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Gas Fired Generation of Electricity

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OCTOBER 9, 2014 | FALMOUTH, MAINE

Natural Gas: Implications on Electric Reliability and Price

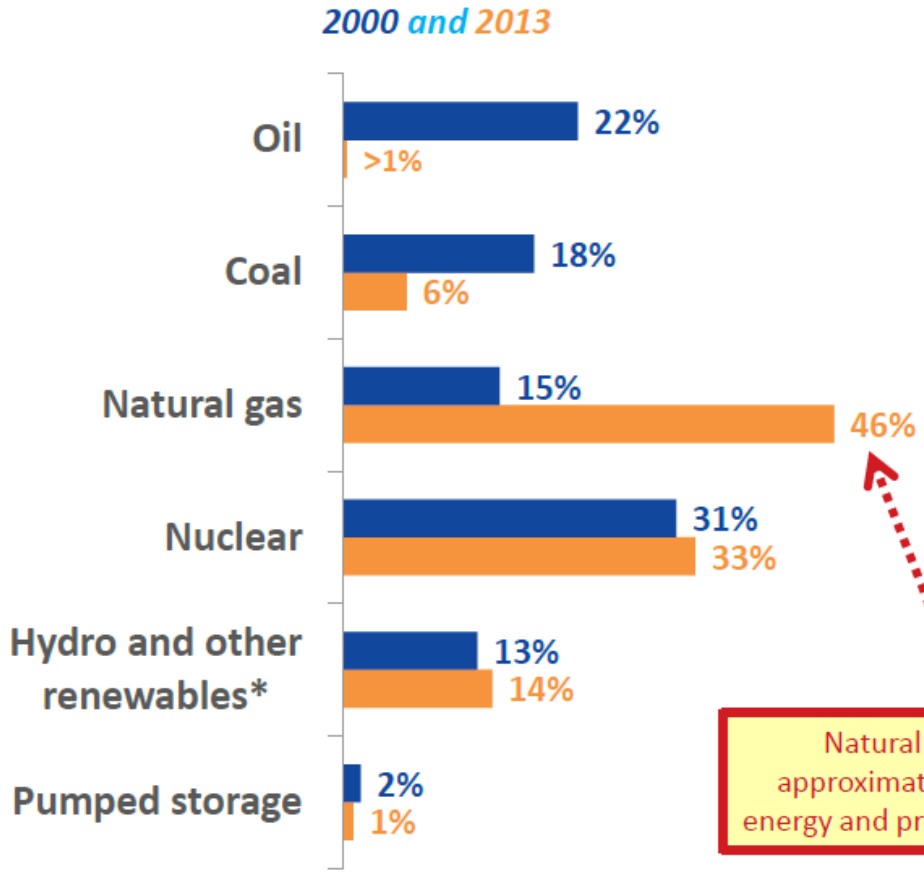
Natural Gas: Continued Growth in Maine?

Anne George

VICE PRESIDENT, EXTERNAL AFFAIRS AND CORPORATE COMMUNICATIONS

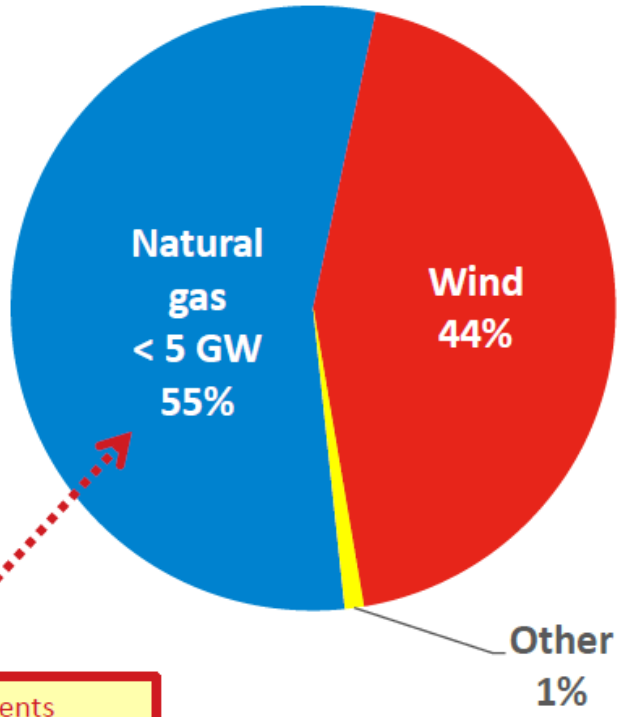
Heavy Natural Gas Reliance

Regional Electric Energy Production



* *Other renewables* include landfill gas, biomass, other biomass gas, wind, solar, municipal solid waste, and misc. fuels.

Proposed Generation

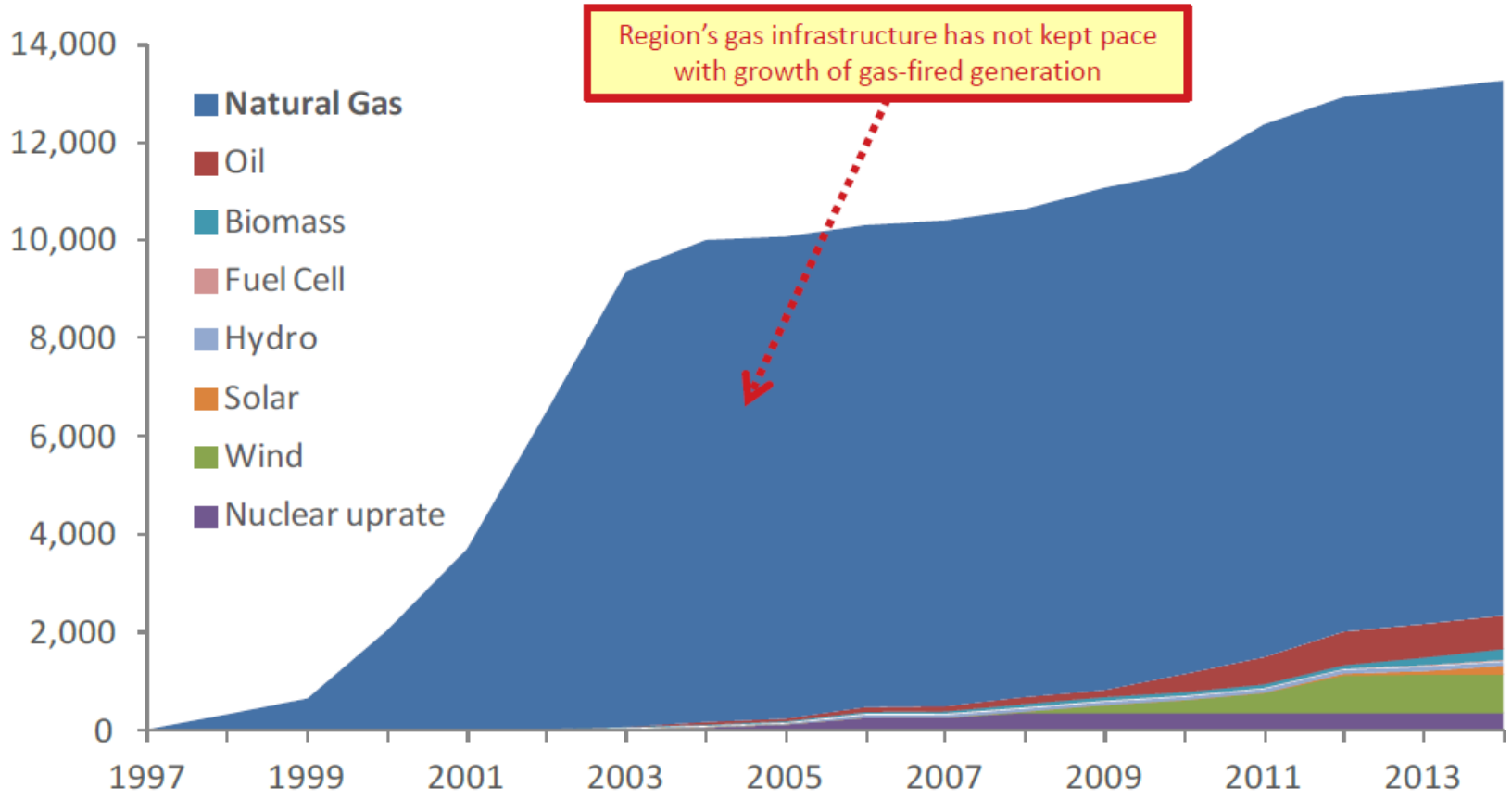


Natural gas represents approximately half of region's energy and proposed power plants

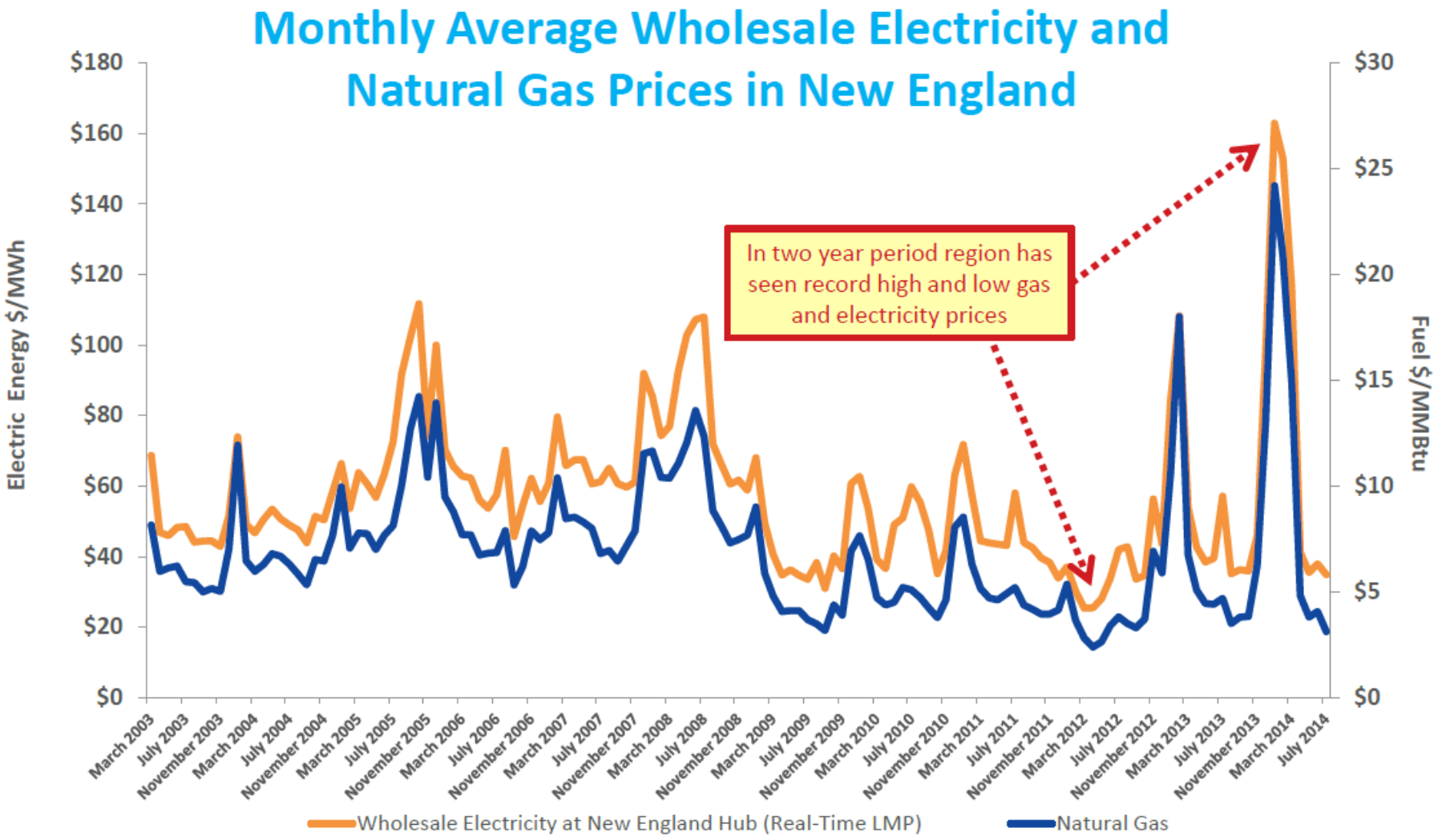
Source: ISO Generator Interconnection Queue (September 2014)
FERC Jurisdictional Proposals Only

Gas-Fired Generation Has Grown Significantly

Cumulative New Generating Capacity in New England



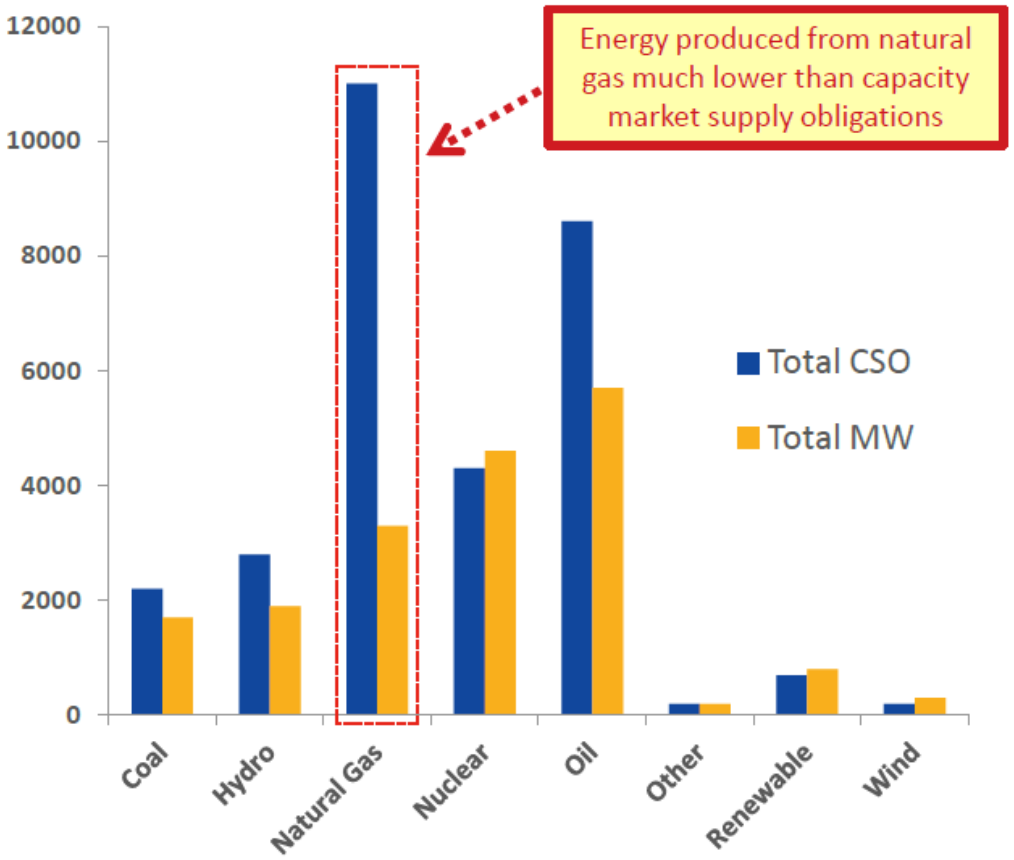
Wholesale Electricity Prices Track Natural Gas



Operational Challenges Experienced Past Winter

Total MW Generated vs. CSO

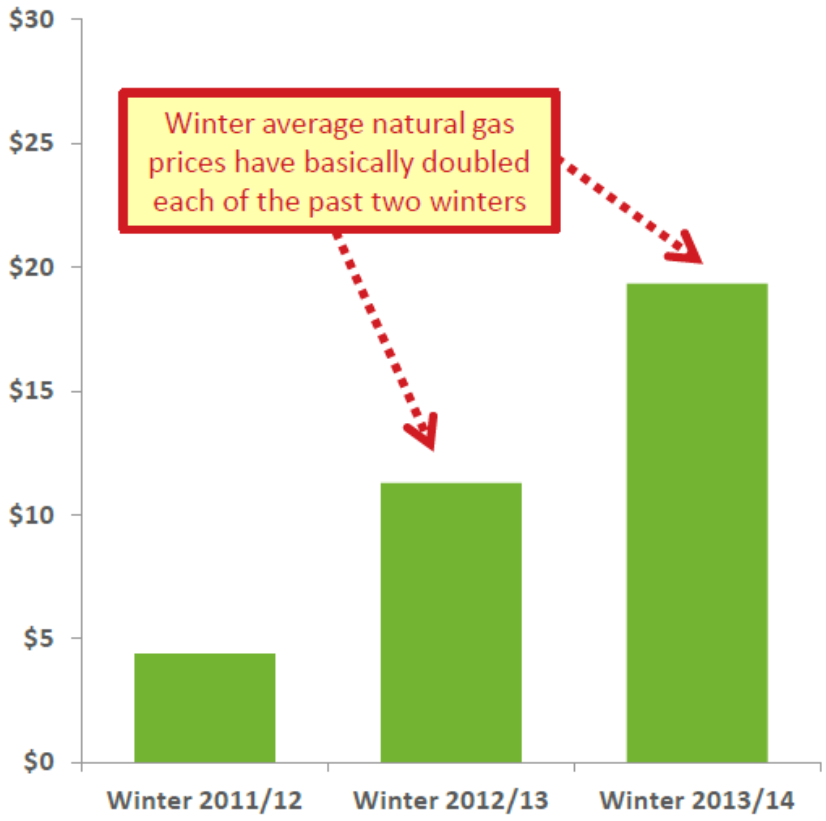
January 28, 2014 – Evening Peak Snapshot



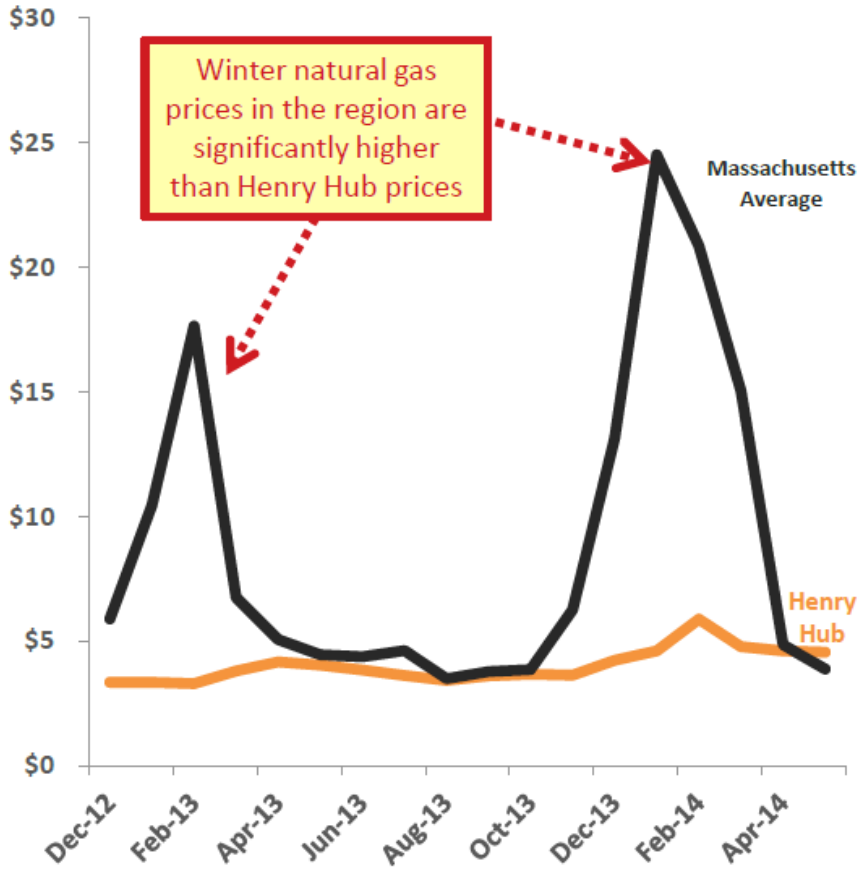
- Natural gas generators produced far less than capacity this past winter
  - Oil inventory was vitally important to reliability
- Gas pipelines constrained even without significant use by generators
- Unless weather is mild, next winter will be more challenging given retirements

Winter Gas Prices Have Grown Over Recent Winters and Are High Relative to Henry Hub

Winter Averages $/MMBtu



Monthly Average $/MMBtu



Enhancements to Improve Reliability

- Energy Market Offer Flexibility
- Shortage Event Trigger Modification
- 2013/14 Winter Program
- 2014/15 Winter Program
- Future winter programs
- Pay for Performance

Market rules and programs
to provide incentive
for generators
to secure fuel arrangements

Natural Gas: Continued Growth in Maine?

New England States Committee on Electricity

Heather Hunt
October 9, 2014

NESCOE

New England's Regional State Committee governed by a Board of Managers appointed by each of the New England Governors to represent the collective views of the six New England states on regional electricity matters

- **Focus**: Resource Adequacy, System Planning & Expansion

- **Resources**: 6 full-time staff with diverse disciplines & experience. Consultants, primarily for transmission engineering, economics & independent studies

- **More information**: including filings & comments at www.nescoe.com

Overview

- Regional Challenges: Reliability & Economic Disparity
- New England Governors' Infrastructure Initiative
- Stakeholder interactions to date
- Status of state discussions and feedback requests

New England requires a reliable, secure, and cost-competitive electric system to sustain and grow its economy

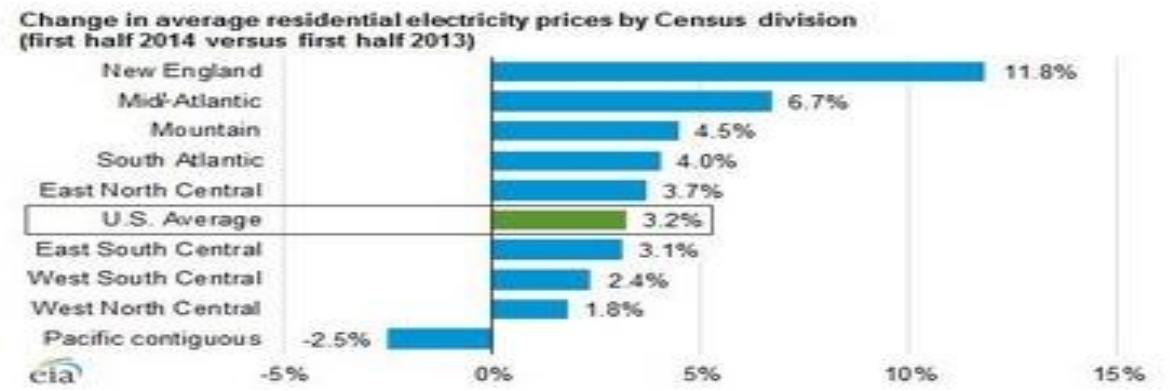
- "**The challenges to grid reliability are not a question of if they will arise, but when - and when is now**."

  - *Gordon van Welie, CEO, ISO-NE, 2014 Regional Electricity Outlook*

- *Forbes on ISO-NE's 2013/2014 Winter Program*: "**The strategy was expensive and dirty, but it was probably the only reason New England avoided rolling blackouts this winter**."

DOE EIA

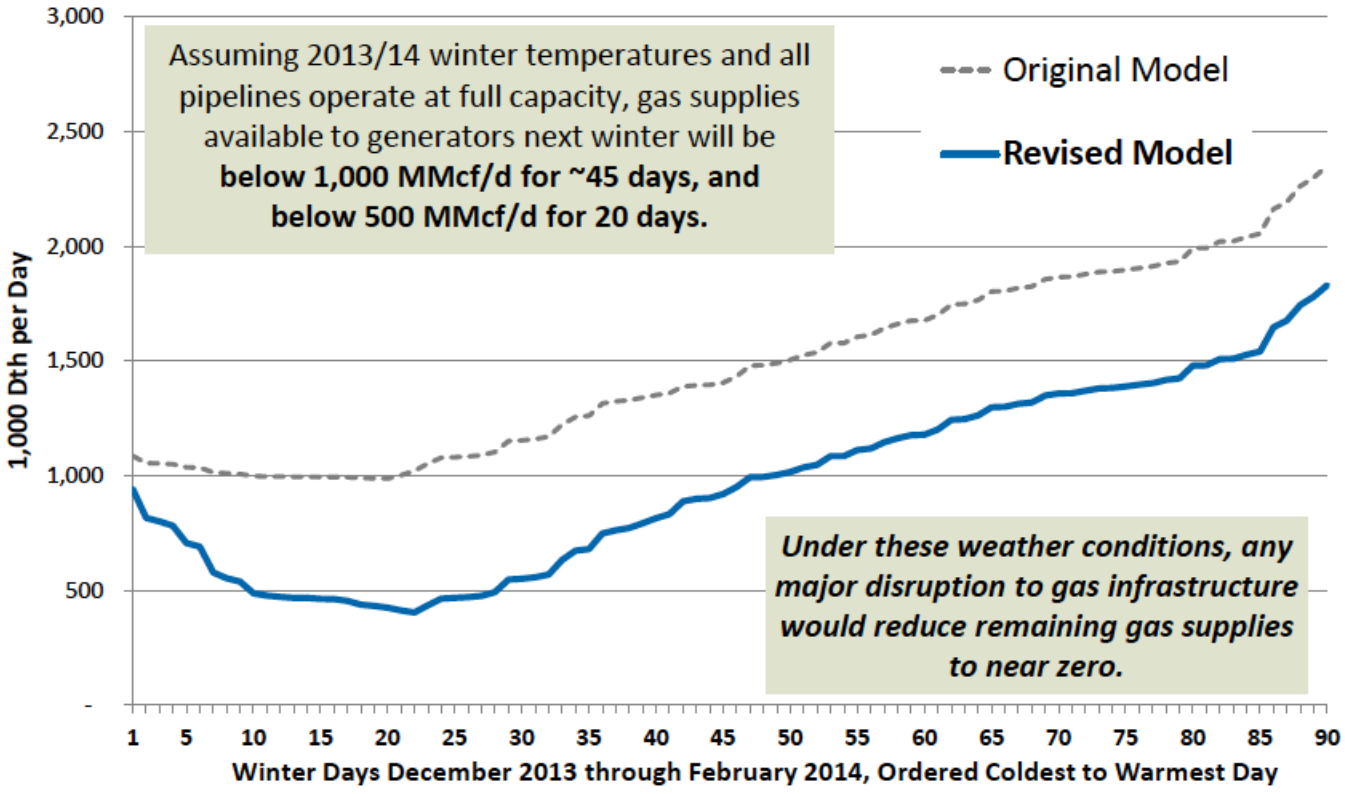
New England price increases triple the national average increase



Incorporating the Winter 2013/2014 experience into the forecast exacerbates the reliability outlook

Revised Model Results for 2014/15 Winter:

Gas Supplies Remaining for Electric Generators



Source: ICF International

Incorporating the Winter 2013/2014 experience into the forecast exacerbates the reliability outlook

- ICF International's "revised projections for gas supplies available to electric generation throughout the winter average nearly 500 MMcf/d lower" than previous projections.

- According to ICF, assuming 2013/14 winter temperatures and all pipelines operate at full capacity, gas supplies available to generators for the Winter 2014/2015 will be:
  - below 1,000 MMcf/d for ~45 days and
  - below 500 MMcf/d for 20 days.

These volumes represent approximately 40% and 20%, respectively, of the total gas-fired resources with commitments to provide capacity throughout the winter.

Source: April 29, 2014 ICF International presentation to ISO-NE Planning Advisory Committee

Market-Based Pipeline Solutions Not Meeting New England's Needs

Gas and Electricity Markets' Term Mismatch

- Nationally, the natural gas pipeline industry is based on long-term contractual commitments (i.e., at least 10 years, commonly 15-20 years)
- In New England, the electric industry is based on short-term market price signals (up to seven years for new resources, year-to-year for existing)

Recent pipeline projects in New England have had zero electric power generators subscribe for firm natural gas transportation

Spectra's AIM project was downsized from original design due to lack of subscription from 500 mmcf/day to 342 mmcf/day

Urgent Need for Action

Absent significant change…

- New England's power system will be increasingly vulnerable to electric service disruptions
- Consumers will needlessly pay more for energy than consumers in nearby states and elsewhere
- Our region will remain at an unacceptable economic and competitive disadvantage to neighboring states and regions

After lengthy and robust regional discussions of potential solutions, no other comprehensive long-term solution has emerged to move New England beyond the status quo.

Think *locally*…

The New England states are committed to continued, robust investment in clean energy and energy-alternative resources…

- Energy efficiency
- Distributed Renewable Generation
- Renewable Energy Standards
- Utility-scale development of Renewable Energy

Importantly, many of these investments generate local economic opportunities and create local jobs, while diversifying the regional fuel mix.

…and act *Regionally*

The problem is too big for any one state to solve – our energy system crosses borders, is highly integrated

- A **reliable** bulk electric system is a necessity to local health and safety, and to our shared economy.
- The New England states share common **economic, environmental, and energy goals**.
- New England is **competing** with other regions to attract new businesses and investment opportunities.

The New England Governors' Energy Infrastructure Initiative

The concept: to make strategic, coordinated investments in regional energy infrastructure that would

- Improve energy **system reliability**
- **Diversify** our energy **supply** portfolio
- Strengthen state and regional **economic competitiveness**
- **Meet** common energy and environmental **policy goals**
- **Increas**e the **supply** of cleaner, no-to-low carbon generation
- **Mitigate energy price volatility**
- *Achieve what no single state could do on its own.*

Energy Infrastructure Initiative

States have been working on two major energy incremental infrastructure investment strategies

1. **Expand pipeline capacity** to increase natural gas supply into New England, reducing supply constraints and associated energy price volatility.

1. **Expand electric transmission** to facilitate utility-scale development and delivery of no-to-low carbon energy resources.

One Possible Means to Expand Natural Gas Capacity

- Drive investment in pipeline infrastructure by allowing for recovery of costs through FERC electric tariffs.
- Costs shared appropriately across the six New England states.
- Ensure any new capacity will be made available in a manner that primarily benefits electricity customers.
- Tariff & cost allocation would have FERC process and require FERC approval.
- Request proposals, through a competitive solicitstion, priced in increments of 200 mmcf/day to allow the evaluation of the cost of adding sufficient increments of additional capacity to achieve levels of at least 1bcf above 2013 levels.

Expanding Transmission to Facilitate Clean Energy

- Issue one or more coordinated RFPs to advance the development of transmission and delivery of clean energy into New England.

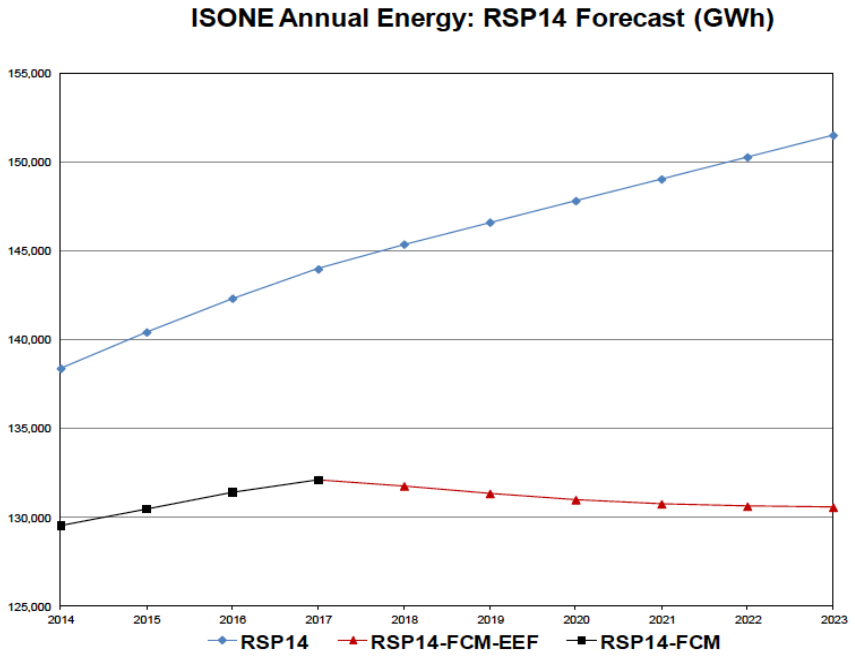
- Transmission infrastructure costs recovered through ISO-NE tariff or through merchant projects in a manner that ensures costs are shared appropriately among the states.

- Depending on procurement structure, a subset of states (directly or through their utilities) may procure the power to ensure its delivery into the region.

Incremental infrastructure is in addition to, not in lieu of, sustained, aggressive investment in energy efficiency and other clean energy resources

- Four New England states - **Massachusetts, Connecticut, Rhode Island, Vermont** - are in the top ten states nationally for energy efficiency, based on ACEEE rankings. Massachusetts ranks first for the third consecutive year.

- Aggressive investment is reflected regional planning, at states' request:
  - The 2018-2023 ISO-NE EE Forecast shows MA will invest another $3 billion over the time period for savings of at least 4.5 TWh and 605 MW.
  - The New England states together will invest $5.7 billion for total savings of 9.1 TWh and 1.2 GW by 2023



Source: ISO New England

Clean energy policies and improving economics driving growth in distributed renewable resources

- To determine the level of solar PV penetration New England is likely to experience in the next ten years, ISO-NE developed, at states' request, a solar PV forecast based on policies with reliable funding sources in each state.
- After discounting for uncertainty and seasonal capability, the region expects almost 500 MW of installed solar by 2018 and up to 632 MW by 2023.

ISO New England Interim Solar Photovoltaic (PV) Forecast

States	Estimated Summer SCC (MW)											Totals
	Through 2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
CT	25.8	16.2	13.8	18.5	12.1	12.1	4.6	4.6	4.6	4.6	4.0	**120.9**
MA	126.6	59.0	41.1	38.7	36.3	34.5	34.5	34.5	11.5	11.5	11.5	**439.7**
ME	2.8	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	**8.8**
NH	2.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.2	0.2	**9.4**
RI	3.8	2.6	1.9	1.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	**12.4**
VT	12.6	7.0	4.7	2.4	2.3	2.3	2.3	2.3	2.3	2.3	0.6	**41.1**
Regional - Annual Summer SCC (MW)	**174.5**	**86.3**	**62.9**	**62.3**	**52.4**	**50.7**	**43.1**	**43.1**	**20.1**	**19.6**	**17.4**	**632.3**
Regional - Cumulative Summer SCC (MW)	**174.5**	**260.8**	**323.7**	**386.0**	**438.4**	**489.0**	**532.1**	**575.2**	**595.3**	**614.9**	**632.3**	**632.3**

Source: ISO New England

Governors' Communications

Six New England Governors' Statement, December 2013

- "To ensure a reliable, affordable and diverse energy system, we need investments in additional energy efficiency, renewable generation, natural gas pipelines, and electric transmission…."
- "…advance a regional energy infrastructure initiative that diversifies our energy supply portfolio while ensuring that the benefits and costs of transmission and pipeline investments are shared appropriately among the New England States"

Request to ISO-NE for technical, related support, January 2014

- Requested assistance to advance the development of transmission infrastructure that would enable delivery of 1200 MW - 3600 MW of no and/or low carbon emissions resources into New England electric system
- Requested assistance to develop and file tariffs with FERC enabling the recovery of the cost of firm natural gas pipeline capacity and infrastructure expansion

Stakeholder Interactions

- Input from New England Gas-Electric Focus Group on gas level
  - Generally advised to procure higher levels than states initially identified
- Constructive informal conversations by and between stakeholders and states
- NEPOOL Participants Committee monthly updates and NEPOOL Transmission Committee presentations on tariff proposals
- Meetings with each NEPOOL Sector
  - Common Issues/Questions
    - Whether supportive or concerned about state action, generally consistent agreement that New England has a problem to solve
    - Nature of the problem: reliability & economic competitiveness
    - Markets vs. other means
    - Role of ISO-NE
- Multiple requests for NEPOOL and New England Gas-Electric Focus Group comments on gas concepts, related issues

Natural Gas Pipeline Development Concept

- On multiple occasions and in several forums, New England states have sought comment on concepts through which to develop incremental gas pipeline for electric power system reliability.

- States heard from about 27 stakeholders by end of July 2014

- Among other items, the states solicited comments on:
  - Amount of natural gas needed for system reliability
  - Characteristics of contracting entity and capacity manager to best serve electric customers and minimize transaction costs
  - Alternative configurations and structural means to minimize market distortions and reduce overall costs
  - Specific proposals offered by stakeholders
  - Specific going-forward market adjustments that would eliminate the need for state action to ensure reliability and economic competitiveness

Snapshot of status through July

- ✓ States presented to NEPOOL a proposal on the tariff approaches for incremental transmission and natural gas pipeline to NEPOOL on June 20th
  - ✓ Looked toward a September NEPOOL vote and FERC filing with stakeholder input process thereafter
- ✓ Issued Request for Further Information on (Pipeline) Capacity Management, Other Concepts and Counterparty Interest
- ✓ Work on RFP draft to be released for public comment
- ✓ Once RFP issued proposals to be evaluated for cost effectiveness
  - ✓ Consumer benefits must outweigh consumer costs
- ✓ States continue to welcome comments, and any other input, at:

RegionalInfrastructure@nescoe.com

Current Status

July 31, 2014: Massachusetts Legislature adjourned without acting on a bill to enable MA to procure levels of no-and/or low- carbon power

August 1, 2014: NESCOE requested from NEPOOL an extension of the schedule for consideration of proposed tariff mechanism to provides Massachusetts state officials time to evaluate options associated with moving forward with other states on regional solutions to the regional energy infrastructure challenges that have significant reliability and economic competitive implications for New England consumers

Current:

- State officials talking with each other to explore ways forward on regional solutions
- Massachusetts conducting a study of Massachusetts state-level solutions in light of state policies

Appendix

Reliability & Economic Challenges

Current Price Projections

Natural Gas Pipeline Projects

Recent Analysis

Regional Challenges: Reliability & Economic Disparity

- FERC's *2012 State of the Market Report* identified New England "as a market particularly at risk for service disruption due to limited pipeline capacity into the region."

- "New England continues to be an area of focus" and constraints will persist.

- Winter 2013-14 Energy Market Assessment Report to the Commission, Oct. 2013

- Pipeline infrastructure constraints in New England create potential for gas supply interruption to gas-fired generators and a reliance on "back-up" fuel for reliability.

- NERC 2013-2014 Winter Reliability Assessment

Regional Challenges: Reliability & Economic Disparity

- "[P]otential gas unavailability threatens the reliability of the electric system due to the limited-capacity pipelines used to transport gas, potential gas supply interruptions, and the 'just- in-time' nature of the resource."

  - *ISO-NE, Strategic Planning Initiative, Addressing Gas Dependence, July 2012*

- The region's "dependence on natural gas is poised to increase and our operational options are becoming more limited."

  - *Gordon Van Welie, Testimony Before the House Energy & Commerce Committee, Subcommittee on Energy, Mar. 19, 2013*

- "New England could face significant reliability issues when natural gas-fired power generators are not able to dispatch as a result of the gas pipeline capacity constraints."

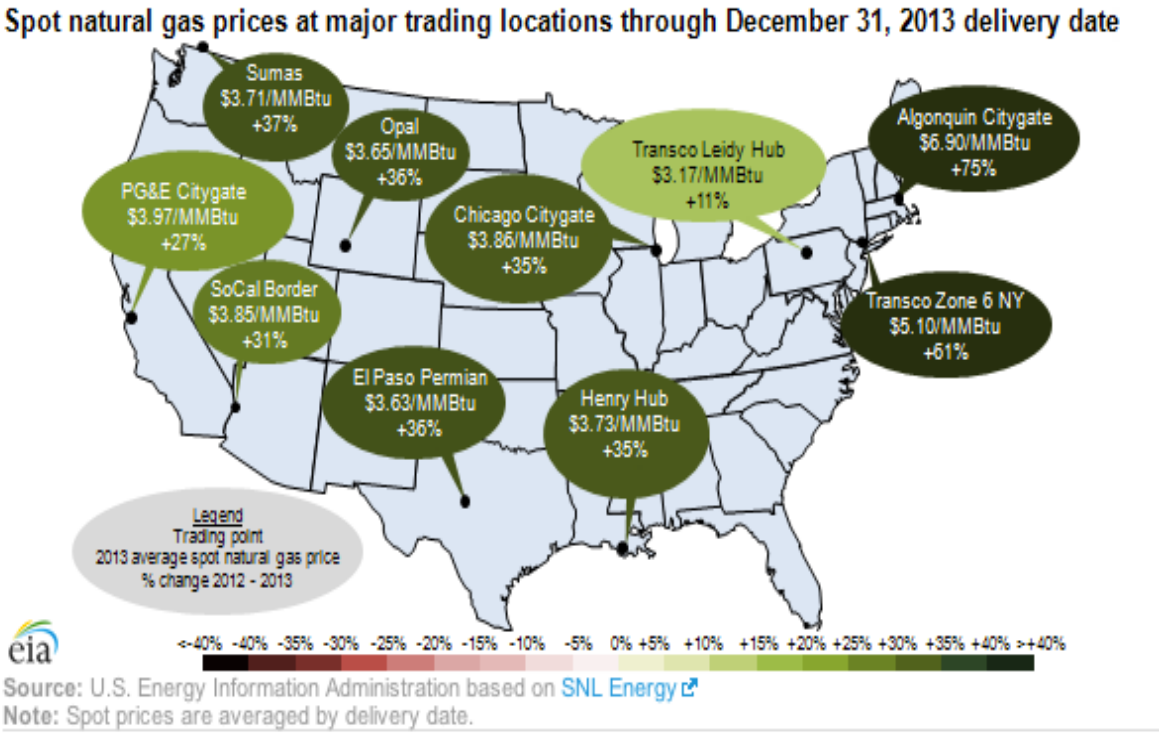
  - *NESCOE Phase III Study, fall 2013*

Retirements of non-gas resources increase the need for greater access to natural gas supply and no/low carbon resources that provide fuel source diversity.

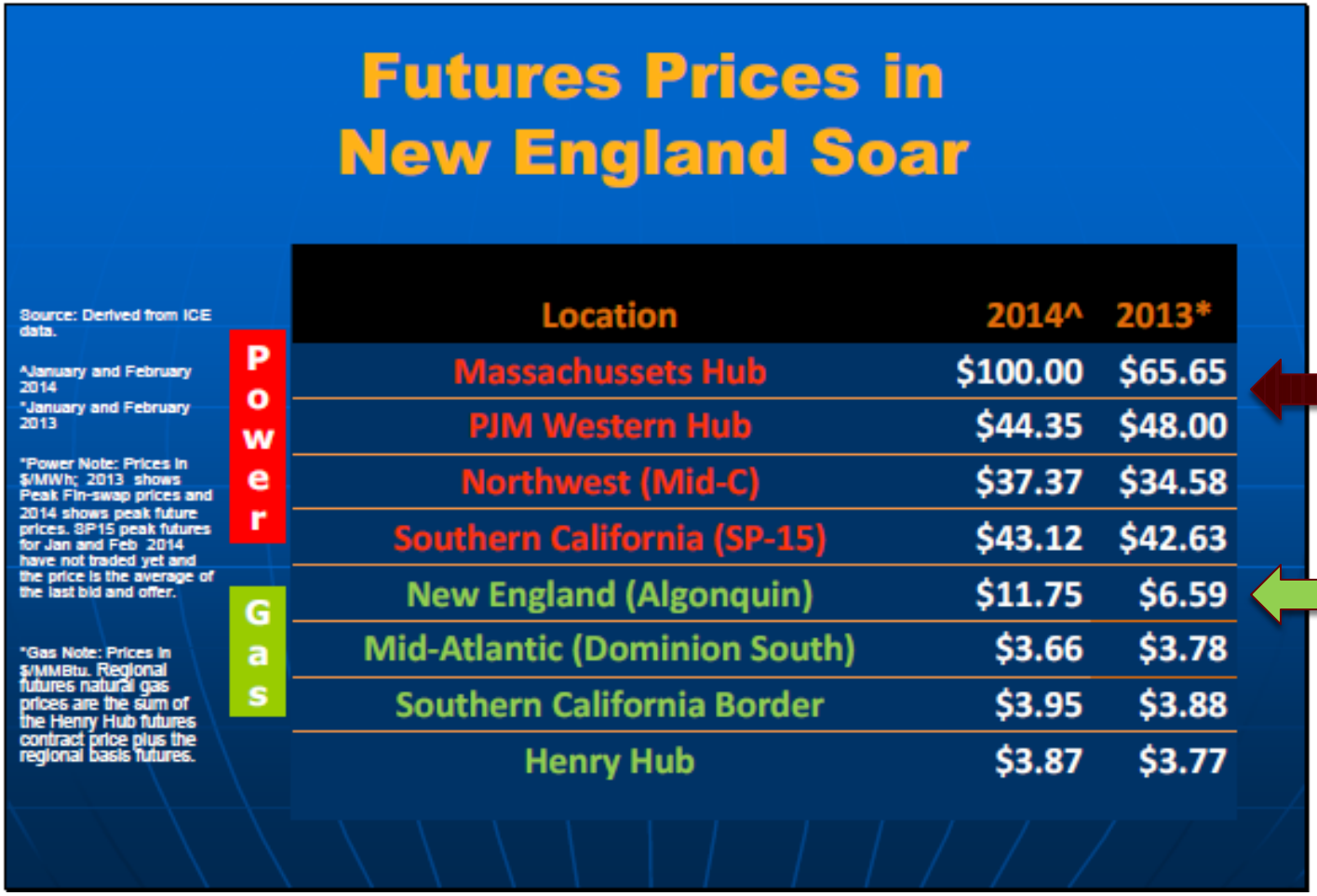
Regional Challenges: Reliability & Economic Disparity

- **New England has the highest natural gas prices in the U.S.**

- Spot price average over 2013 showed an **85%** basis differential – or **$3.17/MMBtu** – between Algonquin Citygate ($6.90/MMBtu) and Henry Hub ($3.73/MMBtu).



Regional Challenges: Reliability & Economic Disparity



New England power futures for Jan/Feb 2014 were more than 2x higher than the Mid-Atlantic region…

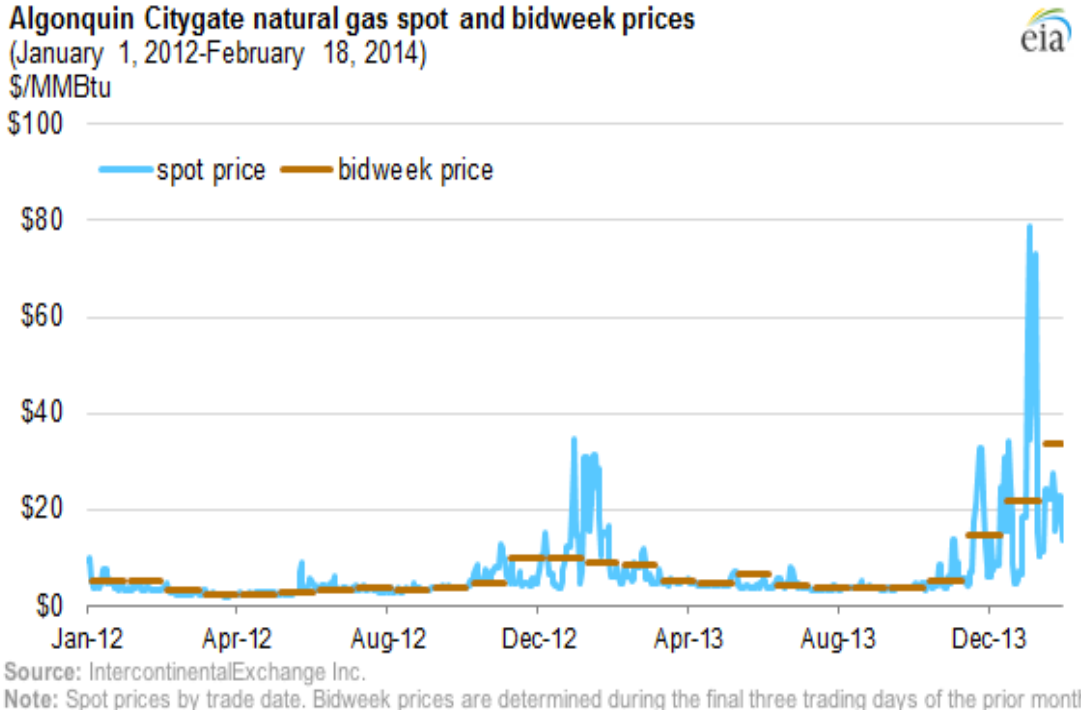
…and natural gas price futures were more than 3x higher.

- from FERC Winter 2013-2014 Energy Market Assessment Report, October 2013, slide 5.

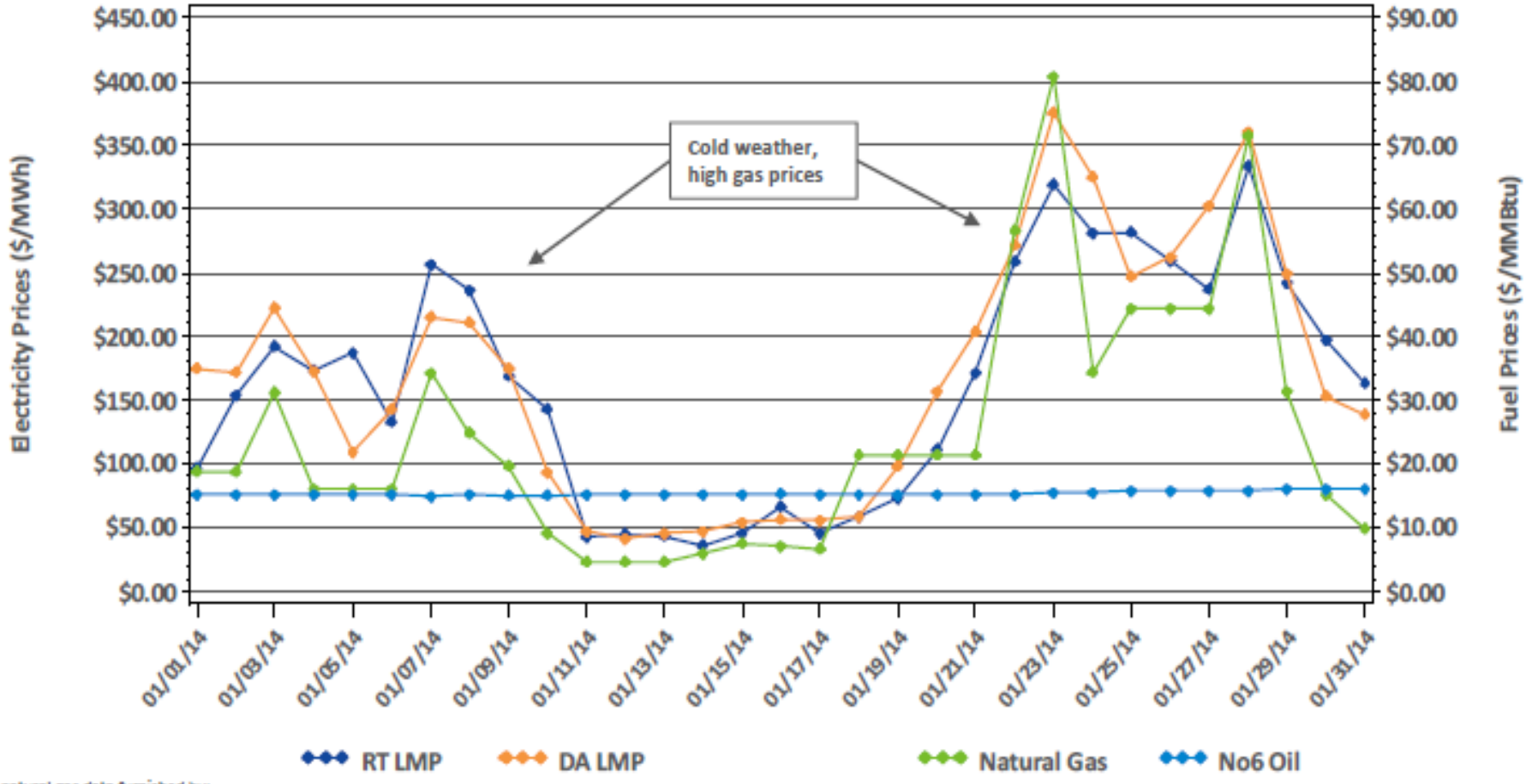
Regional Challenges: Reliability & Economic Disparity

- Spot price spikes driven to a high of $34/MMBtu in 2013, with prices in 2014 averaging $22.53 MMBtu through 2/18/14.
- Spot prices driven to almost $80/MMBtu as a high point.

- "The high winter prices in New England suggest a natural gas delivery system that is stretched significantly." - *EIA, Feb. 7, 2014*
- Record high price since data tracking began in '01 and 50% higher than same period in 2013. - *EIA, Feb. 21, 2014*



Daily DA and RT ISO-NE Hub Prices and Input Fuel Prices: January 1-31, 2014

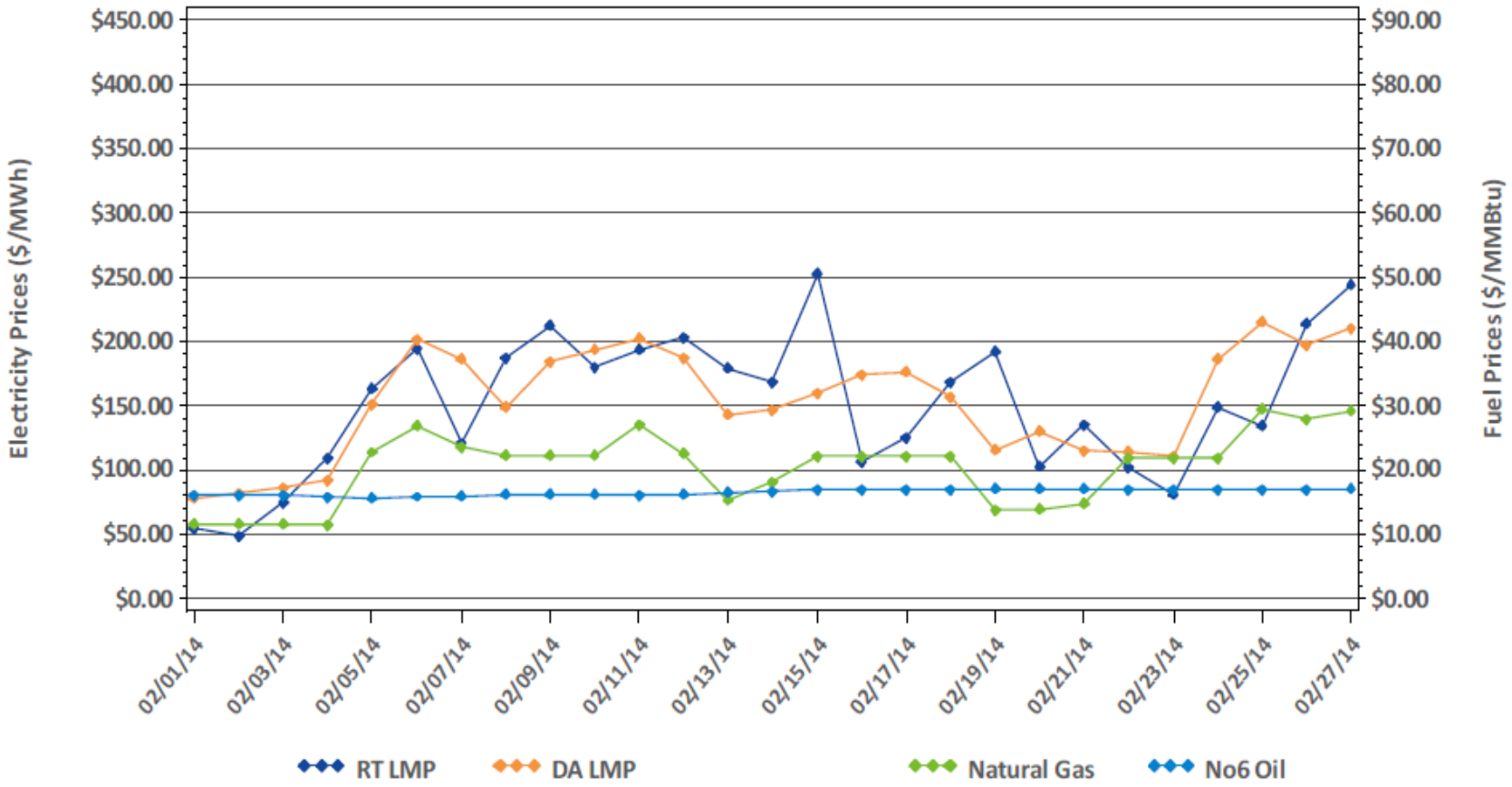


Underlying natural gas data furnished by:

ICE Global markets in clear view

Average price difference over this period (DA-RT): $5.93
Average price difference over this period ABS(DA-RT): $25.99
Average percentage difference over this period ABS(DA-RT)/RT Average LMP: 16%
Gas price is average of Massachusetts delivery points; No6 Oil is New York Spot Price from DOEs Energy Information Administration

Daily DA and RT ISO-NE Hub Prices and Input Fuel Prices: February 1-27, 2014

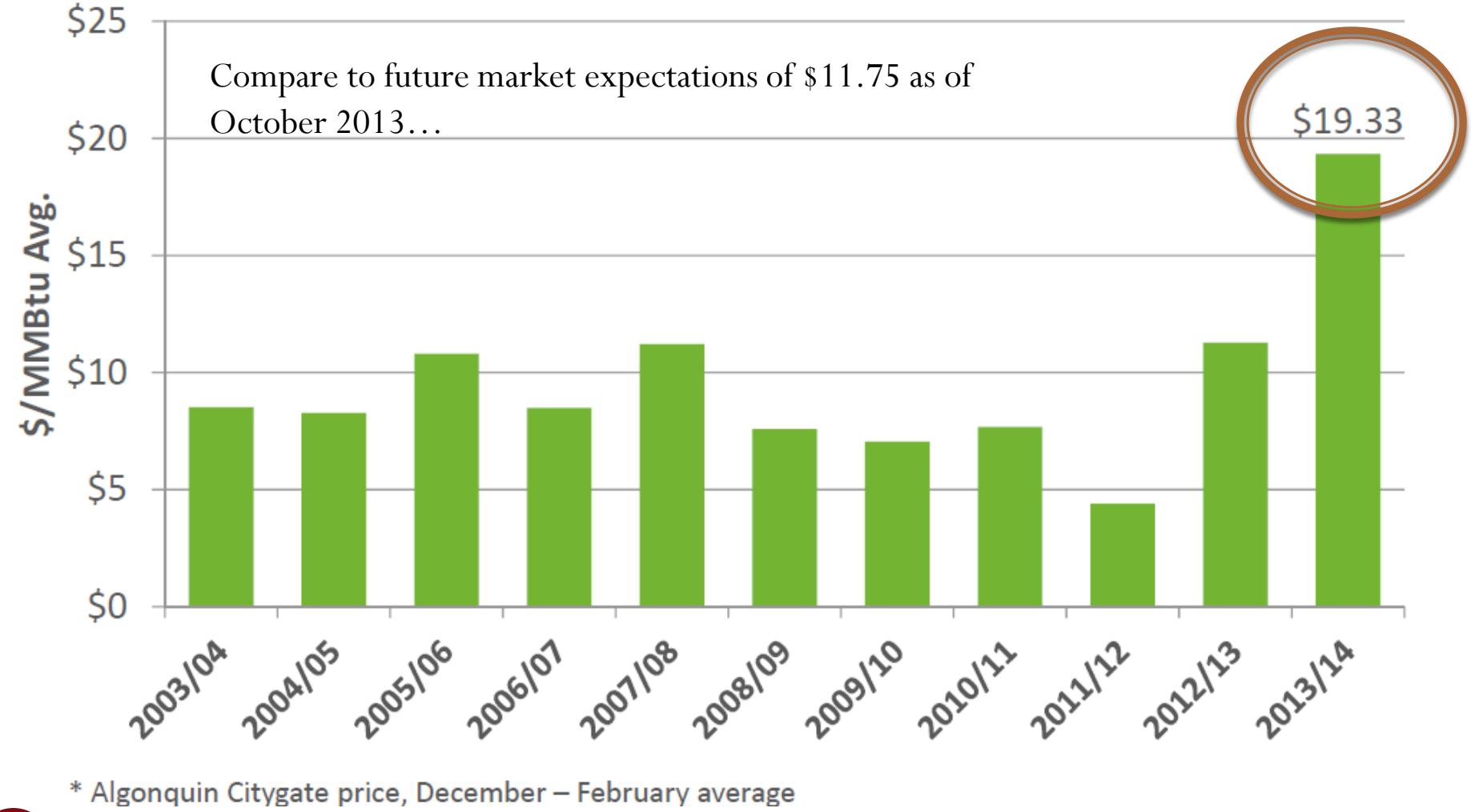


Underlying natural gas data furnished by:

ICE Global markets in clear view

Average price difference over this period (DA-RT): $1.71
Average price difference over this period ABS(DA-RT): $33.08
Average percentage difference over this period ABS(DA-RT)/RT Average LMP: 22%
Gas price is average of Massachusetts delivery points; No6 Oil is New York Spot Price from DOEs Energy Information Administration

Winter Gas Prices Nearly Doubled in a Year



* Algonquin Citygate price, December – February average

Chart taken from ISO NE presentation on Winter 2013/14 to NEPOOL PC , 5/2/14, Boston, MA.

Electricity Prices Followed Gas Prices: Monthly Average Gas Price and RT Hub LMPs

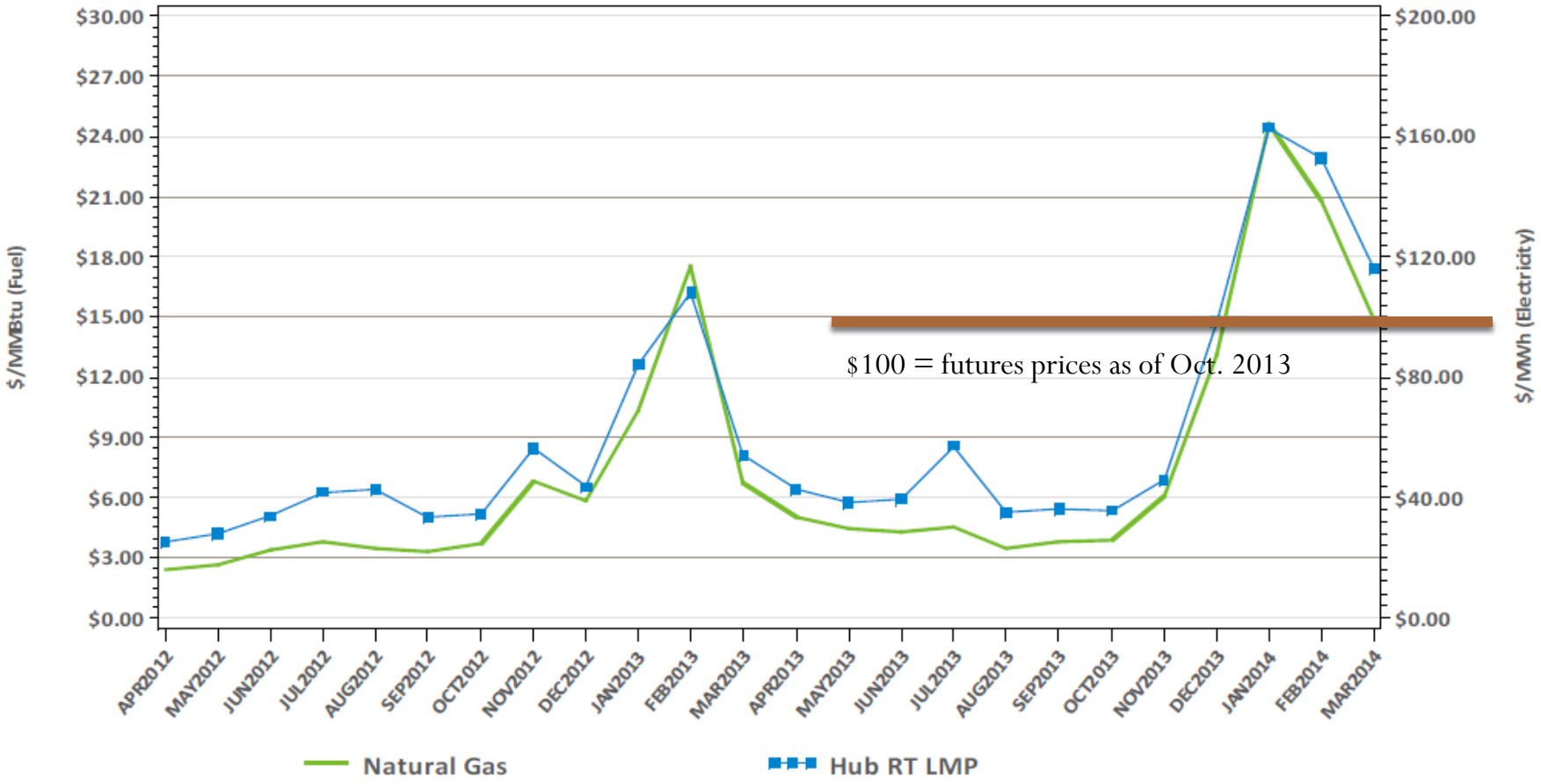


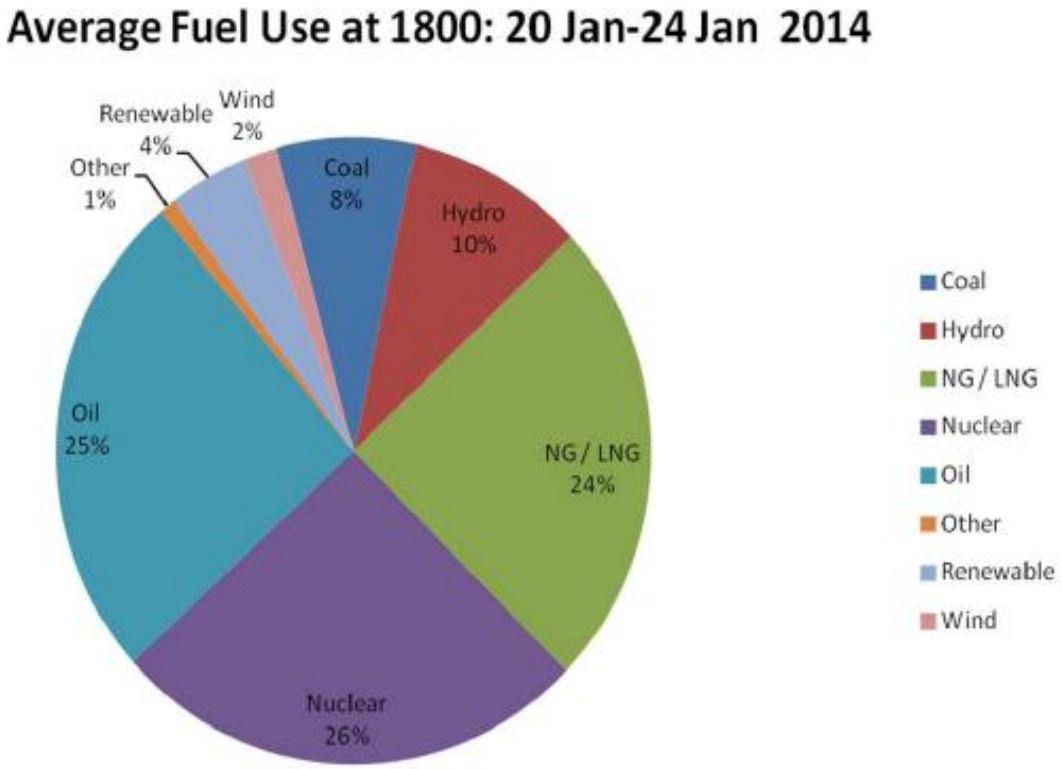
Chart taken from ISO NE presentation on Winter 2013/14 to NEPOOL PC , 5/2/14, Boston, MA.

Winter 2013/2014

- Energy market costs exceeded $5 billion this past winter.
  - Compare to $5.2 billion…for **ALL** of 2012.
- 64% of average daily real-time prices were > $100
  - 28% in Winter 2012/13
- For first time in a decade, average daily price exceeded $250…nine times
- Winter average real time price (Hub) was $132.10
  - Up 84.4% from Winter 2012/2013 (December through March)

Data and phrasing taken from ISO NE presentation on Winter 2013/14 to NEPOOL PC , 5/2/14, Boston, MA.

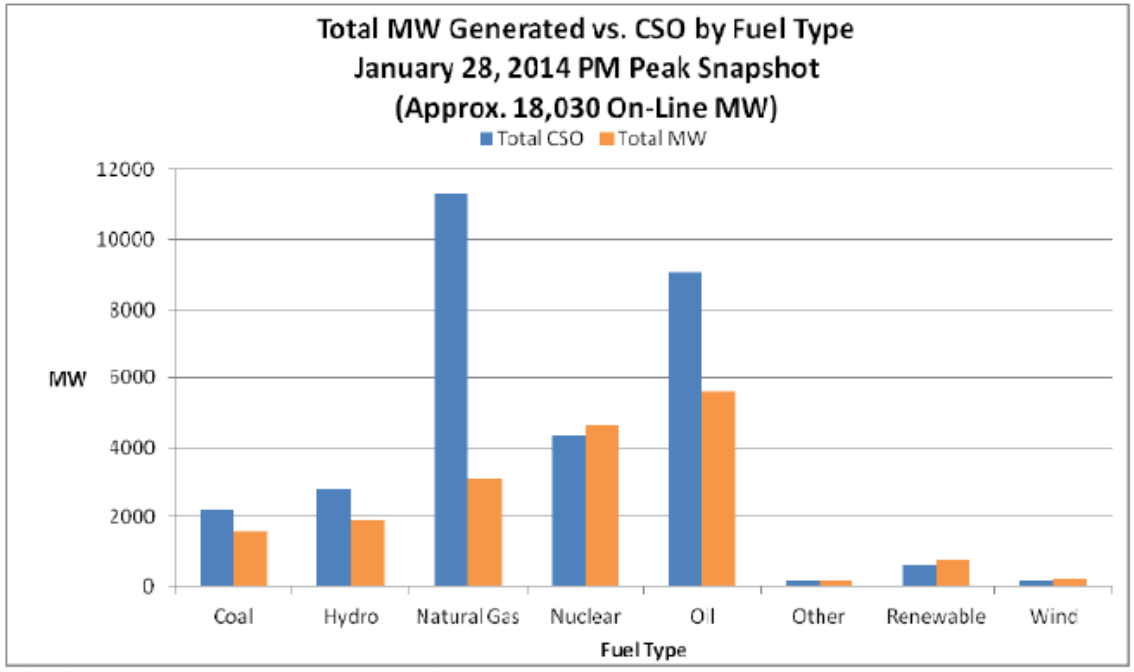
Winter 2013/2014



- Natural gas pipeline constraints drove economics and system reliability needs.
- Oil "in the money"
- Gas prices exceeded oil prices 57% of winter days, compared to 18% in Winter 2012/13.

Data taken from ISO NE presentation on Winter 2013/14 to NEPOOL PC, 5/2/14, Boston, MA.

Winter 2013/2014



- While oil produced more energy and other assets approached capacity limits, gas units produced far less than capable.
- i.e. on one cold day, at peak, gas gens produced just 3,000 of 11,000 MW capacity

Others' Observations About New England

Forbes

"The result is an **escalating energy crisis** in New England. Although the northeast has become the largest natural gas producing region in the United States, **New England currently has the nation's highest natural gas prices**."

William Pentland, December 5, 2013 [emphasis added]

UBS

"We have increasing confidence that the northeast gas basis blow-out vs. Henry Hub this winter will **reoccur in future years**…"

"…we see an argument for **continued higher gas and power prices for the '14/'15 winter**. We see the greatest uplift to the thesis as the 'end of the pipe' in Boston/New England, where Algonquin prices could further expand…"

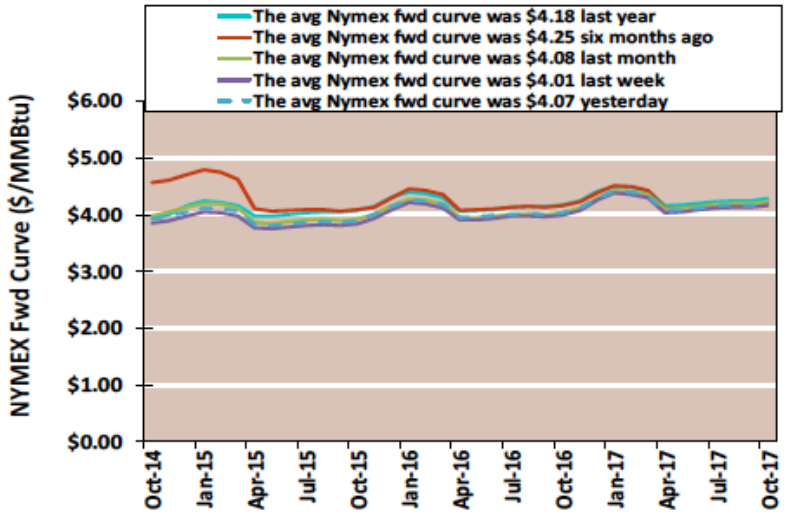
Global Research, April 2, 2014 [emphasis added]

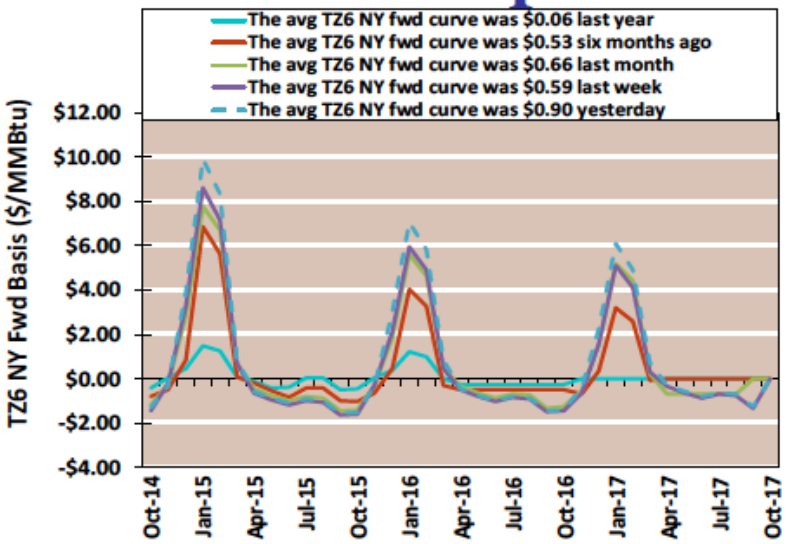
http://www.forbes.com/sites/williampentland/2013/12/05/has-anyone-noticed-new-englands-escalating-energy-crisis/

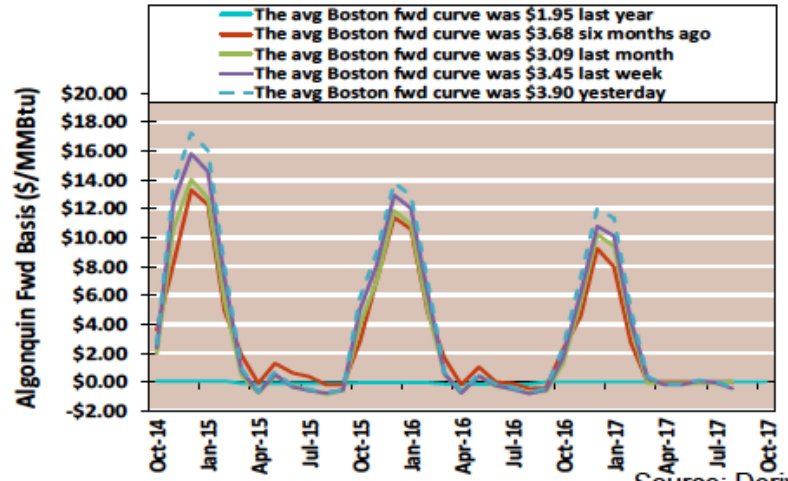
Current Price Projections

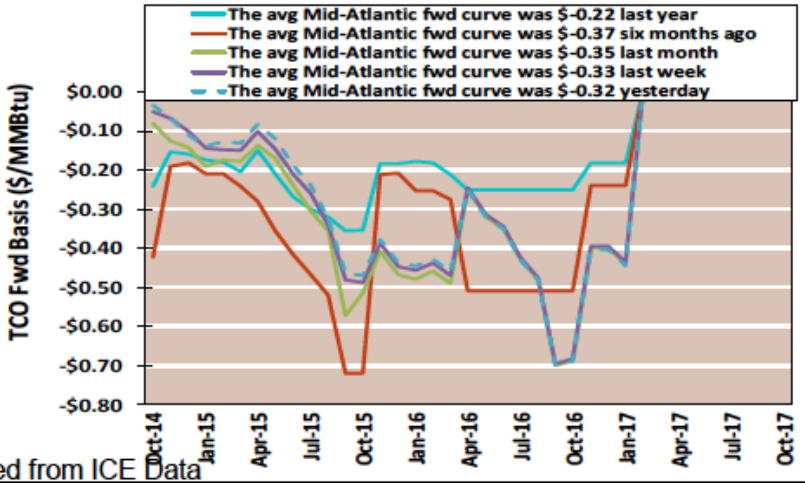
Federal Energy Regulatory Commission • Market Oversight • www.ferc.gov/oversight

Nymex and NE Fwd Basis Swaps



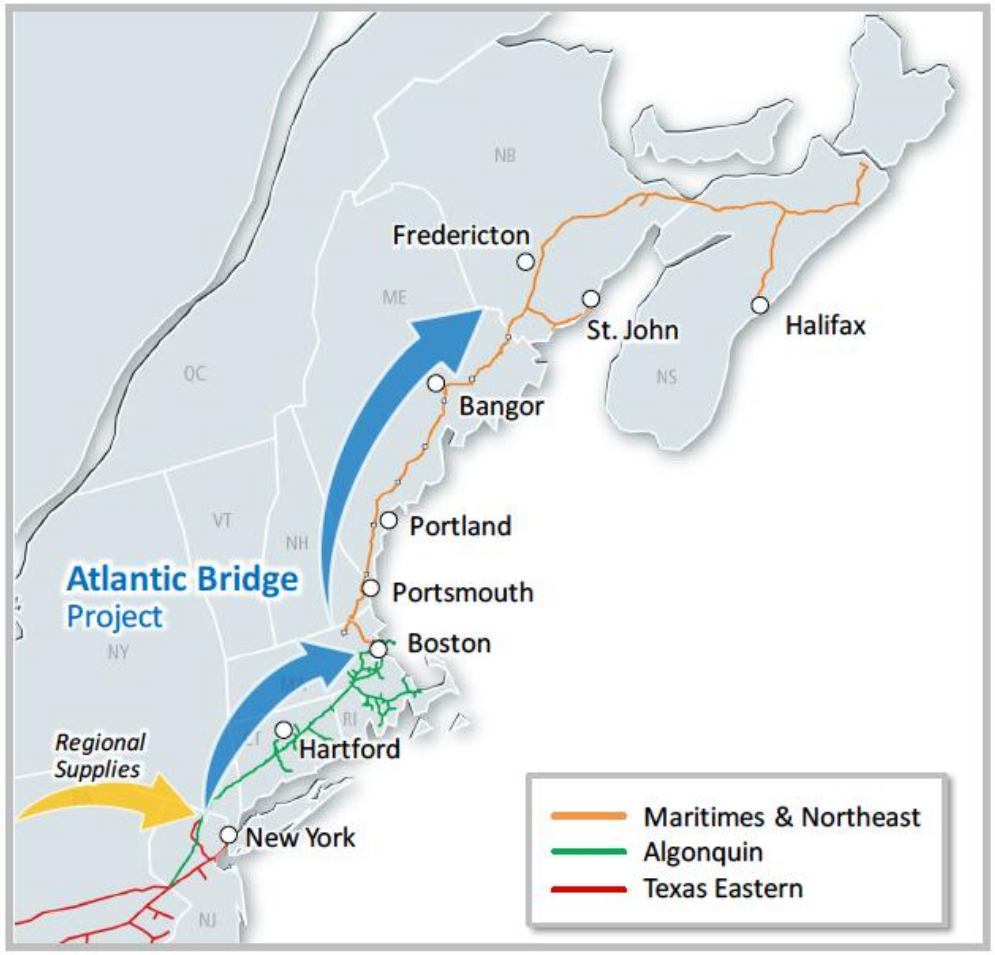






Source: Derived from ICE Data

Existing Pipeline Expansion

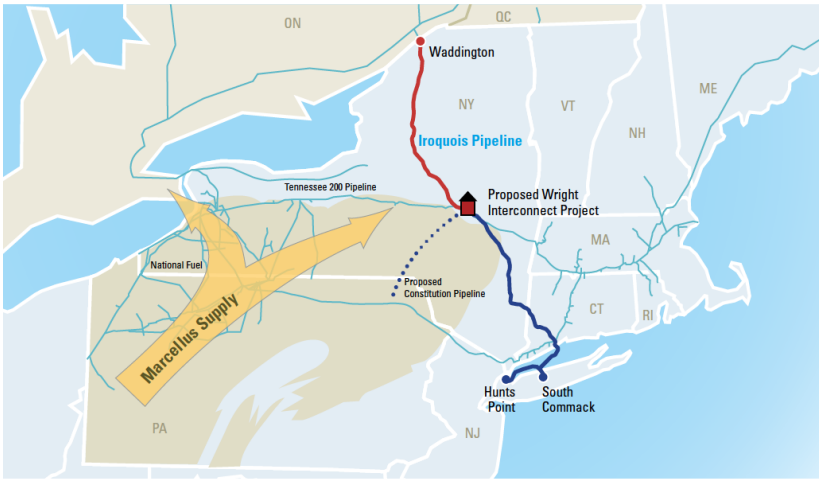


- Spectra Energy's Algonquin and Maritimes & Northeast Pipeline networks have projects in various stages of development with the opportunity for additional expansion:
  - Algonquin Incremental Market (AIM) Project (2016 in service)
  - Atlantic Bridge Project (2017 in service)
  - Access Northeast Project (2018 potentially in service)

NU??????????

Source: Spectra Energy

Upstream Expansion & Flow Reversals

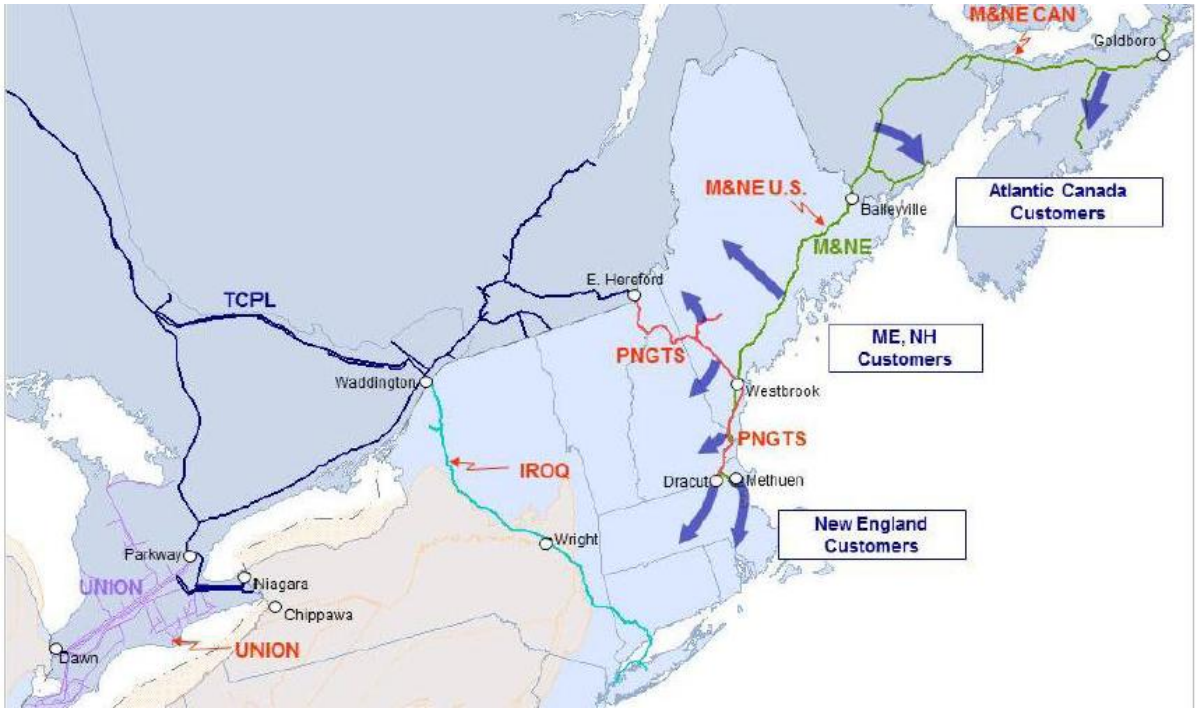


- Iroquois Gas Transmission Systems' (IGTS) Wright Interconnection Project is expected to provide access to additional Marcellus-based supply for the Iroquois network. The project is anticipated to be in service in 2015.

- IGTS' South-to-North Project would reverse the flow on the Iroquois system and thereby provide transportation to the Canadian border. It is proposed to be in service in 2016.

Source: Iroquois Gas Transmission System

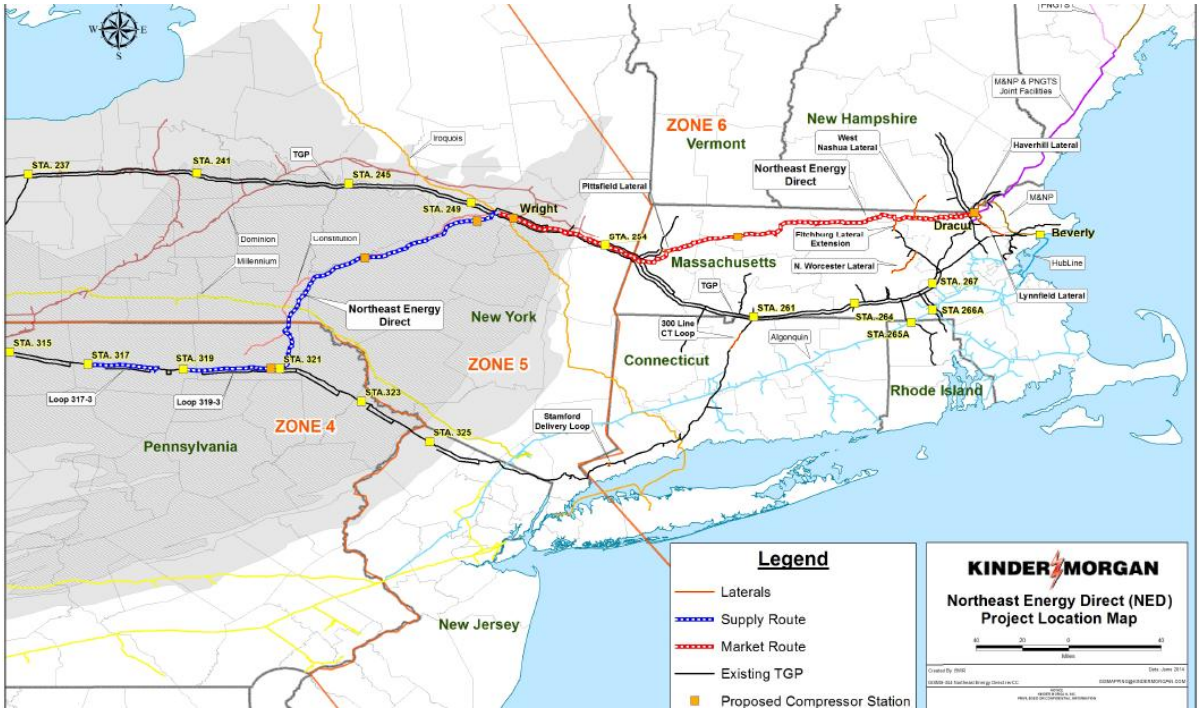
Alternate Supply Routes



- In conjunction with TransCanada Pipelines Limited (TCPL), Portland Natural Gas Transmission's (PNGTS) Continent-to-Coast (C2C) project may provide access to incremental gas supply from a variety of supply basins. The project is anticipated to be in service in 2016.

Source: Portland Natural Gas Transmission

Greenfield Pipeline Development

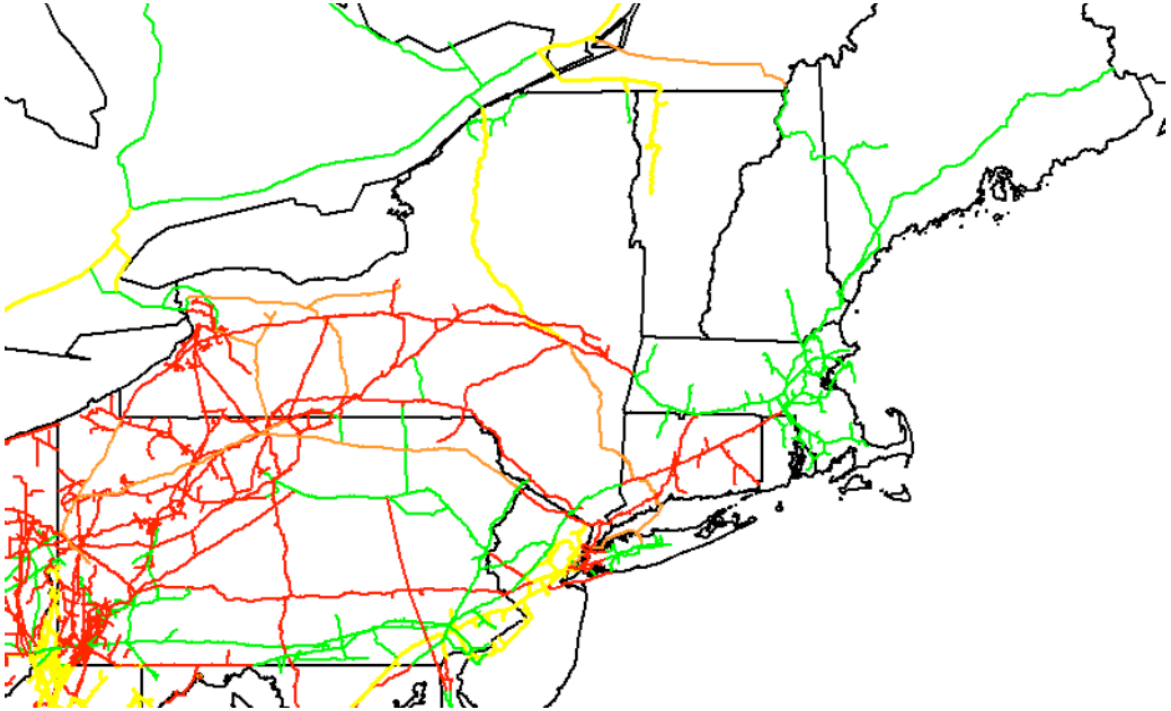


- Kinder Morgan's Tennessee Gas Pipeline Northeast Energy Direct Project is proposed to be in service in 2018.
- On July 30, 2014, Kinder Morgan announced it has reach agreement with initial anchor shippers, natural gas local distribution companies, with an aggregate demand of 500,000 dekatherms/day.

Source: Kinder Morgan Energy Partners

Recent Analysis – EIPC's Gas-Electric Study

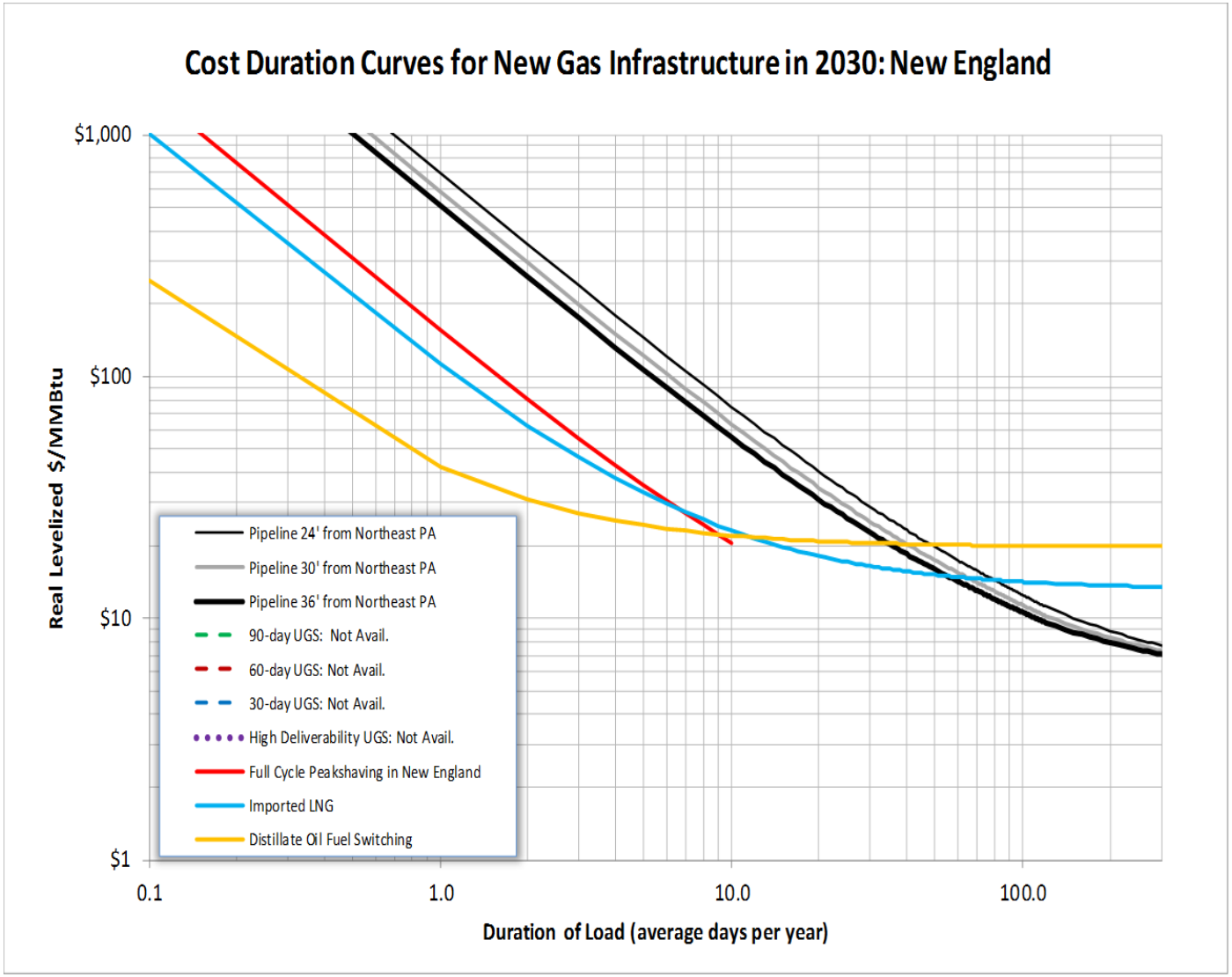
Figure 51. *RGDS* Pipeline Utilization – Winter 2018 – ISO-NE and NYISO



- According to Levitan & Associates, under the Reference Gas Demand Scenario, "model solutions reveal that deliverability *into* Massachusetts is the bottleneck, as shown in red across New York and Connecticut, reflecting the complete or near complete utilization of primary pipelines linking Marcellus with market centers in NYISO, ISO-NE and IESO." (emphasis in original)

Source: Eastern Interconnection Planning Collaborative, Gas-Electric Study, Target 2 Draft Report (June 2014)

Recent Analysis – EISPC's Gas-Electric Study



Source: ICF International

Emera Energy

MAINE NATURAL GAS CONFERENCE

OCTOBER 2014

Rumford – A Day in the Life

Heidi Leslie

Rumford Power

Emera Energy acquired three natural gas generating facilities in November 2013, including Rumford Power

- 260 MW facility in Rumford, Maine
- located on the Portland Natural Gas Transmission System

Emera

A Day in the Life of Rumford

All day, everyday: plant is fully staffed and ready to run

- **7 am - 9 am:** quotes for gas are sought for same day and next day
- **10 am:** Rumford decides whether to "self-schedule" or bid its energy economically into the day ahead market (DAM)
- **10 am onwards**: if Rumford has self-scheduled, it works to procure gas for the next day
- **12 pm – 1 pm**: Rumford hears if it cleared the DAM
- **After 1 pm**: if Rumford clears the DAM, it works to procure gas. It may be possible to get next day gas but usually needs to wait for next same day gas cycle
- **After midnight**: if Rumford has neither self-scheduled nor cleared in the DAM, ISO-NE may dispatch the plant at any time in the real time market for reliability or based on an in merit locational marginal cost

Effect of Gas Price Volatility

All day everyday, Rumford bears gas price volatility risk

Rumford bids into the market based on its expected gas price but gas prices change during the day

- If Rumford is dispatched, it may have to pay more for gas than what it was quoted in the morning
- If Rumford is not dispatched but has already procured gas, it may have to sell gas back into the market at a price lower than the price it purchased it for

Example: if Rumford is picked up in the DAM for its full output and gas prices increase by $1 from the time the bid is entered to when gas is actually purchased, this could cost Rumford approximately $30,000 that day. **In the winter of 2013/14, there were days when gas prices changed by $20 in a single day.**

Effect of Market Rule Changes

Rumford serves an important market function, which will increase over time as more intermittent resources are brought onto the grid and older, less efficient plants are retired

- Rumford can balance wind resources
- Rumford can serve base load requirements

For a plant with the characteristics of Rumford, most recent market changes will not increase its capacity factor

- very efficient plant but located away from load
- excellent access to gas but high and volatile gas prices
- not compensated for investments in firm capacity, LNG contracts or dual fuel

Natural Gas: Continued Growth in Maine?

Dan Allegretti – VP State Government Affairs - East

October 9, 2014

Exelon®

Examining the Goals of Expansion

- **Reliability** – Does the region have adequate capacity to meet reliability needs without pipeline expansion?
- **Winter Volatility**– How much additional pipeline capacity is needed to bring winter electric prices closer to non-winter levels?
- **Basis** – What are the effects of building enough pipeline to equalize basis with Marcellus fields?

Published Expansions and Additions

- **AIM** – Will reportedly add 342 Dth/d by 11/16 and has commitments to move forward.
- **Northeast Energy Direct (Kinder Morgan)** – Will reportedly add 600 to 2.2 M Dth/d by 11/18 and has commitments to date for 500 Dth/d.
- **LNG** – ISO-NE Winter Program. 8 gas units have submitted intent to supply at least 1.5 BCF this winter.

- * Information obtained from press reports and from ISO-NE COO Report

Food For Thought

- **Reliability** – On January 7, 2014 not only did New England maintain reliability but we exported 500 MW to PJM.
- **Winter Volatility**– Winter 2014 prices in New England were reportedly lower on many peak days than PJM and NY due to oil dispatch.
- **Basis** – What happens if an abundance of shale gas leads to more nuclear retirements?

- * Information based on ISO-NE statements and reports

Disclaimer

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Gas Demand Response

An overlooked solution to the Electricity/Gas Interface Issue?

BY

Jurgen Weiss

The Brattle Group

October 9, 2014

THE Brattle GROUP

Fixed cost solutions to occasional problems are likely expensive

- Gas-heavy electricity generation leads to volatile gas demand
- Combination of high heating demand and high power demand leads to occasionally very tight supply situations, mostly during longer winter cold spells
- Many initiatives underway, some New England, some Maine specific
  - **Focus primarily on supply side measures, which can be expensive**
    - Forcing firm contracting by power generators
    - Dual-fuel capabilities
    - Building new pipelines, electric wires, etc.
- **Are there cheaper alternatives to deal with an occasional issue?**
  - Since electric DR has become so “hot”, why not think about gas DR?
    - Short article by Faruqui/Weiss in PUF (Spark, 2012)
    - Brainstorming Summit in Boston in June 2014

Gas DR might be a cheaper alternative or at least complement

- Fixed infrastructure makes sense if used frequently
- Build pipeline capacity (and other fixed infrastructure) for “normal”, not “extreme” situations unless no other options available
- Electric DR has emerged as one of the lowest cost “peaking” resources (but may not be useful in winter due to lack of A/C)
- **Def.: Gas DR = temporary reductions of gas demand by the customer, with or without enabling technology/investments**
- Examples might be:
  - Interruptible gas contracts
  - Direct controlled gas uses
  - Programmable/wifi-thermostats controlled by the utility or a third-party provider
  - DG with alternative fuel supply (back-up generation)
- If already existing, emerging (wifi-thermostats) or “behavioral”, might avoid significant capital investment relative to other alternatives

Proliferation of wifi-enabled thermostats may provide an easy basis at least for pilots

- Direct load control for electric/gas DR does not require smart electric/gas meters
- New generation of thermostats (NEST, Ecobee, etc.) allow remote control of gas furnace
  - MA utilities have done pilots for EE and are rolling out wifi-thermostats
  - Ideal for doing gas-DR pilots
- Smart meters allow for more sophisticated approaches
  - For electric DR, TOU, CPP, RTP etc.
  - Could have similar options for gas

Key Questions that emerged during summit

1. How much gas DR would be needed to overcome occasional bottle necks in gas supply?
    1. Pilots would help! (likely justifiable under EE budgets)
2. What are the technological requirements to make gas DR work?
    1. How much gas DR potential might exist with current technology already in place? (and how might it evolve with wifi-thermostats)
    2. What incremental investments may be needed to access significant additional potential?
3. What might be the cost of putting the needed technology in place and how would it be recovered?
4. Why would a gas user want to participate? What level and kind of incentive would be necessary? Where would the money come from?
5. What are the regulatory issues that need to be sorted out (often no cross-fuel regulatory mechanism)