

Meeting Natural Gas-Electric Interdependency Challenges Through Market Enhancements



*US Department of Energy's Electricity
Advisory Committee*

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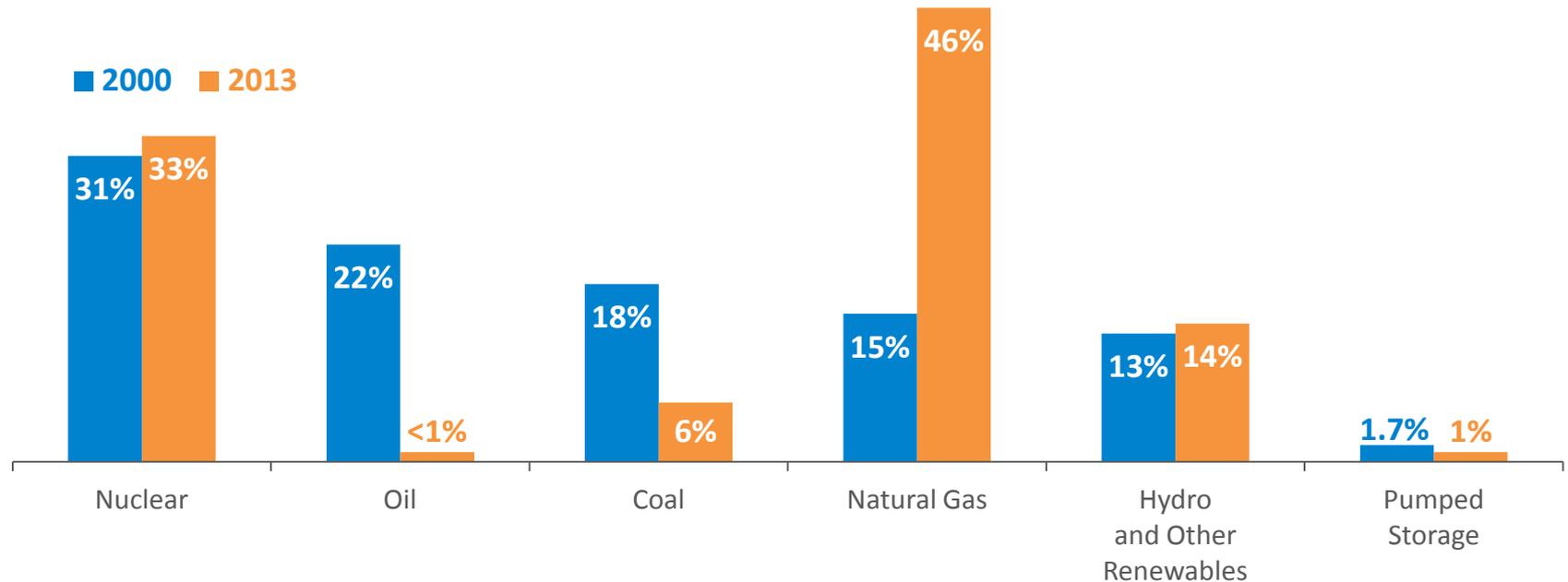
NEW ENGLAND IS EXPERIENCING A TRANSITION AWAY FROM TRADITIONAL FOSSIL-FIRED RESOURCES

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)

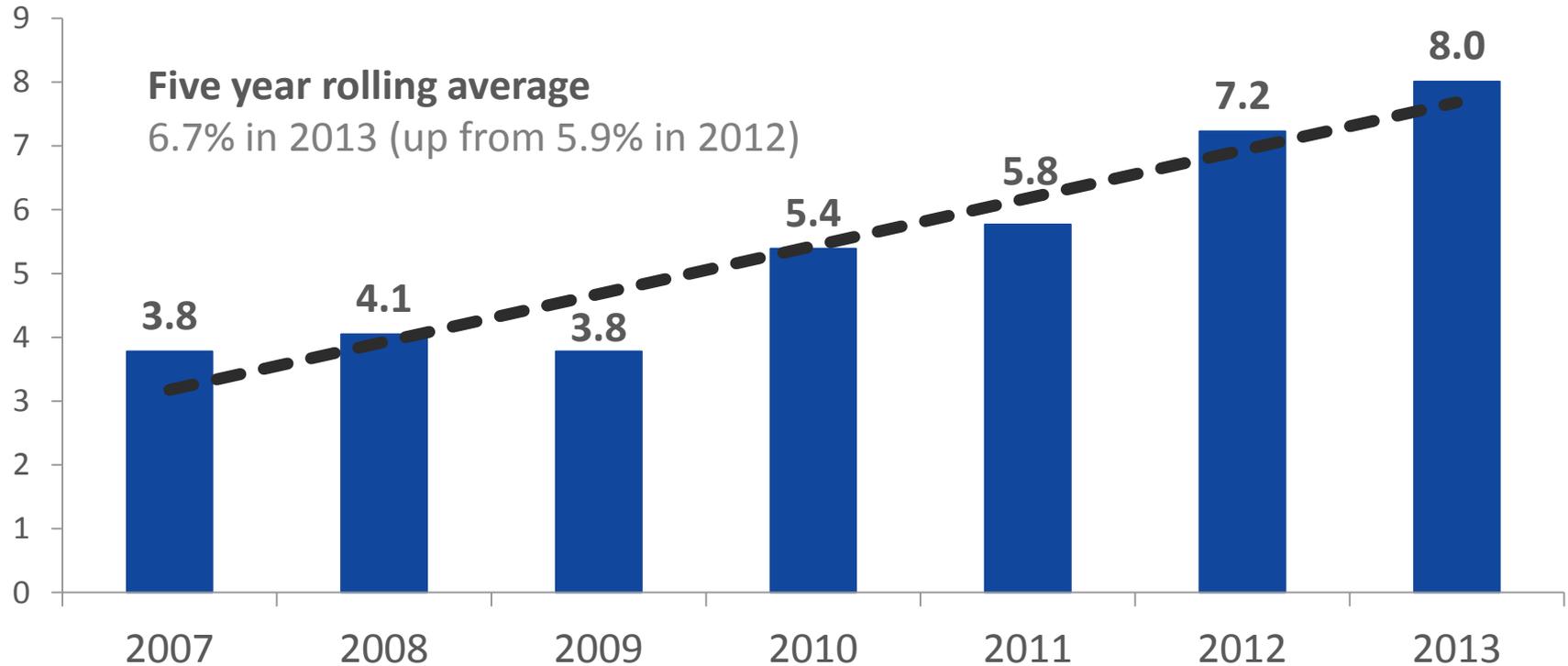


Source: ISO New England [Net Energy and Peak Load by Source](#)

Fleet-wide Forced Outages Are Increasing

Performance under stressed conditions is a growing problem

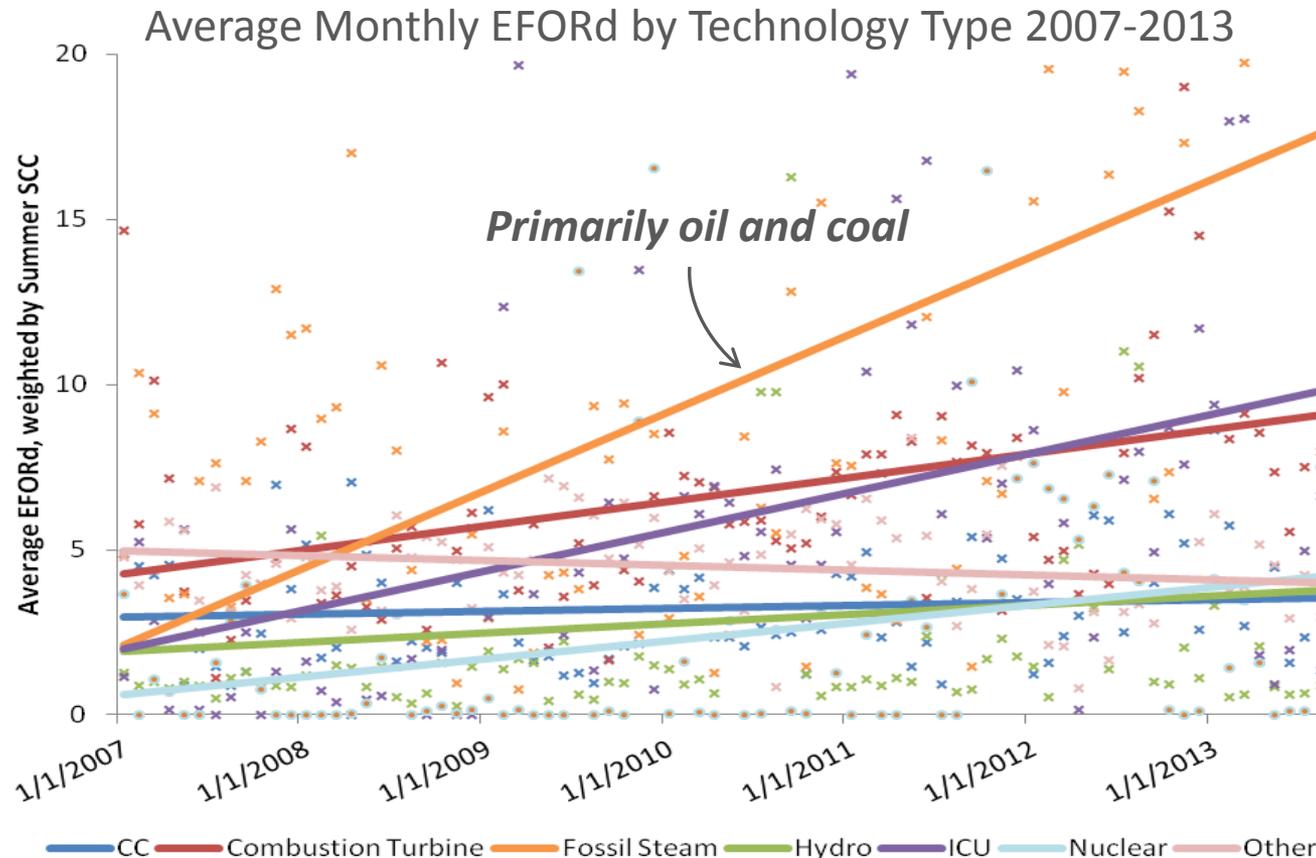
System Average Annual Generation EFORd Rate (%)
with 2007-2013 Trend line



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*

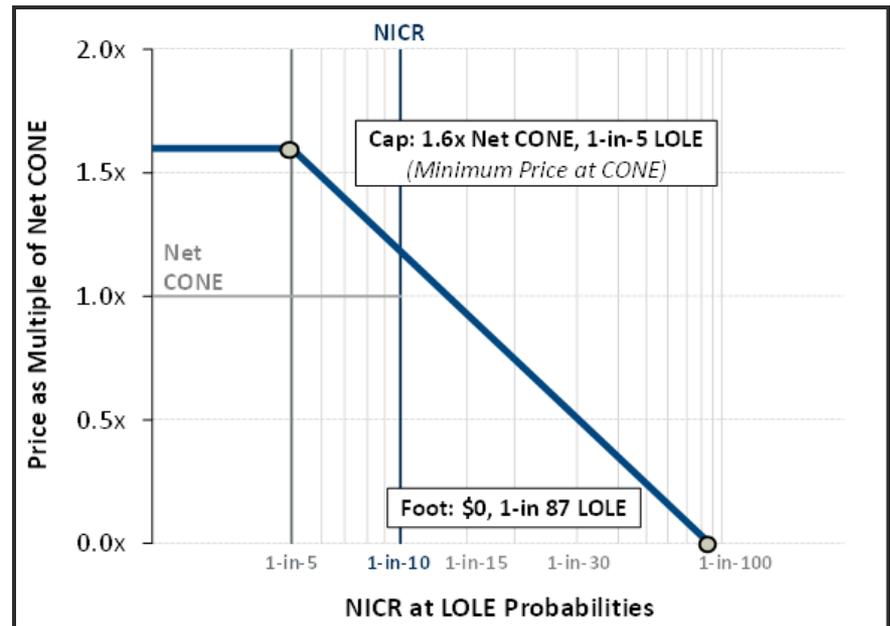
Two FERC Orders Address Performance Issues

- 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

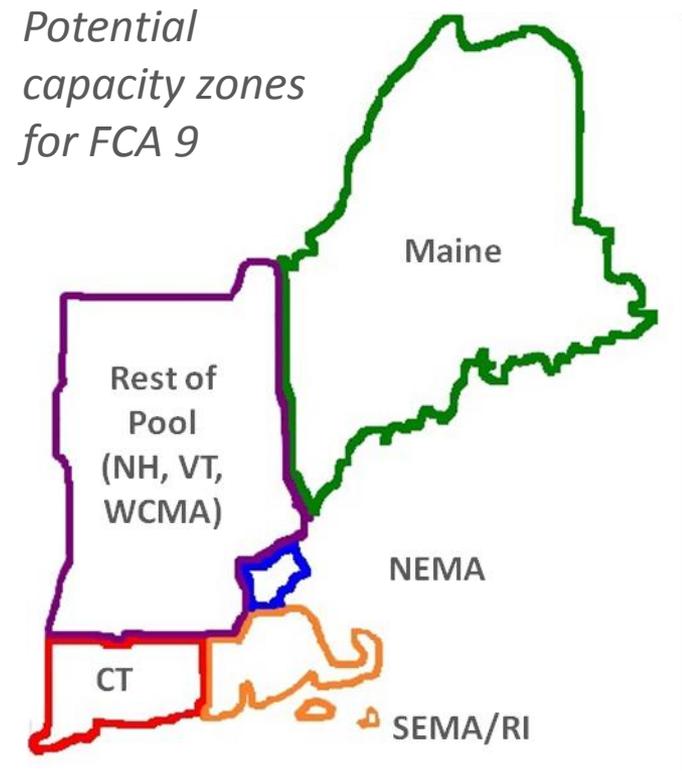
- ISO developed Pay-for-Performance approach in the Forward Capacity Market to strengthen financial incentives for resources to perform
 - Over-performing resources will be paid a premium through revenue transfers from under-performing resources
- Incentive will drive resources to perform when and where 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

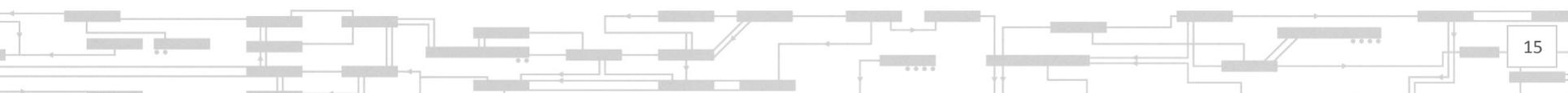
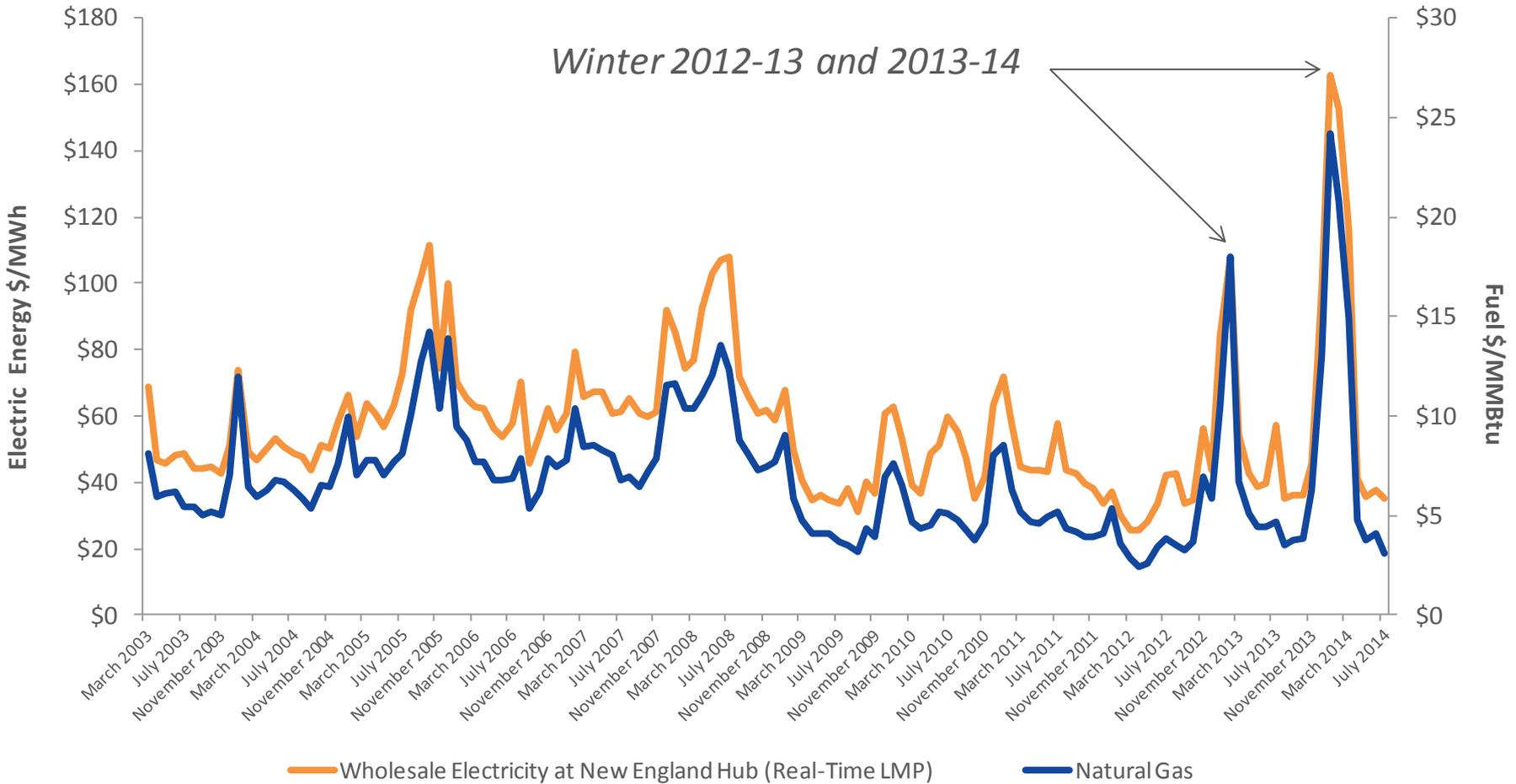
- ISO models both import- and export-constrained areas
- **Two zones** in the first six auctions
Maine and Rest of Pool
- **Four zones** in the past two auctions (FCA 7 and 8)
Maine, Northeast Massachusetts, Connecticut, and Rest of Pool
- FERC recently approved new zonal modeling criteria
- ISO could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

Questions

