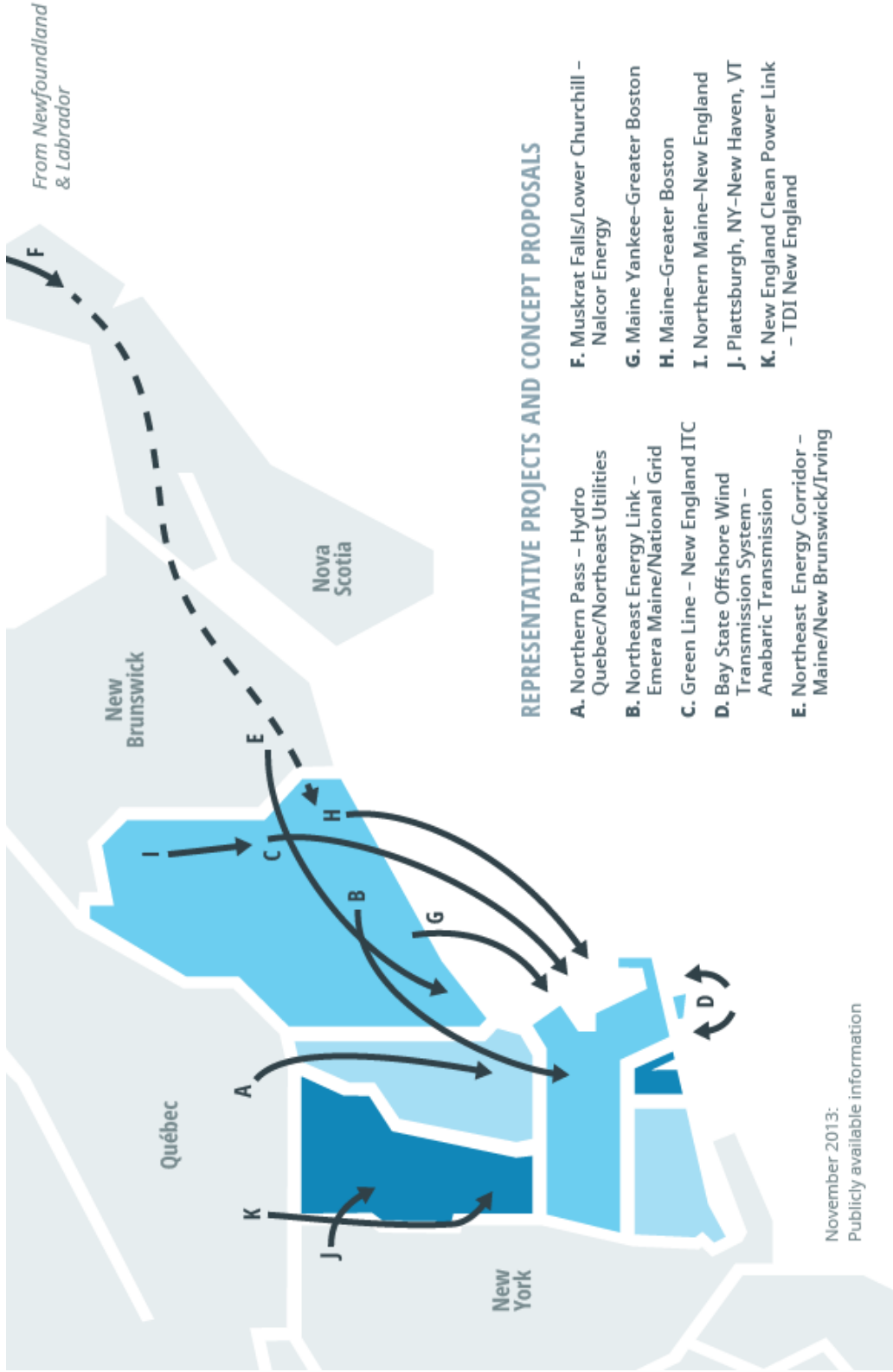
# ISO Continuously Studies Transmission System Needs to Maintain Reliability

1. Greater Hartford and Central Connecticut
2. Southwest Connecticut
3. Eastern Connecticut
4. Southeast Massachusetts and Rhode Island
5. Greater Boston
6. Pittsfield and Greenfield
7. New Hampshire and Vermont
8. Maine



Source: ISO New England Key Study Areas at <http://www.iso-ne.com/system-planning/key-study-areas>

# On- and Off-shore Merchant Transmission Proposals Vie to Move Renewable Energy to New England Load Centers



## REPRESENTATIVE PROJECTS AND CONCEPT PROPOSALS

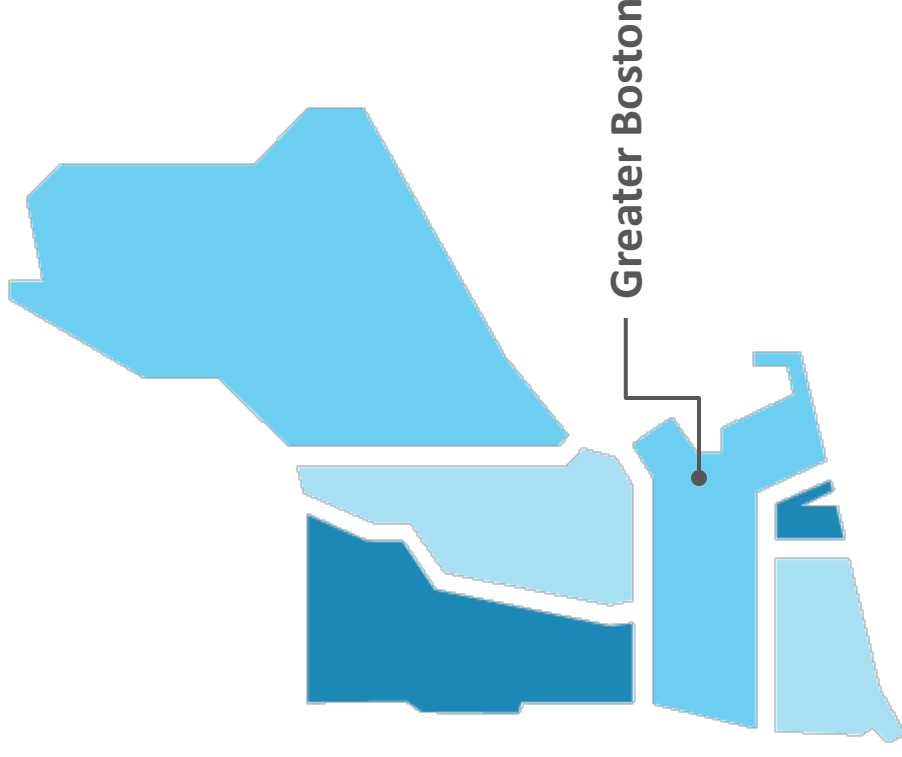
- A.** Northern Pass – Hydro Québec/Northeast Utilities
- B.** Northeast Energy Link – Emera Maine/National Grid
- C.** Green Line – New England ITC
- D.** Bay State Offshore Wind Transmission System – Anabarcic Transmission
- E.** Northeast Energy Corridor – Maine/New Brunswick/Irving
- F.** Muskrat Falls/Lower Churchill – Nalcor Energy
- G.** Maine Yankee–Greater Boston
- H.** Maine–Greater Boston
- I.** Northern Maine–New England
- J.** Plattsburgh, NY–New Haven, VT
- K.** New England Clean Power Link – TDI New England

November 2013:  
Publicly available information

Note: These projects are NOT reliability projects, but ISO New England’s role is to ensure the reliable interconnection of these types of projects.

# Greater Boston Area Needs Resources and Transmission

- Electricity demand is rising, while at the same time internal resources and transmission supplying the area are limited
- Generator retirements and delays to new generation projects add to challenges
- System operators are challenged given the limited transmission import capability
- Long-term transmission solutions (scheduled to be in service by the 2017–2018 timeframe) are long overdue



Greater Boston includes Boston and the North Shore

# 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
- 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



# FERC's Winter Market Assessment Found NE had Highest Winter Power and Natural Gas Futures

## Futures Prices Elevated

	2015 <sup>^</sup>	2014*
<b>Location</b>		
<b>Gas</b>		
Algonquin (New England)	\$21.45	\$11.76
Transco Zone 6 non-NY (Mid-Atlantic)	\$9.09	\$4.78
Dominion South (Marcellus)	\$2.85	\$3.66
Southern California Border	\$4.30	\$3.95
Henry Hub	\$4.08	\$3.87
<b>Power</b>		
Massachusetts Hub	\$183.88	\$99.88
PJM Western Hub	\$72.60	\$44.90
Northwest (Mid-C)	\$37.73	\$35.75
Southern California (SP-15)	\$46.13	\$42.25

Source: Derived from ICE and Nymex data.

<sup>^</sup>January and February 2015 as of October 1 2014

\*January and February 2014 as of October 1 2013

\*SP-15 2014 prices from October 31 2013

\*Power Note: Prices in \$/MWh. Peak financial swap prices.

\*Gas Note: Prices in \$/MMBtu. Regional futures natural gas prices are the sum of the Henry Hub futures contract price plus the regional basis futures.

Source: FERC's Winter 2014-2015 Energy Market Assessment, October 16, 2014

# Energy Market Offer Flexibility Enhancements

- ISO and NEPOOL developed enhancements to the energy market to provide greater **flexibility** for market participants to adjust their supply offers in the *day-ahead* and *real-time* markets.
  - Offers may now be changed in **real time** (during the operating day)
  - Offers are now **hourly** (versus an offer for all hours of the day)
  - Offers may be **negative** (as low as -\$150/MWh)
- Offers should now reflect near real-time price of fuel, improving dispatch efficiency, price formation, and incentives to follow dispatch instructions
- Enhancements went into effect on December 3, 2014

# Reserve Constraint Penalty Factor Changes

- When reserves are scarce (below required amounts), real-time reserve prices are set at the Reserve Constraint Penalty Factor rates
  - The real-time reserve clearing price is *reflected in the energy price*
- Per FERC order, the Reserve Constraint Penalty Factor rates were increased
  - 30-Minute Operating Reserves from \$500/MWh to \$1,000/MWh
  - 10-Minute Non-Spinning Reserves from \$850/MWh to \$1,500/MWh
- This is also expected to enhance incentives to perform in the near-term until larger capacity market reforms take effect
- Enhancements went into effect on December 3, 2014

# Problems with Existing Capacity Market Design

- *Currently*, capacity payments are linked to resource *availability* and poorly linked to resource *performance*
  - Performance means actual delivery of energy or reserves
- Consequently, supply offers do not include the value of performance
- The market doesn't distinguish between resources based on performance, hence there is little incentive for resource owners to make investments to improve performance

**ISO New England's pay-for-performance proposal is  
a comprehensive solution**

# Pay for Performance

- Capacity payments will be closely tied to performance during system deficiencies—the amount of energy and/or reserves provided
- Provides strong incentives for resources to make investments that improve performance
  - Examples: more secure fuel arrangements, capital improvements, improved maintenance and staffing, etc.
- Market participants have the *flexibility* to select the best, least-cost investments to ensure performance
- Goes into effect in 2018-2019 for resources that clear in FCA #9

