

# Meeting Natural Gas-Electric Interdependency Challenges Through Market Enhancements

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*US Department of Energy's Electricity  
Advisory Committee*

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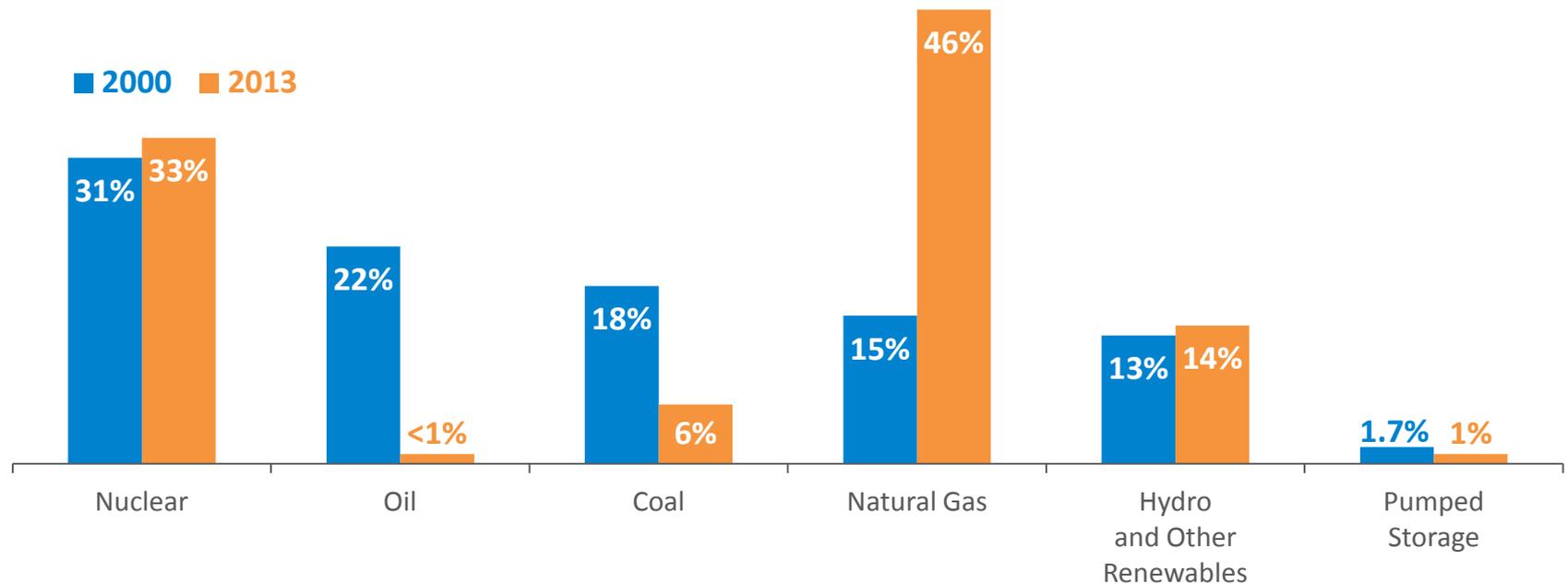
# NEW ENGLAND IS EXPERIENCING A TRANSITION AWAY FROM TRADITIONAL FOSSIL-FIRED RESOURCES

*Regional natural gas pipeline infrastructure is not sufficient to meet growing demand for natural gas for power generation*

# Dramatic Changes in the Energy Mix

*The fuels used to produce New England's electric energy have shifted*

Percent of Total **Electric Energy** Production by Fuel Type  
(2000 vs. 2013)

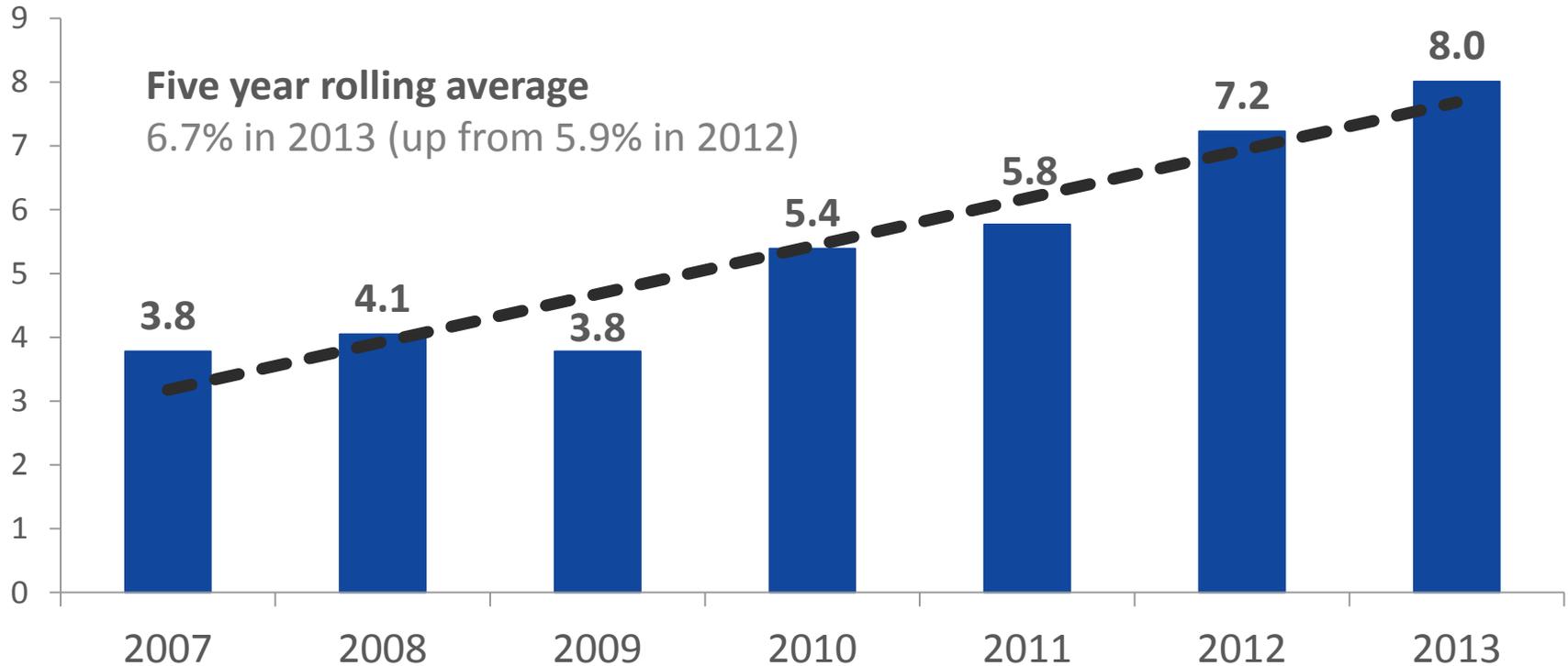


Source: ISO New England [Net Energy and Peak Load by Source](#)

# Fleet-wide Forced Outages Are Increasing

*Performance under stressed conditions is a growing problem*

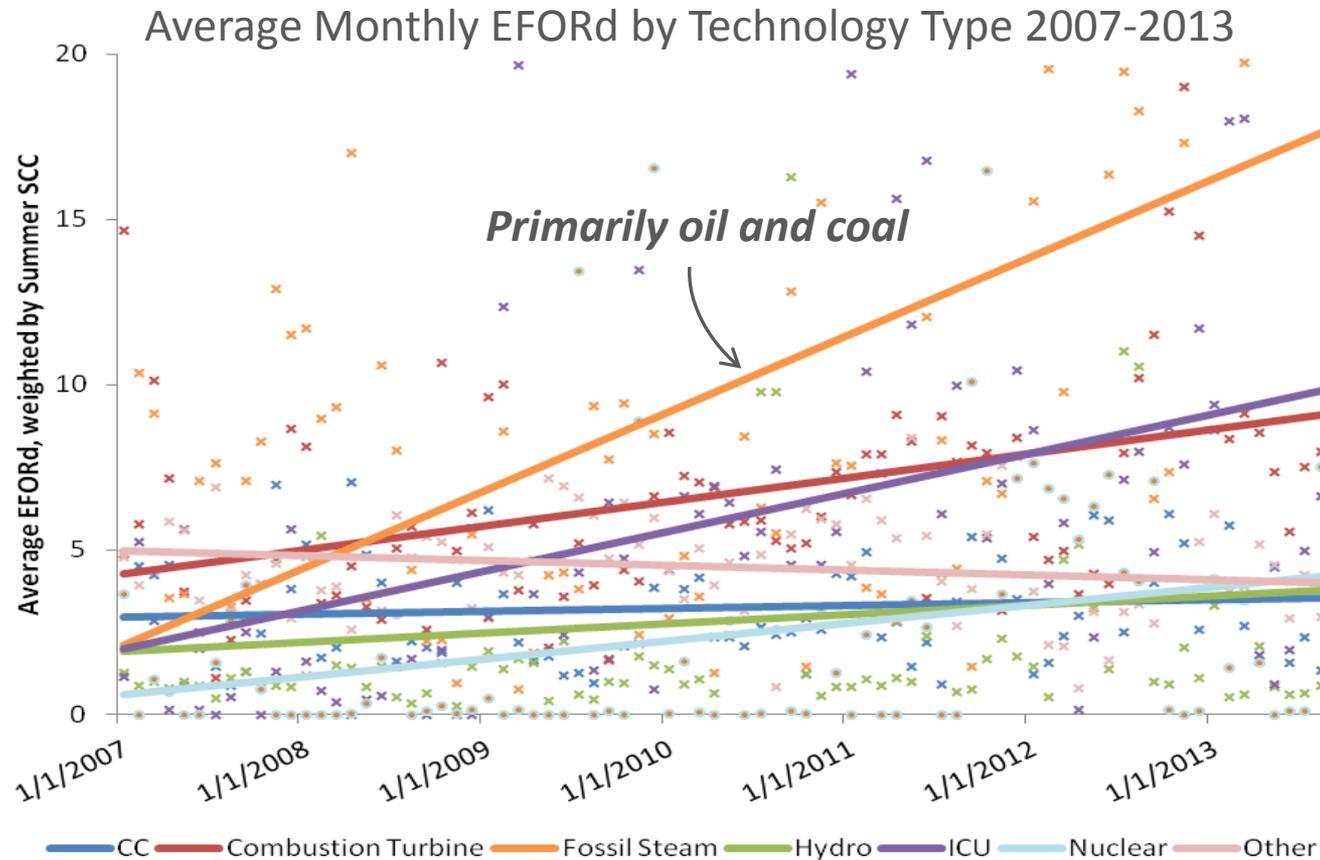
System Average Annual Generation EFORd Rate (%)  
with 2007-2013 Trend line



Source: NERC Generation Availability Data System (GADS), ISO New England; EFORd – Equivalent Demand Forced Outage Rate.

# Outages Are Trending Upward in all Categories

*Older, fossil-steam units (oil and coal) are driving this trend*



Source: NERC Generation Availability Data System (GADS), ISO New England

# ISO-NE IS IMPLEMENTING MARKET-BASED ENHANCEMENTS TO IMPROVE GENERATOR PERFORMANCE

# Forward Capacity Market: Overview

- Procures capacity to meet New England's forecasted Installed Capacity Requirement (ICR) three years in the future
- Allows new capacity projects to compete in the market and set the price for capacity in the region
- Selects a portfolio of supply and demand resources through a competitive Forward Capacity Auction (FCA) process
  - Resources must be pre-qualified to participate in the auction
  - Resources must participate and clear in the auction to be paid for capacity
- Provides a long-term (up to 7-year) commitment to new supply and demand resources to encourage investment

# Why Did ISO Propose Capacity Market Design Changes?

- Capacity payments are poorly linked to resource performance
- Consequences for non-performance are negligible
- Pervasive and worsening performance problems with existing generators
- Lack of incentive for resource owners to make investments to ensure they can provide energy and reserves when needed
- Delays exit of poor performers from the market; creates a bias in the FCM to clear less-reliable resources
- Lack of investment poses serious threats to system reliability

*ISO's  
"Pay-for-Performance"  
proposal is a  
comprehensive solution  
to these problems*

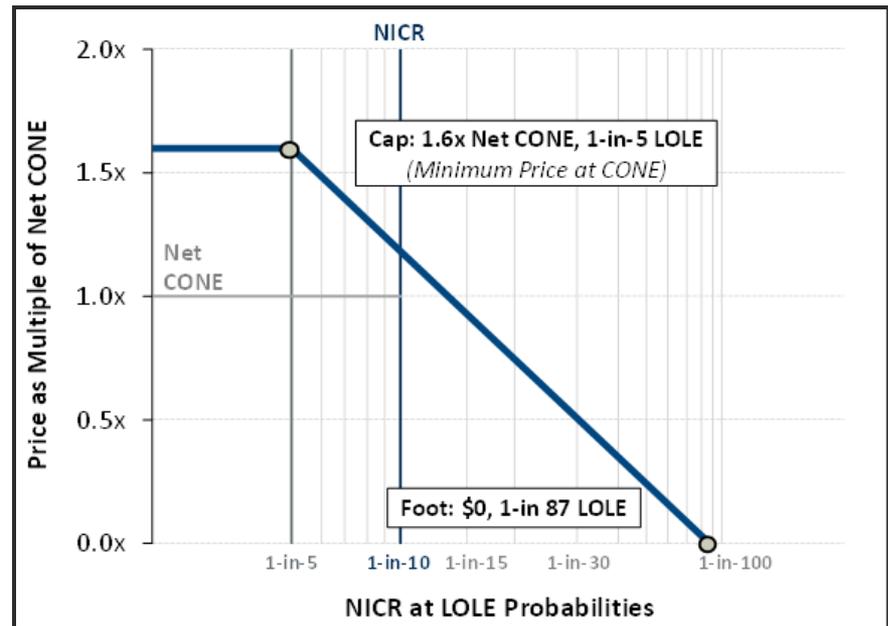
# Two FERC Orders Address Performance Issues

- FERC approved two Forward Capacity Market enhancements that will improve resource adequacy and resource performance in the longer term (June 2018 and beyond)
  - **Sloped demand curve:**
    - Smooths the boom-and-bust cycle of investment when the region is either just short, or just long, on capacity
    - Cost of new entry is based on an efficient gas combined cycle generator
    - Seven year price ‘lock in’ for new resources to incent new entry
    - Tailored accommodation for ‘out of market’ renewable contracts
  - **Pay-for-Performance:**
    - Capacity payments during stressed system conditions will be closely tied to performance
    - Energy market prices (Reserve Constraint Penalty Factor) will be increased to reflect scarcity conditions

# Sloped Demand Curve Effective for FCA #9

*FERC approved ISO proposal in May for effect in February 2015 auction*

- Solves significant flaws in the existing FCM design
  - Eliminates the binary nature of existing vertical demand curve
  - Smooths the boom-and-bust cycle of investment when region is either just short, or just long on capacity
- Alleviates the need for administrative pricing rules
  - Insufficient competition and insufficient supply



The illustration above depicts the proposed demand curve filed with FERC on April 1, 2014, which received strong support from NEPOOL.

# FCM Pay-For-Performance is a Long-Term Solution to Strengthen Resource Performance

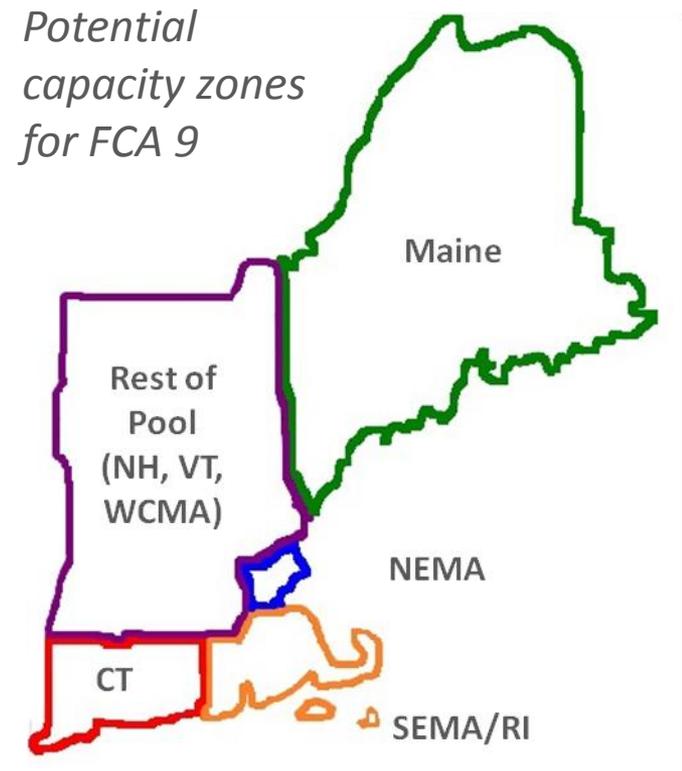
- ISO developed Pay-for-Performance approach in the Forward Capacity Market to strengthen financial incentives for resources to perform
  - Over-performing resources will be paid a premium through revenue transfers from under-performing resources
- Incentive will drive resources to perform when and where needed, including creating a strong incentive for investment in more secure fuel arrangements
- FERC approved market rule changes this year to be effective for the next capacity auction (February 2015), which affects resource commitments beginning June 1, 2018
- PFP design provides for a resource-neutral capacity market

# NEW ENGLAND IS DEVELOPING ADDITIONAL RELIABILITY INITIATIVES

*Further zonal modeling in the capacity market and winter  
reliability enhancements*

# Modeling Additional Capacity Zones Shows Areas With a Potential Shortfall or Surplus of Capacity

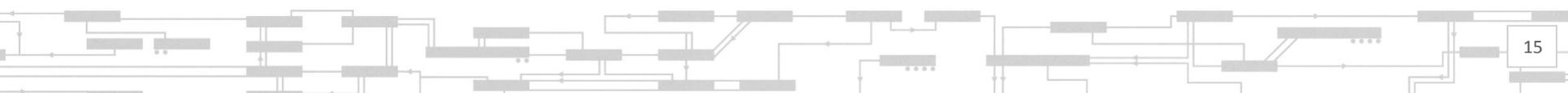
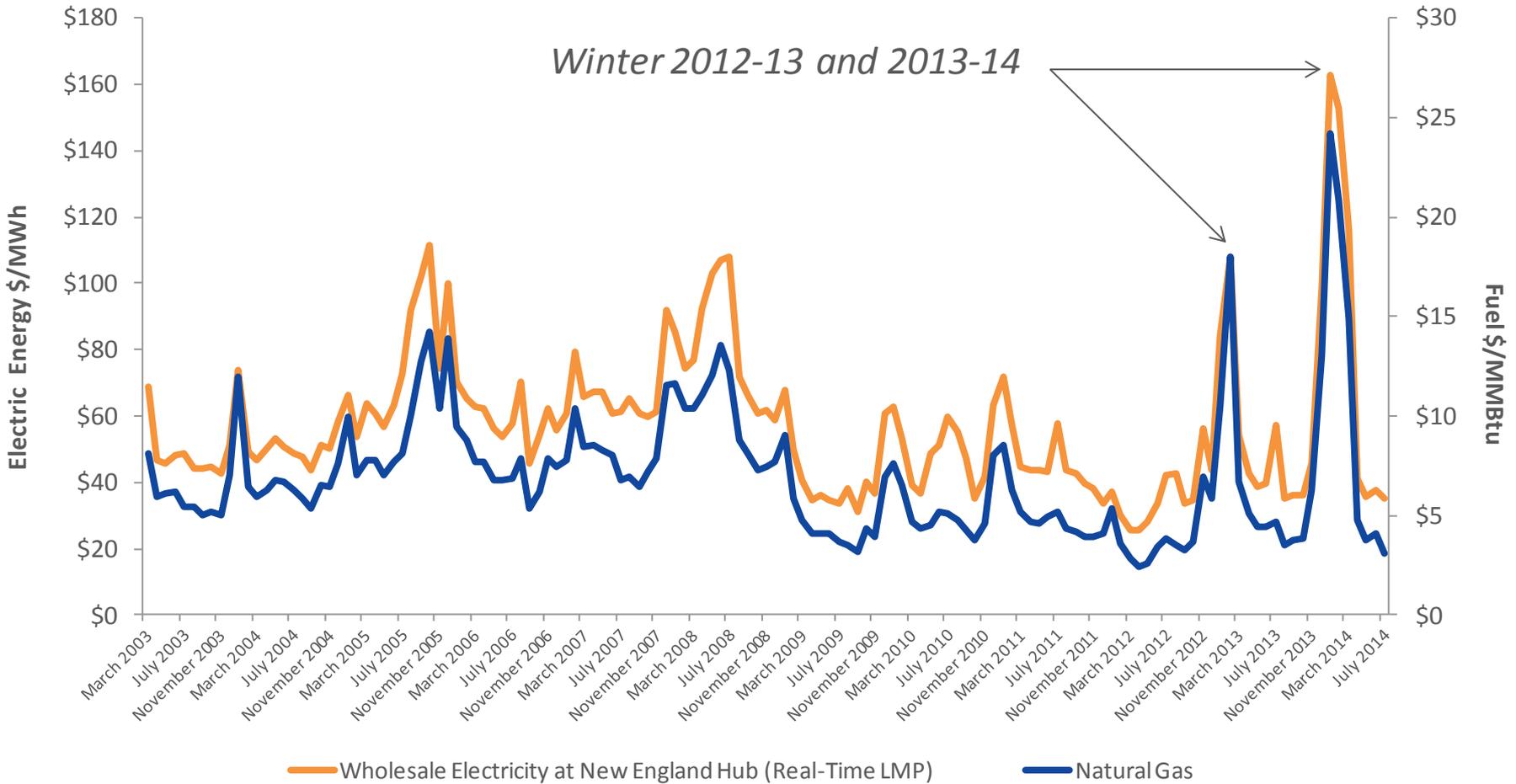
- ISO models both import- and export-constrained areas
- **Two zones** in the first six auctions  
*Maine and Rest of Pool*
- **Four zones** in the past two auctions (FCA 7 and 8)  
*Maine, Northeast Massachusetts, Connecticut, and Rest of Pool*
- FERC recently approved new zonal modeling criteria
- ISO could model **five zones** in the next capacity auction (FCA 9)



# 2013-2014 Winter Operations Were Challenging

- January ranked among the coldest months in recent history
  - 9 days were in the coldest 5% of days over the past 20 years
- New England experienced *sustained* high natural gas prices
  - ISO frequently operated with little or no gas-fired generation
  - High natural gas prices made many oil-fired generators economic
- Gas pipelines were constrained even without significant use by gas-fired generators
- Generation fleet is operating with limited fuel inventories (other than nuclear and coal resources)
- Oil supply chain is increasingly constrained
- Oil-fired generators were vitally important to reliability this winter

# High Gas Prices Drove Wholesale Electricity Prices to Record Levels Over the Past Two Winters



# 2014-2015 Winter Reliability Program

- Following the success of the 2013-2014 Winter Reliability Program, ISO-NE has received FERC approval for a second, three-month (12/1/14-2/28/15) Winter Reliability Program to strengthen reliability for winter 2014-2015
- The upcoming Winter Program will focus on dual-fuel resource participation in the markets:
  - Additional compensation will be provided to offset commissioning costs and for unused oil inventory
- Additional compensation will also be provided for:
  - Unused oil inventory of non-dual-fuel resources
  - Unused LNG contract volume of pipeline gas resources
  - Demand-response resources (similar to Winter 2013-2014)

# Conclusions

- Growing dependence on natural gas for power generation is the highest-priority strategic risk for New England
- Changes to ISO's electricity markets will strengthen resource performance and seek the most economic market solutions, but these changes alone won't spur long-term investment in region-wide infrastructure
- The region needs to find a way forward to secure the natural gas infrastructure it needs to ensure a reliable electric system

