Northeast Forum on Regional Energy Solutions
Remarks by Gordon van Welie, President & CEO, ISO New England
April 23, 2015

Introduction

My name is Gordon van Welie. I am president and chief executive officer of ISO New England. We are responsible for operating New England's power grid and wholesale electricity markets, and planning to ensure the future reliability of the system.

Thank you for inviting me to participate in the Northeast Forum on Regional Energy Solutions.

ISO New England has a long-standing relationship with the New England Governors and is committed to working with the states as they formulate solutions to the region's energy infrastructure needs.

Dramatic Transformation of the Generation Fleet

The region is undergoing a dramatic transformation of the generation fleet, and this is due to a number of economic and environmental factors. ***(See Slide 2)***

Over the last 15 years, the region has seen a major shift toward natural-gas-fired generation. Last year, we produced nearly half of our electricity with natural gas, up from 15% in 2000.

The combined use of coal and oil has fallen dramatically over the same period (from 40% to 6%), and these resources only operate during the summer when electricity demand is highest, and in the winter when natural gas pipelines are constrained.

The shift in New England's resource mix is the result of two primary factors. Low-priced natural gas, for most of the year, is making it uneconomic for coal and oil plants to operate in the energy market. And policymakers are seeking to reduce carbon and other power-plant emissions through environmental policies.

These factors are driving major generator retirements in the region. In the past few years, 10% of our generating capacity announced plans to retire within five years. This includes coal, oil and nuclear power plants. And that is just the beginning.

Many more coal- and oil-fired power plants (another 6,000 MW) are "at risk" of retirement.

The timeframe for these retirements is uncertain and will depend on investments in transmission and gas pipelines, as well as environmental policies, but our best guess is that this will occur over the next decade or so.

This will only increase our dependence on natural gas for power generation.

As the generation fleet turns over, we recognize that the states are looking to influence the future resource mix toward energy efficiency, distributed resources, and non-carbon renewable resources.

The Future Resource Mix

The ISO's markets and planning processes fully recognize the states' investments in energy efficiency. According to our energy-efficiency forecast, overall electricity demand in New England has essentially flattened over the next decade, and this is largely because of the billions of dollars being spent by the states on energy-efficiency measures.

As you consider further resource needs, it appears your clear priority is to develop non-carbon, renewable energy resources, and this is driving significant investments in solar photovoltaics (PV) and wind.

Solar PV resources have been coming online rapidly and we expect the current amount (900 MW) to nearly triple within a decade (2,400 MW by 2024).

Wind power supplies about 1% of our annual electricity needs, but almost half of proposed generation in New England is wind power. Many of these projects are proposed to be built in areas where the transmission system is already constrained, and some in areas where there is no transmission at all.

This is like building a manufacturing plant in an area where there is no transportation system to move the products to market.

If the New England states want to improve the deliverability of existing wind resources, develop new wind resources, or access more hydropower from eastern Canada, then they will need to invest in additional electric transmission to deliver that energy, which is largely sourced in the north, to where it is consumed, which for the most part is in southern New England.

I am aware that the southern New England states are evaluating a solicitation for projects that could address some of these clean energy goals.

(See Slide 3) There are a number of transmission proposals by private developers vying to move clean energy supplies from Newfoundland and Labrador, Québec, and northern New England, particularly Maine, to southern New England. Some of these transmission proposals, as well as other proposals, may come forward in the states' solicitation. While these are not considered reliability projects, the ISO's role is to study these proposals to ensure they can interconnect reliably.

The projects listed on Slide 3 reflect publicly available information as of November 2013 and are not intended to be a comprehensive list of the elective transmission proposals in our interconnection queue. They are intended to be representative of the types of transmission projects emerging inside and outside the region in response to the states' clean energy goals.

While the region is transitioning to more renewable energy, we are experiencing environmental and cost impacts associated with constraints on the natural gas pipeline system. These impacts have been most severe during the last few winters.

Natural Gas Pipeline Infrastructure

Because natural gas represents such a large portion of the region's generating fleet, availability of natural gas for power generation has a profound impact on grid reliability and production costs.

New England has limited natural gas pipeline infrastructure serving the region and these pipes are reaching maximum capacity, especially during the winter months when demand for natural gas to heat homes and businesses is at its highest.

New England's natural gas infrastructure has not kept pace with the tremendous growth in natural gas-fired generation and the increasing demand for natural gas as a heating fuel. ***(See Slide 4)***

When natural gas supply to generators is constrained, the ISO must commit other generating resources to maintain system reliability, and these resources are often coal- and oil-fired power plants. Coal and oil have made vital contributions to the fuel mix during high gas demand days over the past few winters. ***(See Slide 5)***

These resources are still important to keeping the lights on, but they are retiring. And we understand that New England policymakers do not like the increase in emissions that occurs when they run, or the impact on electricity prices resulting from high fuel costs.

Impact on Natural Gas and Wholesale Electricity Prices

Over the last three winters, New England experienced significant price spikes in both natural gas and wholesale electricity. ***(See Slide 6)***

Constraints on the natural gas pipeline system drove gas prices to record levels. This volatility in the New England gas markets was the direct cause of volatility in the wholesale electricity markets.

Natural gas prices were less volatile this winter, but we still saw many days in February with spot gas prices in the $20 – $30 per MMBtu range, which is very high by historical standards. And significantly higher than areas of the country where the gas system is unconstrained. ***(See Slide 7)***

This week, the U.S. Department of Energy released the first installment of the Quadrennial Energy Review (QER), which shines a spotlight on natural gas infrastructure constraints in the northeast.

The QER points out that despite large volumes of gas available from the Marcellus Shale in nearby Pennsylvania, pipeline constraints restrict sufficient supplies of this gas from reaching New England, putting upward pressure on gas prices in the wintertime. The New York metropolitan area, by contrast, has alleviated some of the winter congestion it faced by adding new pipeline capacity.

This winter, the region's power grid operated well through cold weather and, due to a confluence of regional and global factors, natural gas and wholesale electricity prices were lower on average than last winter.

That said, February 2015 still ranked as the third-highest monthly average for wholesale electricity prices in New England since 2003. The highest and second-highest prices were logged the previous winter, during January and February 2014.

Why were prices less volatile this winter? ***(See Slide 8)***

A number of factors helped ensure power system reliability and keep price volatility in check this winter.

First, we ran a winter reliability program that provided incentives for power plants to have oil inventory stored on site, or to have a contract for LNG deliveries to supplement pipeline gas supplies before the start of the winter. This meant that resources had the fuel they needed to run when dispatched by the ISO.

Second, December was mild, and the coldest winter weather didn't arrive until February, when days were longer and electricity consumption was down.

High natural gas prices last winter and high forward prices for delivery this winter attracted liquefied natural gas (LNG) supplies to New England.

Global oil prices dropped dramatically, making it more economical at times to burn oil than natural gas. This dampened gas and electricity price volatility.

And, finally, energy-efficiency measures promoted by the states helped reduce total power consumption and peak demand. [Our latest forecast shows energy efficiency flattening peak demand growth in the wintertime.]

The region benefited from the availability of LNG resources this winter, but there is no guarantee that those same shipments will arrive next winter, or that oil prices will remain low. The region's pipeline infrastructure, however, will continue to be constrained as heating demand grows and gas-fired generation replaces retiring power plants.

Beyond the winter programs, what actions has the ISO taken to address infrastructure challenges?

In addition to two winter reliability programs, the ISO has taken major steps to increase market efficiency and improve gas-electric coordination in response to the challenges posed by the region's natural gas dependence and infrastructure constraints.

Our longer-term market enhancements, called "Pay for Performance," will provide strong incentives for resources to invest in operational improvements and secure fuel arrangements to ensure resource performance. This will go a long way towards mitigating the reliability risks facing the region.

The response to "Pay for Performance," however, likely will not ensure investment in natural gas pipeline capacity. The design gives market participants the flexibility to select the most cost-effective way to ensure performance.

Gas generators have told us that the most cost-effective solution for them is to continue to utilize the pipelines when they are unconstrained and to switch to burning oil when gas transportation becomes unavailable.

While the ISO may be satisfied with this solution from a reliability perspective, the states may not be satisfied from an environmental perspective. And given that dual fuel will not directly relieve the gas pipeline constraints, it is unlikely to resolve the issue of gas price volatility during the winter months.

I worry too about the long-term reliability of a system that is so fuel constrained, particularly during the winter. We are currently maintaining reliability by relying heavily on older oil and coal resources, and we know that these resources are the most likely to retire in the coming years.

In fact the largest coal and oil generator in New England will retire in June 2017. And the constraints on the fuel system supplying New England make us that much more vulnerable to the outage of a large non-gas generator or transmission line during extremely cold weather.

We also observe that it is becoming increasingly difficult for gas generators to obtain permission to install dual-fuel capability and that the oil supply chain can be fragile under adverse weather conditions.

There are alternatives to burning fossil fuels, such as renewable energy. While these resources can offset the need for gas, they are unlikely to be developed in sufficient quantity in the timeframe needed.

There is also the operational reality that renewable resources cannot be fully relied upon to produce the energy we require when our demand is highest in the winter months. The one possible exception is imported hydro energy, but only if the delivery of that energy has been guaranteed, since our neighbors to the north also experience high demand for that energy during cold periods.

Concluding Remarks

In summary, all these indicators seem to point in the direction of increasing the capacity of the gas infrastructure serving New England in order to mitigate the risks facing the region and facilitate the integration of additional renewable energy.

This raises two questions: who will contract for this infrastructure and how will the costs be recovered?

As I mentioned previously, gas generators are unlikely to contract for the additional gas infrastructure. It is also unlikely that gas producers will do so, because they typically will only invest in gas infrastructure when there is a year-round demand for their product. This leaves either the gas distribution companies, who have traditionally been the contracting party, or the electric distribution companies.

My understanding is that the states are considering a variety of solutions to alleviate the infrastructure constraints and mitigate the risks facing the region. I believe state policymakers have a very important role in shaping future infrastructure solutions and we look forward to working with you as you consider these potential solutions.

Thank you.

APRIL 23, 2015 | HARTFORD, CT

ISO new england

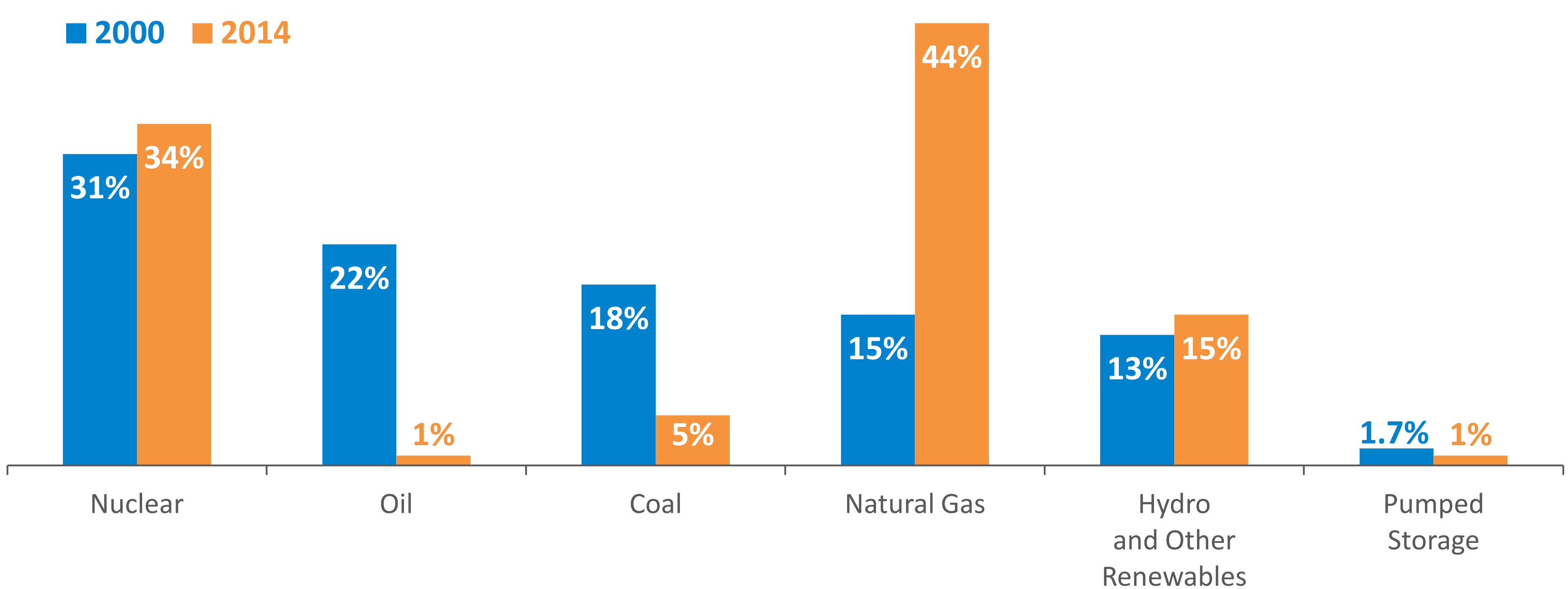
Challenges Facing the New England Power System

Northeast Forum on Regional Energy Solutions

Gordon van Welie
PRESIDENT & CEO

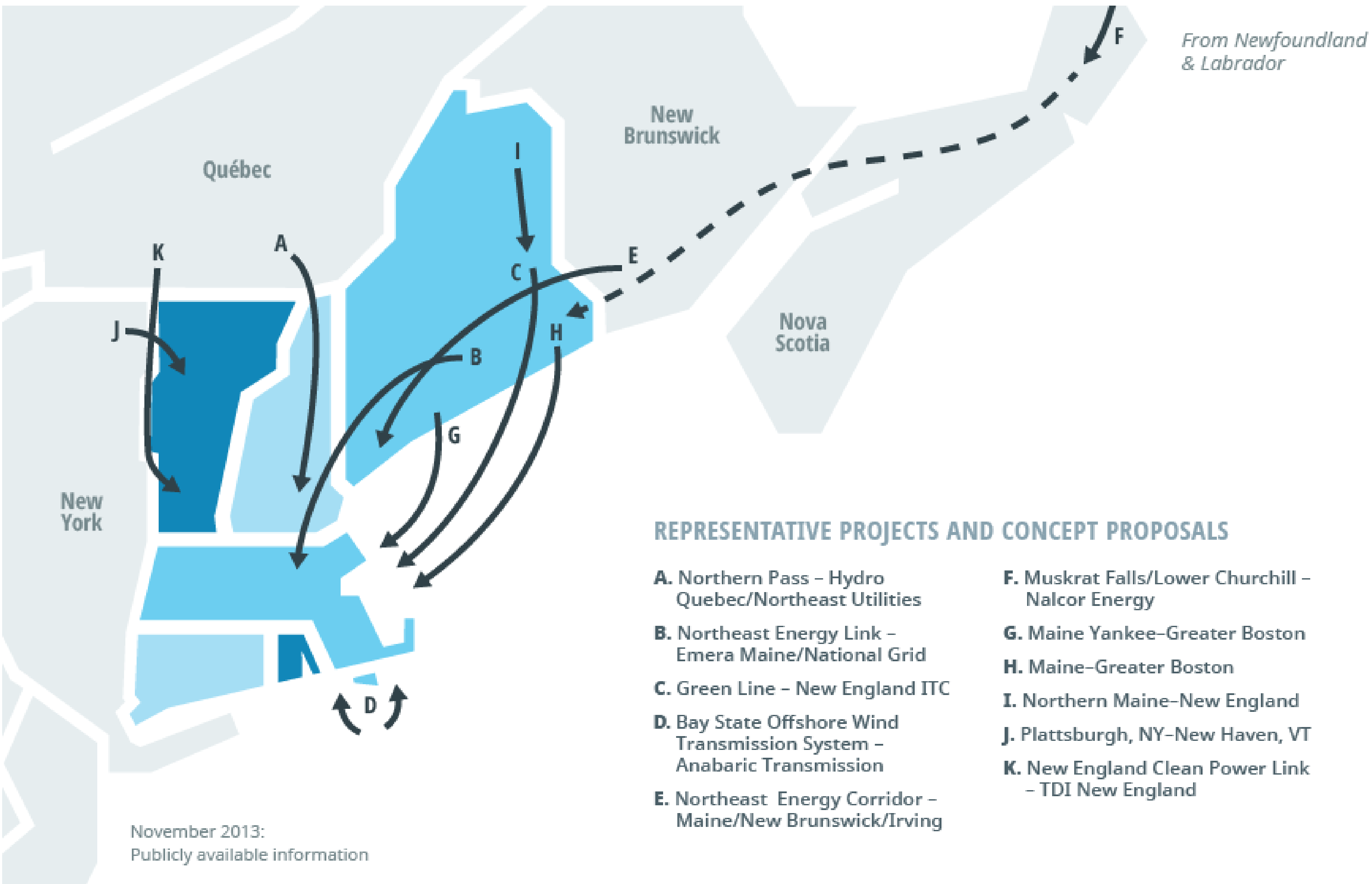
New England has Seen Dramatic Changes in the Energy Mix from Oil and Coal to Natural Gas

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

On- and Off-shore Transmission Proposals are Vying to Move Renewable Energy to New England Load Centers



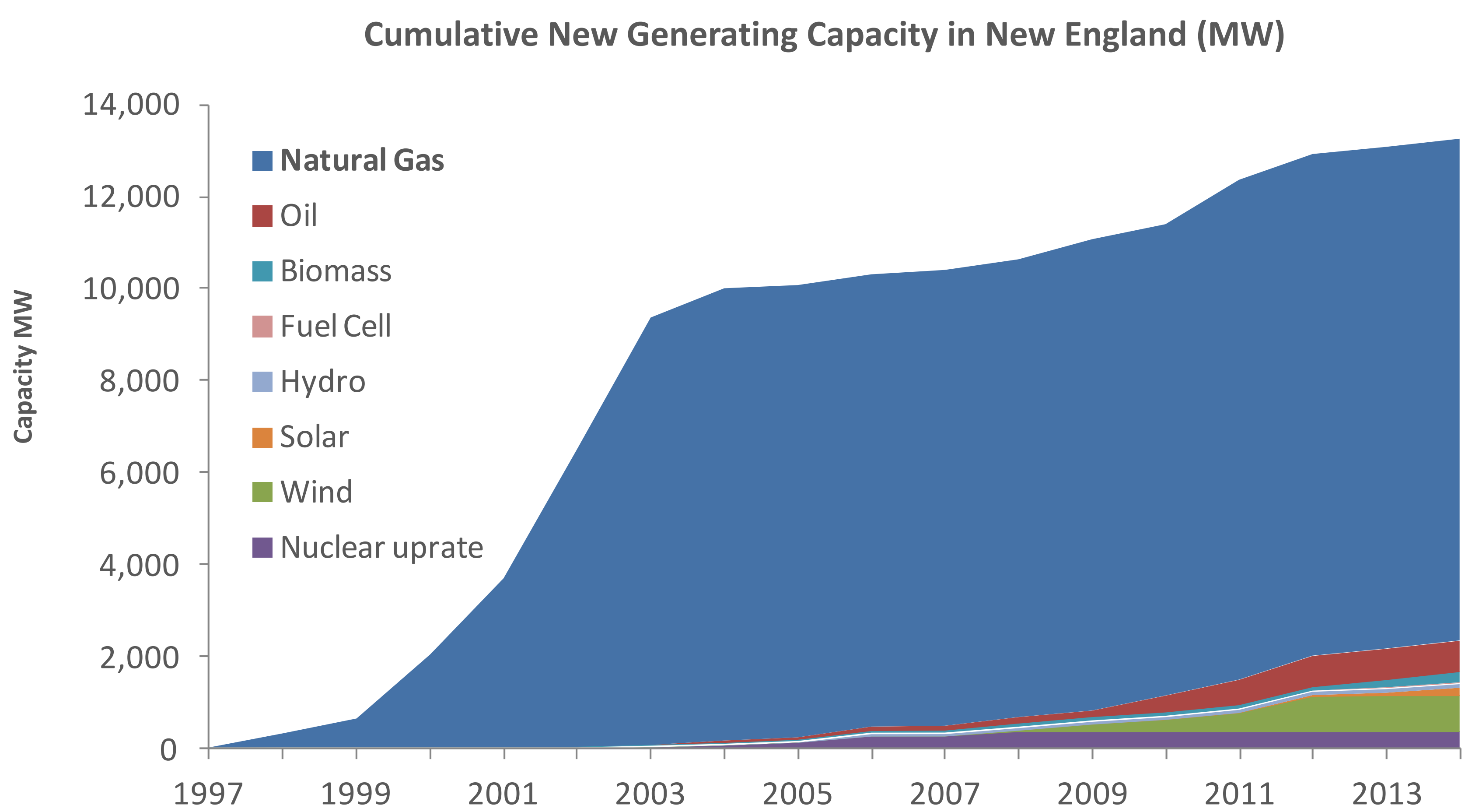
REPRESENTATIVE PROJECTS AND CONCEPT PROPOSALS

- **A.** Northern Pass – Hydro Quebec/Northeast Utilities
- **B.** Northeast Energy Link – Emera Maine/National Grid
- **C.** Green Line – New England ITC
- **D.** Bay State Offshore Wind Transmission System – Anabaric 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

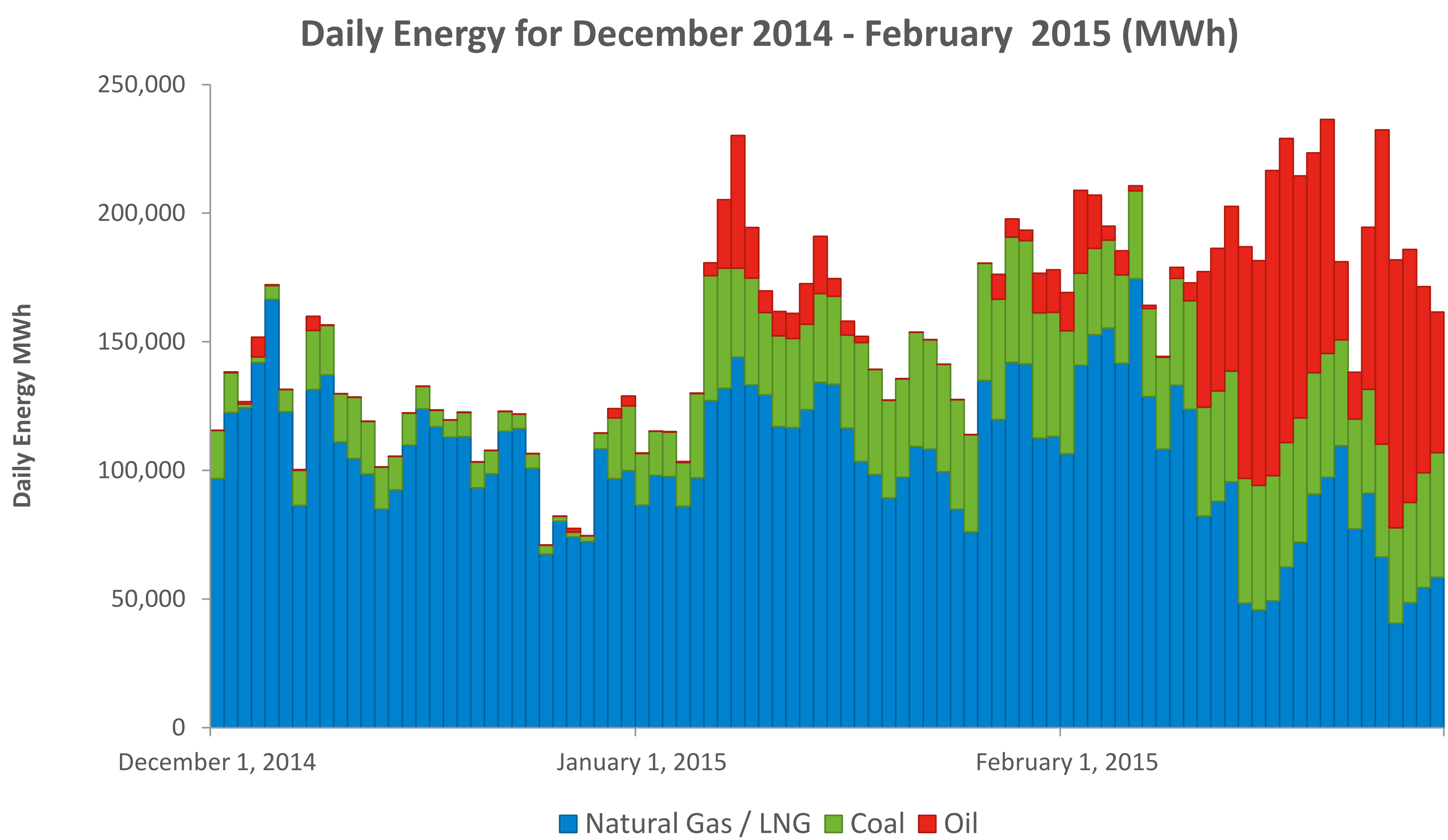
November 2013:
Publicly available information

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

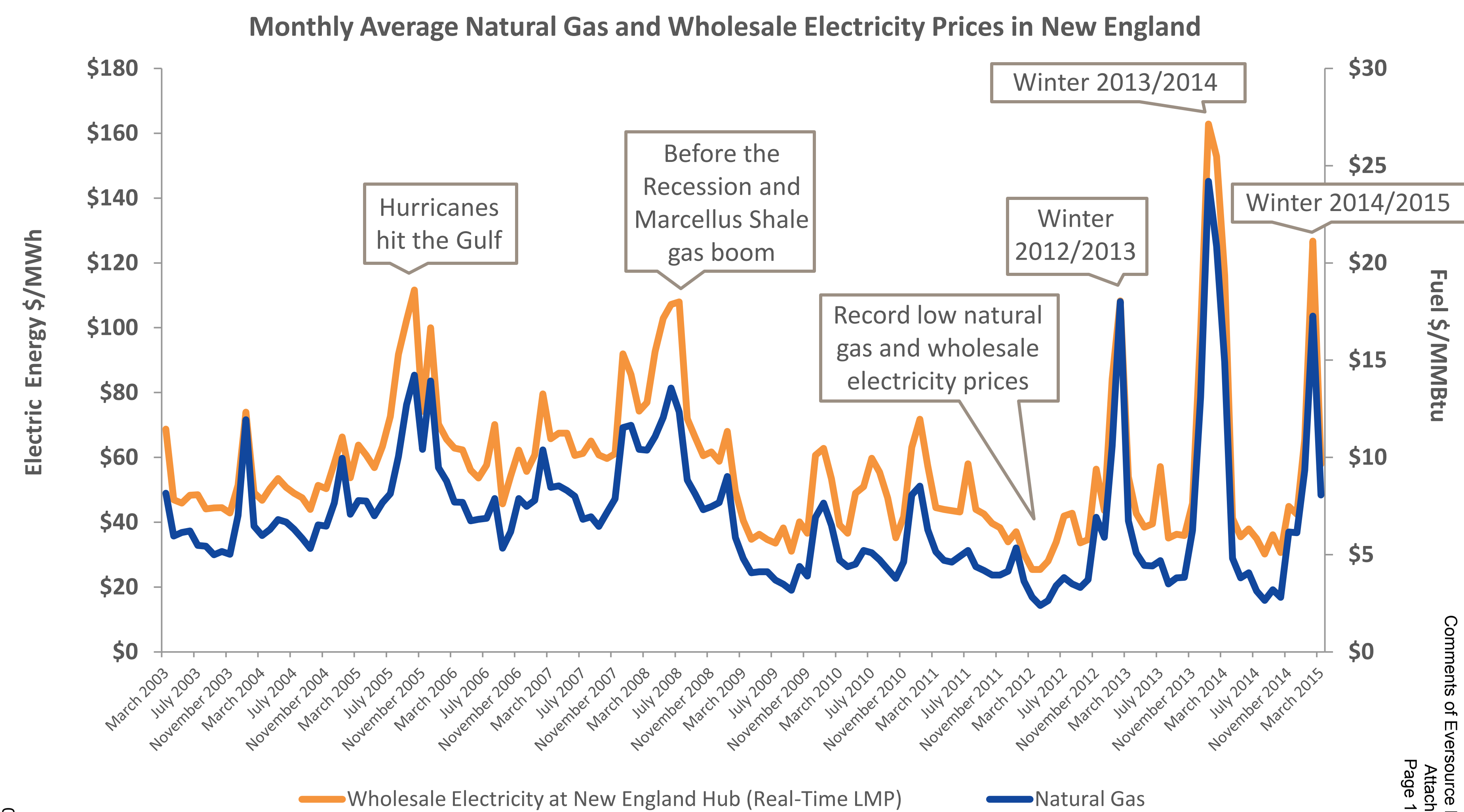
Natural Gas Infrastructure has Not Kept Pace with Tremendous Growth in Gas-fired Generation



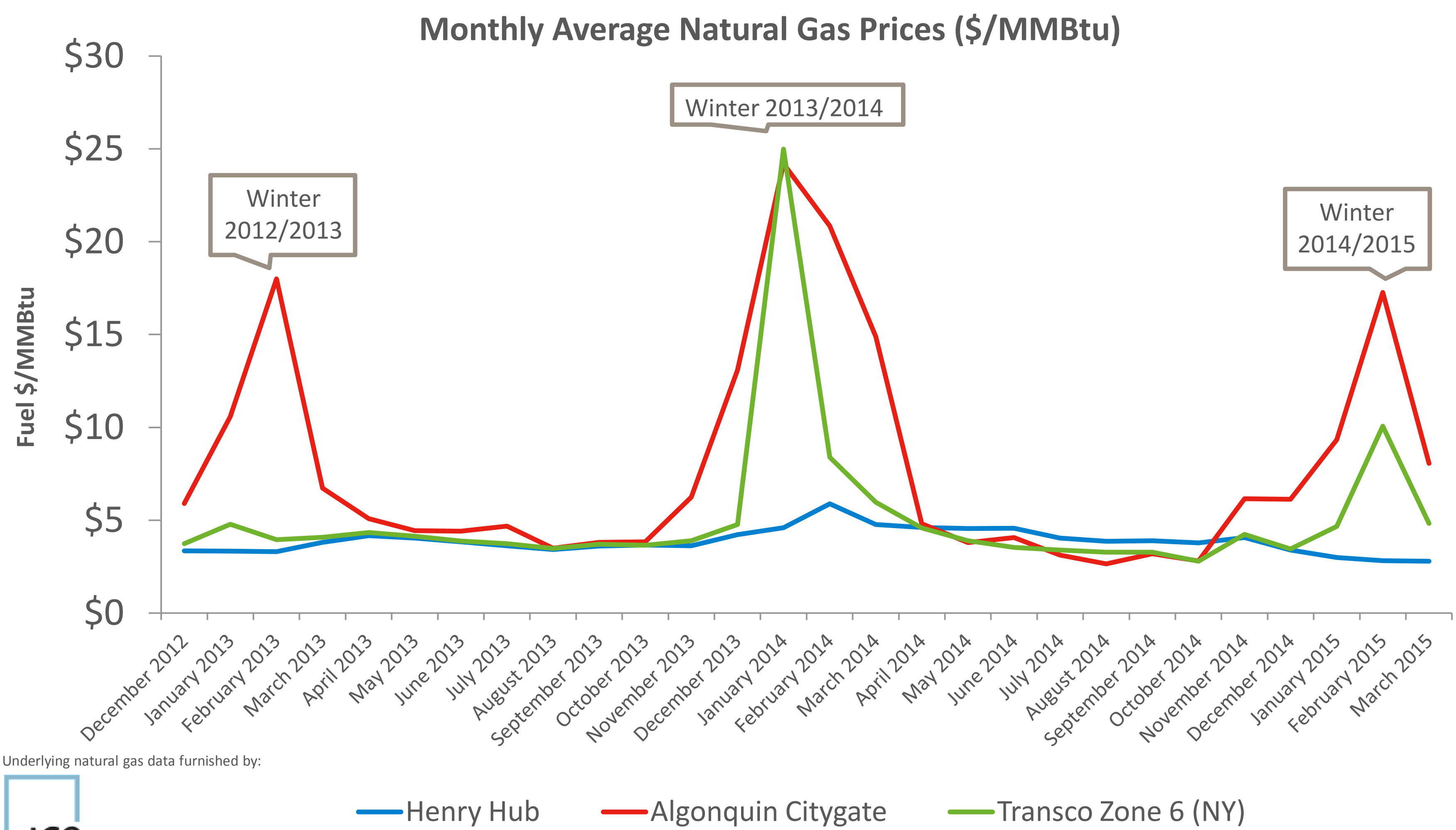
New England Shifted to Coal and Oil this Winter



The Region has Experienced High Natural Gas and Wholesale Electricity Prices the Past Few Winters



Natural Gas Prices are High During the Winter Relative to Other Regions



Underlying natural gas data furnished by:

ICE Global markets in clear view

A Comparison of the Last Two Winters

Why were prices less volatile this winter?

- 2014/2015 Winter Reliability Program provided incentives to fill tanks before the start of the winter
- High forward prices, due to high prices the previous winter, attracted large supplies of LNG to the region
- Oil prices were half what they were a year ago
- Coldest winter weather happened in February, when days were longer and demand was down

	Winter 2013/2014	Winter 2014/2015	% change
Average monthly temperature (°F)	26.5	25.5	- 3.8%
Total energy consumption (GWh)	33,991	33,654	- 1.0%
Peak demand (MW)	21,453	20,556	- 4.2%
Date of peak	12/17/2013	1/8/2015	-
Average wholesale energy price at Hub ($/MWh)	$137.60	$76.64	- 44.3%
Average gas price at Algonquin ($/MMBtu)	$19.33	$10.70	- 44.6%
Total value of energy markets (in billions)	$5.05 B	$2.77 B	- 45.1%