ISO New England
ISO on Background
State of the Grid: 2017
January 30, 2017

Remarks and slides

JANUARY 30, 2017

State of the Grid: 2017

ISO on Background

Gordon van Welie

PRESIDENT & CEO, ISO NEW ENGLAND INC.

Slide 2—About the *ISO on Background* Series

Good morning, everyone. My name is Ellen Foley and I am the Director of Corporate Communications at ISO New England. I'm joined today by Gordon van Welie, president and CEO of ISO New England. We'd like to welcome all of you to our 10th "ISO on Background" session.

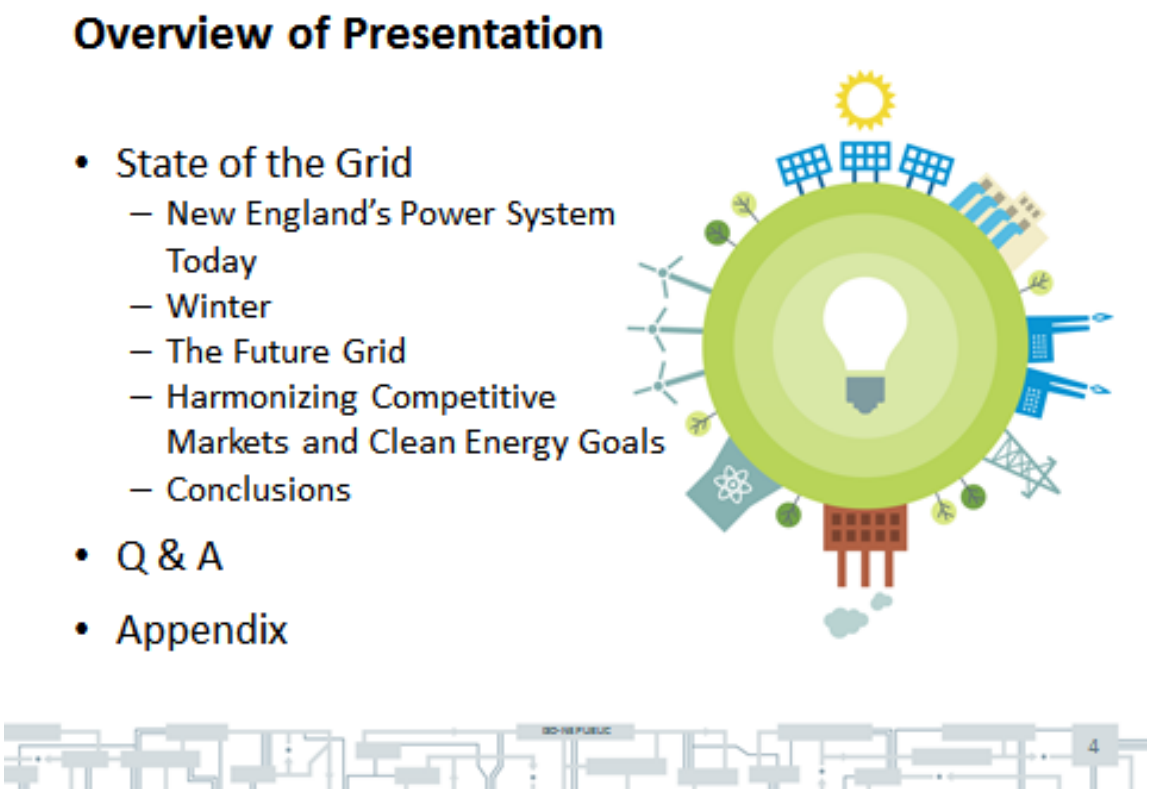
We hold these informational briefings periodically to provide the media with an informal opportunity to get an in-depth look at the trends affecting New England's electricity industry. Although these sessions are called *ISO on Background,* the content is on the record, and may be quoted and attributed to the speaker.

Slide 3—Agenda

Today's briefing will last about 40 minutes, and we've set aside about a half-hour at the end for questions from the media.

After the briefing concludes, the presentation and remarks will be posted in the press release section on the ISO New England website. This year, we've included an appendix that describes ISO New England's role, showcases some facts and figures about the power system in 2016, and provides more information about some of the issues we'll discuss today.

Slide 4—Overview of Presentation



Today's briefing will focus on the continuing transformation of New England's power grid. Gordon van Welie will update you on the state of the grid today, as well as concerns about power system reliability during winter. He'll describe the future hybrid grid, and discuss ongoing and emerging challenges to power system reliability.

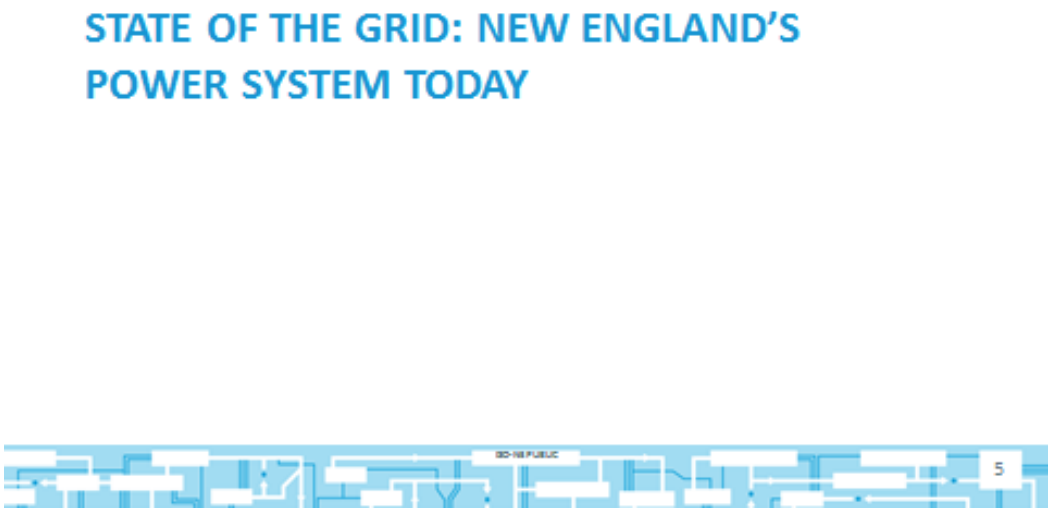
For those of you who may not be familiar with ISO New England, we are the independent, not-for-profit corporation established by the federal government in 1997 to handle three important tasks. The ISO operates the high-voltage power system in the six New England states, administers the wholesale electricity markets, and conducts power system planning.

A hallmark of the ISO's independence is the fact that employees, management, and the Board of Directors cannot have any financial interest in any of the companies doing business in the markets.

The ISO is fuel- and technology-neutral, and takes no position on any proposed energy projects. The ISO doesn't own any transmission or distribution lines or power plants; doesn't buy or sell electricity, and doesn't make money in the markets we administer. Additionally, the ISO has no financial or other connection to the natural gas industry, other than to coordinate with the pipeline operators when needed to ensure reliable electricity. The ISO also has no role in setting energy or environmental policy.

Now I'll turn the briefing over to Gordon van Welie to update you on the state of New England's power grid.

Slide 5—Title Slide—New England's Power System Today



Slide 6—Key Takeaways

Thank you, Ellen, and thanks to all of you for dialing in today.

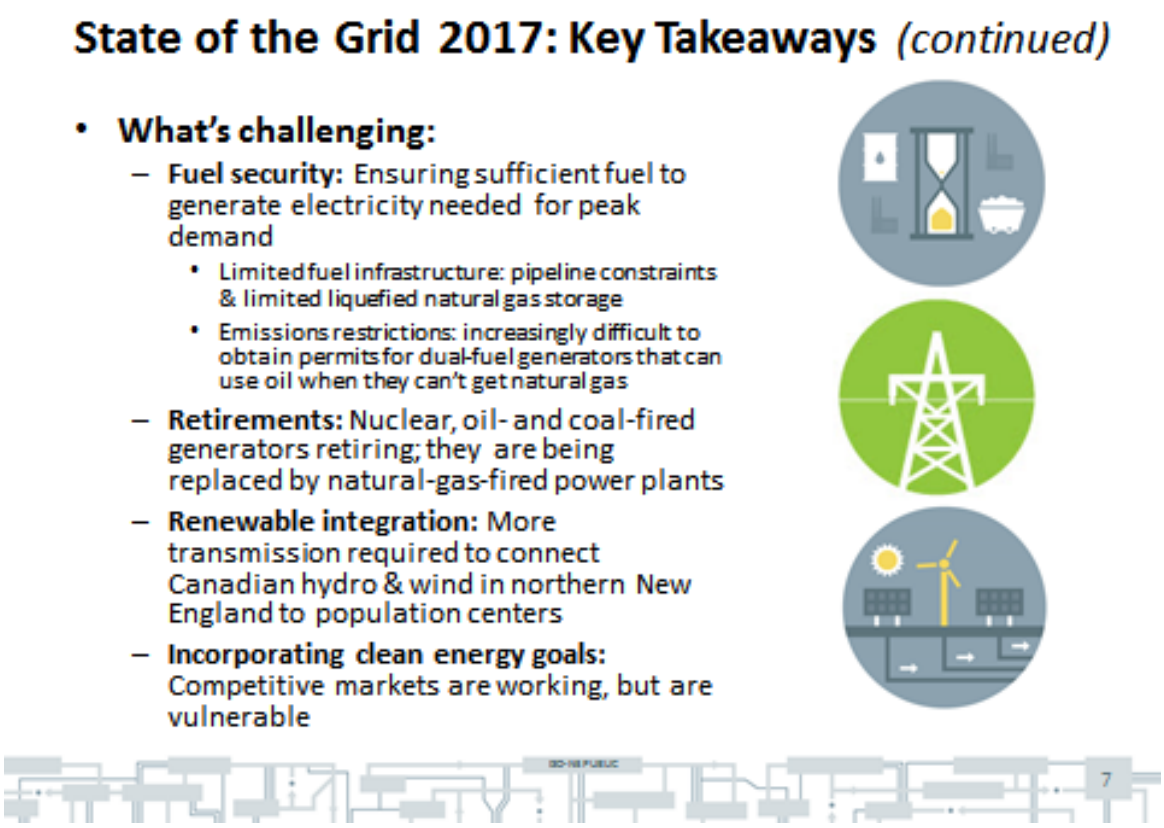
Let me start by noting that ISO New England's primary responsibility is reliability. The ISO was created to ensure that the New England power system can deliver competitively priced electricity, whenever and wherever it's needed. We operate the power system and the competitive wholesale markets so that the lowest-cost resources are used first to meet consumer demand. The ISO also conducts long-term power system planning to ensure reliability.

Today, in 2017, the physical state of New England's power grid is good. Nearly twenty years of competitive markets have attracted investment in the power plants and the demand-side resources needed to meet consumer demand. Regional transmission planning has identified upgrades that have vastly improved the reliability of the high-voltage transmission system.

These upgrades allow power to move freely around the six states, expanding access to electricity from the lowest-priced power plants and enabling older, inefficient generators to retire. With the wholesale markets, the power plants, and the transmission system we have today, New England's power grid has the electricity infrastructure needed to provide reliable, competitively priced electricity.

Evidence of this can be found in last year's wholesale energy prices. In 2016, wholesale electricity prices were the lowest since the current markets were launched in 2003. These low prices accurately reflected last year's historically low natural gas prices and mostly mild weather.

Slide 7—Key Takeaways, continued



However, last year's low prices and mild weather mask fundamental challenges that could derail the region's progress toward a cleaner, greener power system that can provide

competitively priced *and* reliable electricity.

The most pressing of these challenges is fuel security. Inadequate fuel infrastructure, particularly natural gas infrastructure to serve New England's growing fleet of natural-gas-fired power plants, is a current, and growing, reliability risk.

On the coldest days of the year, a significant portion of the region's power plants can't get the fuel they need to generate electricity. On those cold days, it's the region's nuclear, coal- and oil-fired power plants, as well as the expertise of the ISO's system operators, that keep the lights on in New England. However, the nuclear, coal, and oil plants are retiring or are at risk of retirement, and their replacements are mostly new natural gas plants.

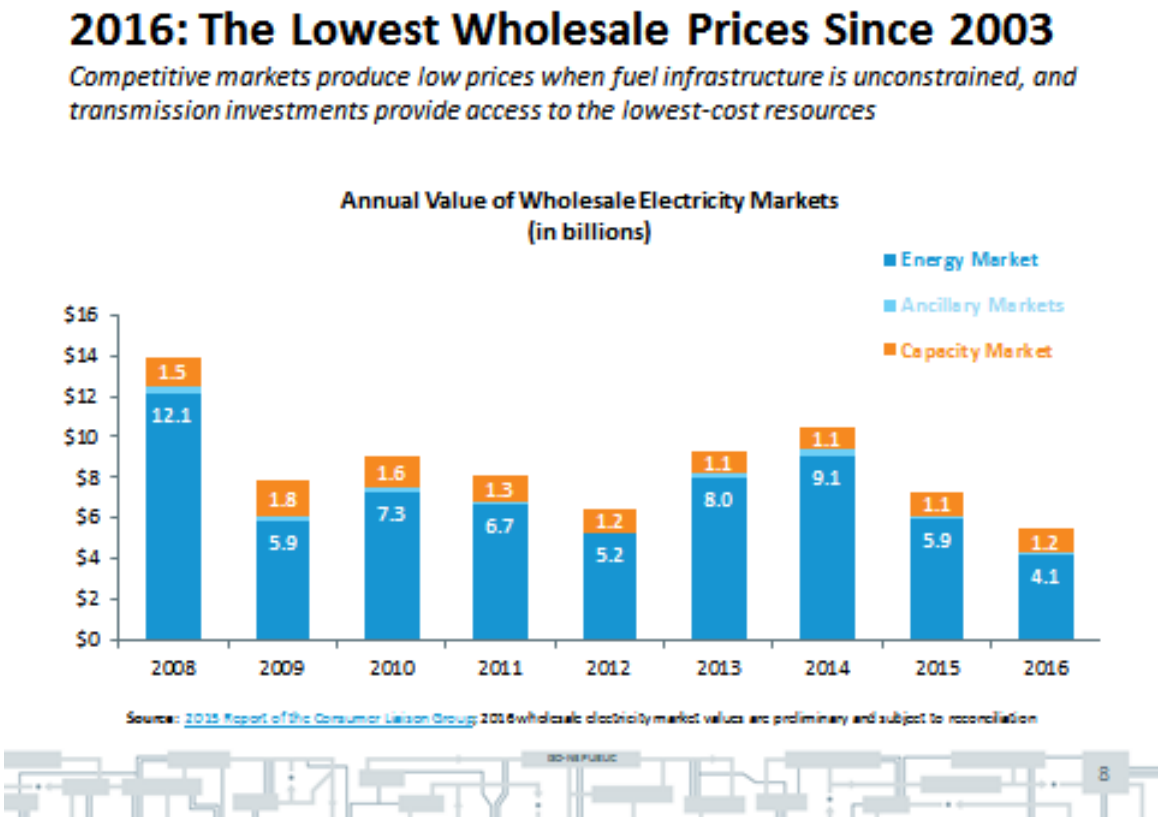
Expanded natural gas pipeline capacity could be one solution, but it is not the only way to solve the region's fuel infrastructure needs. Solutions could also include more storage for liquefied natural gas, or LNG, and having generators enter into contracts for that LNG. More power plants could add dual-fuel capability so they can switch to oil stored onsite when they can't get natural gas. But developers of new dual-fuel power plants, as well as owners of existing oil-fired generators, face tighter environmental restrictions that limit how often they can run on oil.

More renewable resources could help ease the region's reliance on natural gas. But that solution requires more transmission lines to tap the region's great potential for wind energy in northern New England and offshore, and to reach Canada's hydro energy.

Despite the growing need, the outlook for additional energy infrastructure has dimmed. Siting energy infrastructure projects has proven to be difficult. State efforts to develop a regional funding mechanism to expand natural gas infrastructure have stalled, and several natural gas pipeline projects have been suspended. These and other factors are likely to require greater reliance on higher-emitting, less efficient resources.

Toward the end of this presentation, I'll elaborate on the vulnerability of the region's wholesale markets. Briefly, the challenge is how to accommodate the New England states' clean energy goals while protecting the markets and their ability to ensure resource adequacy and power system reliability.

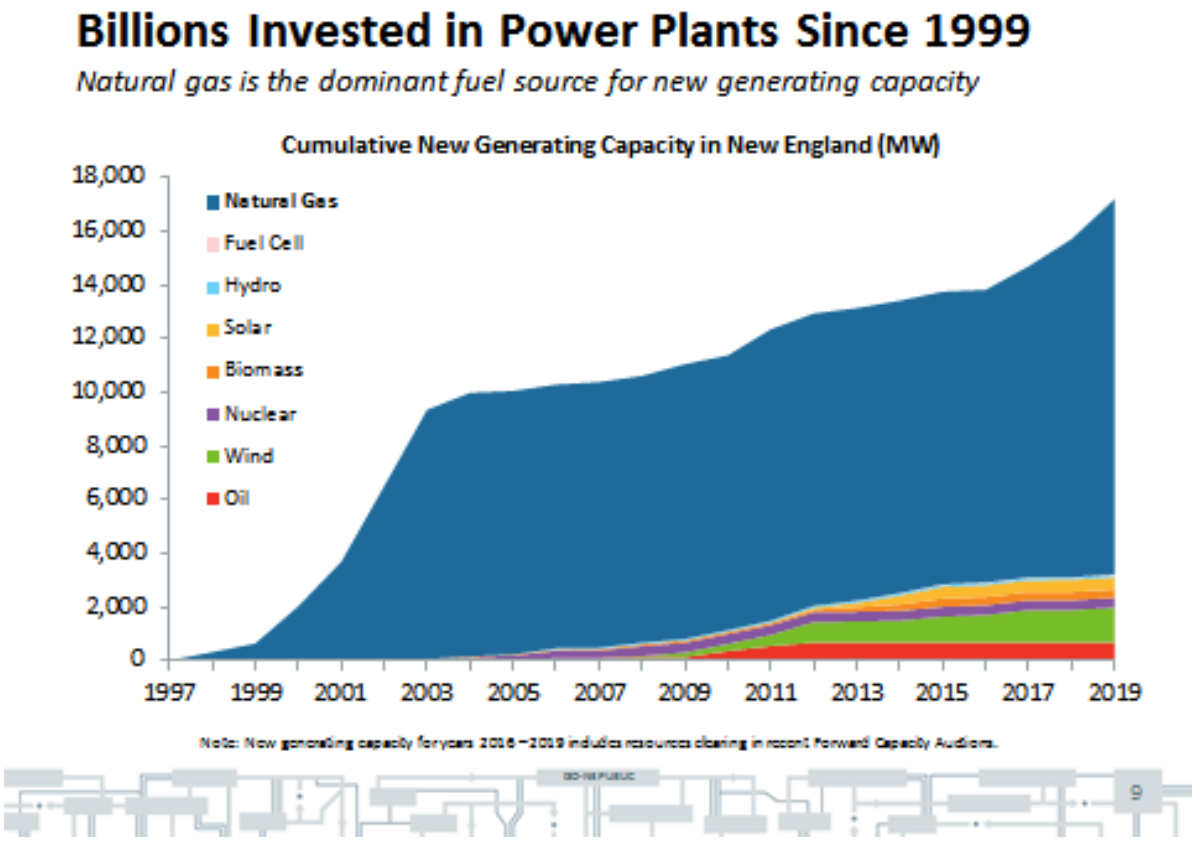
Slide 8—2016: The Lowest Wholesale Prices Since 2003



The preliminary value of last year's energy market was $4.1 billion dollars, the lowest level in 13 years. There are two reasons. First, natural gas is the fuel used most often to generate power in New England, and natural gas prices in 2016 were at their lowest level since 1999. Second, mild winter weather in New England kept down heating demand for natural gas, which left room in the natural gas pipelines to deliver that low-priced natural gas to the region's power plants.

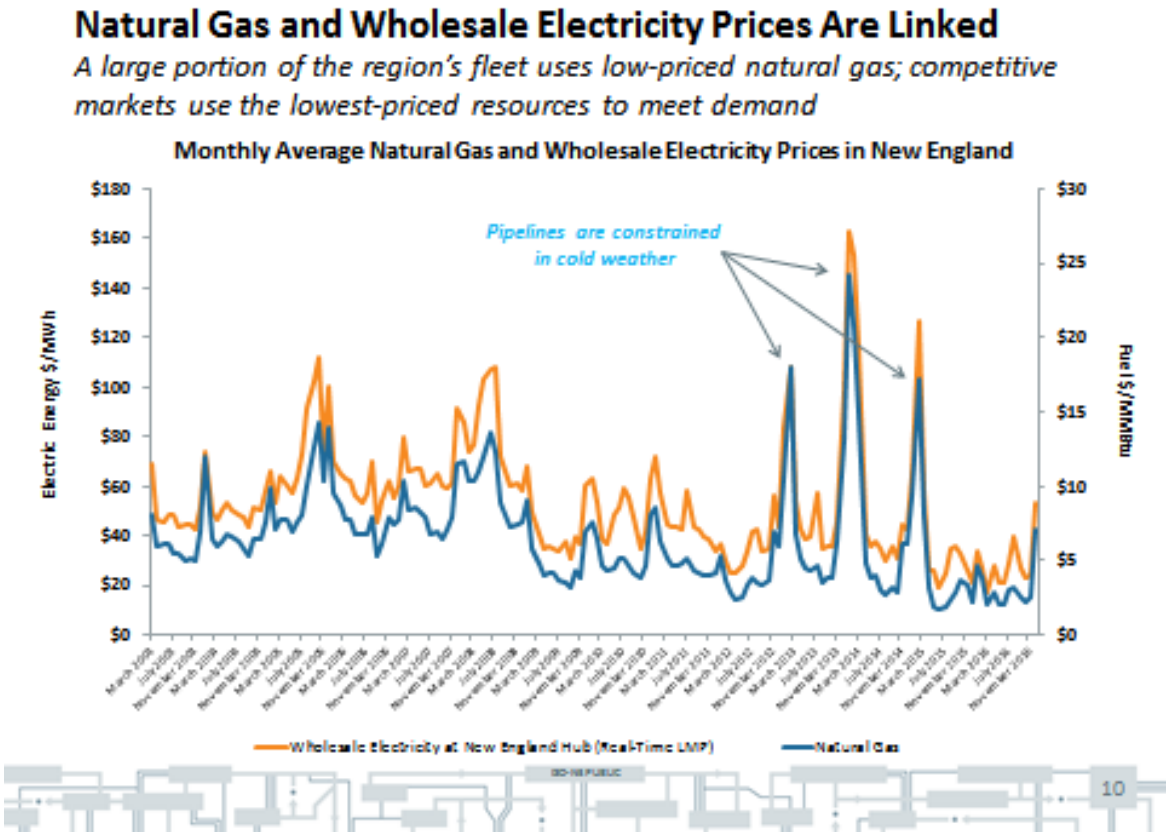
By comparison, during the extremely cold winter of 2013-2014, pipeline constraints pushed up prices for both natural gas and wholesale electricity to record highs. In just three months that winter, the total value of the wholesale electricity market was about $5 billion dollars. That's more than the cost of wholesale power for all 12 months of 2016.

Slide 9—Billions Invested in Power Plants Since 1999



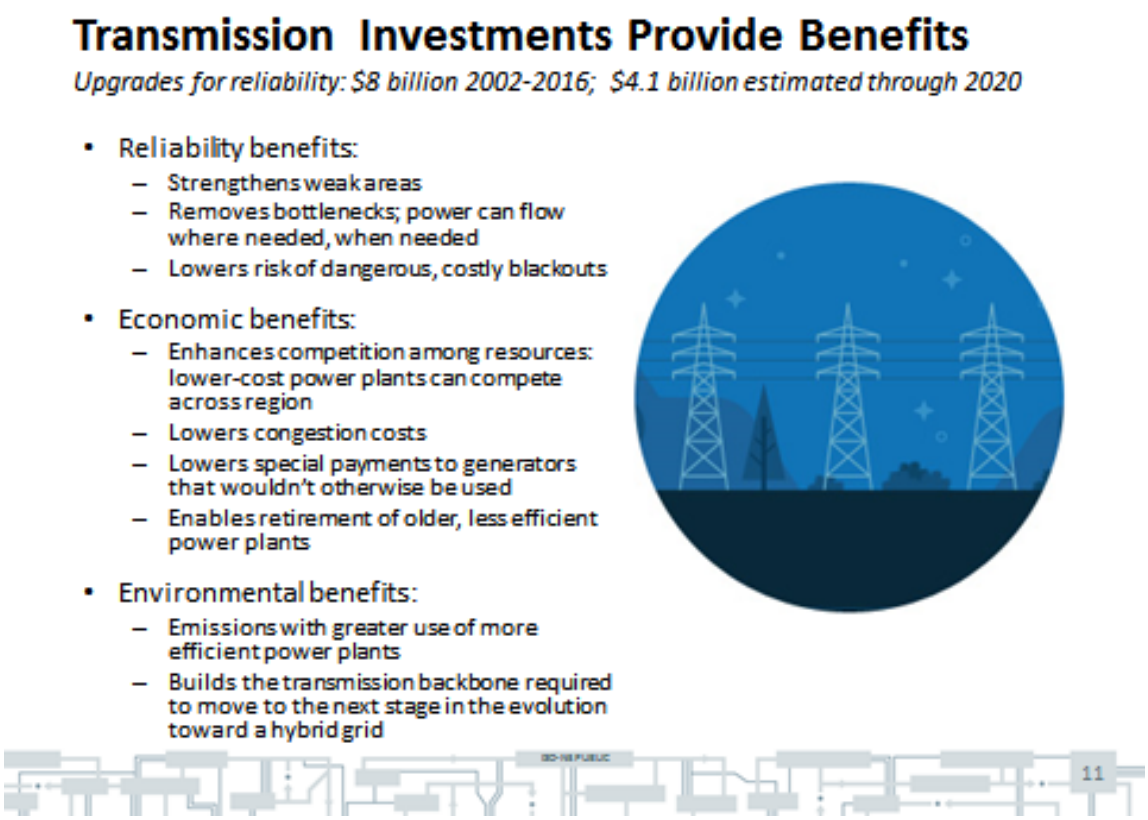
New England's competitive markets, as well as open access to utility-owned transmission systems, are the results of industry restructuring in the late 1990s. This combination spurred billions of dollars of private investment in new power plants. The blue area on this chart illustrates that the vast majority of that new generation uses natural gas. It's been the fuel of choice because natural gas power plants are generally less expensive to build and operate.

Slide 10—Natural Gas and Wholesale Electricity Prices Are Linked



You can see here that the prices of natural gas and wholesale electricity are closely linked. In 2016, power plants using natural gas generated 49% of the power produced in New England. This also illustrates the seasonal price volatility for both natural gas and electricity. When demand for natural gas spikes in winter, the prices of both natural gas and electricity also spike.

Slide 11—Transmission Investments Provide Benefits



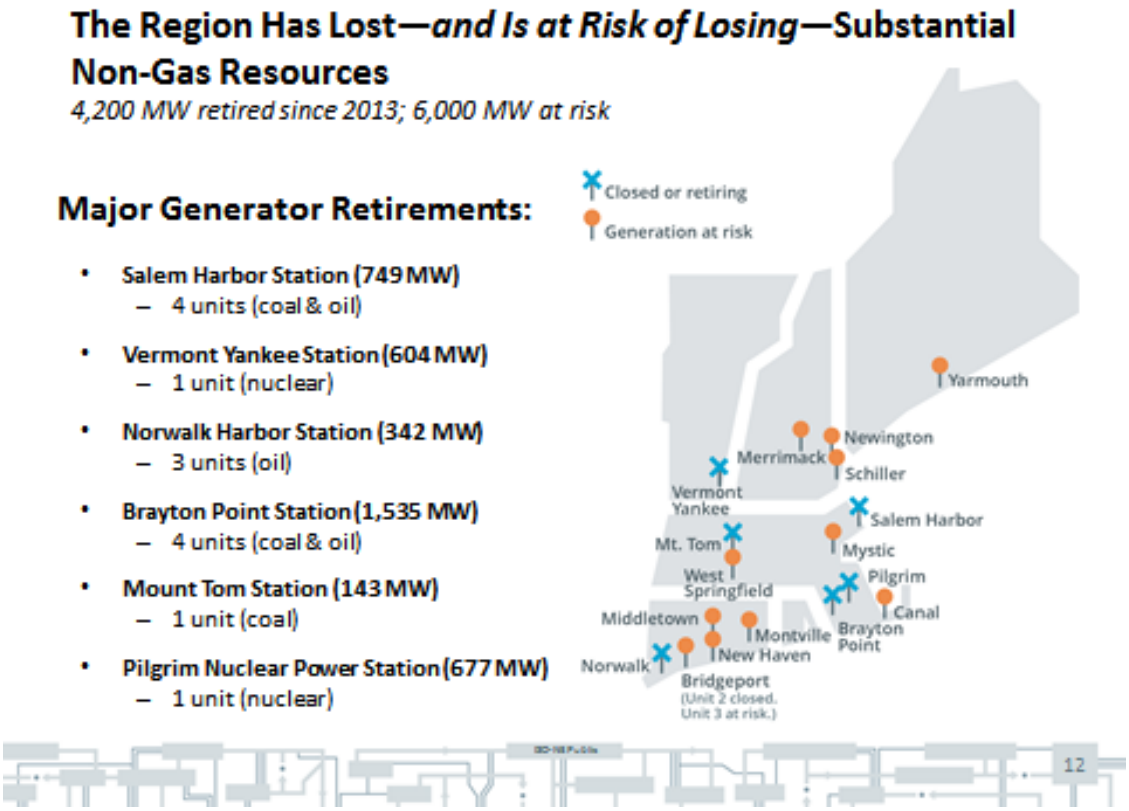
ISO New England was given primary responsibility for long-term power system planning in 2001. Working with transmission owners, the ISO has identified weak areas and bottlenecks on the high-voltage transmission system, and the region has invested $8 billion dollars in nearly 700 transmission upgrades to address those issues. That investment is making up for several decades of under-investment in the system.

The transmission upgrades are meeting mandatory requirements for system reliability, but they also provide economic benefits and have been a factor in reducing power plant emissions. A strong transmission grid allows electricity to flow more freely across the region, enabling resources in all six states to compete with each other. The availability of more efficient and less expensive power plants has enabled older fossil fuel generators to retire. Before the upgrades, special reliability contracts were needed to keep some of those older generators running behind transmission bottlenecks. Eliminating the bottlenecks

allows less expensive power to flow into the areas behind bottlenecks.

The reliability upgrades also form the transmission backbone needed for increased renewable energy, distributed energy, and deployment of new technologies. And most importantly, a robust transmission system puts the region at a much lower risk of dangerous and costly blackouts.

Slide 12—The Region Has Lost—and is at Risk of Losing—Substantial Non-Gas Resources



While competitive markets attract investments in new generation, the flip side is the effect of competition on older, less efficient or less profitable generators. The competition from generators using low-priced natural gas has reduced the revenues of some older power plants, and retirements are accelerating.

In just the last three years, more than 4,000 megawatts of coal, oil and nuclear generators have retired or announced they will retire by 2019. Another 6,000 megawatts of the

remaining coal and oil plants are at risk for retirement, given their age, the low price of natural gas, and environmental requirements.

Slide 13—Power Plant Emissions Have Declined With a Changing Fuel Mix and Transmission Upgrades

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Power Plant Emissions Have Declined with a Changing Fuel Mix and Transmission Upgrades

CO_2 emissions rose in 2015 after Vermont Yankee's retirement in December 2014

Reduction in Aggregate Emissions (kilotons/year)

Year	NO_x	SO_2	CO_2
2001	59.73	200.01	52,991
2014	20.49	11.68	39,317
2015	18.86	9.11	40,312
% Reduction 2001–2015	⬇ 68%	⬇ 95%	⬇ 24%
% Change 2014–2015	⬇ 8%	⬇ 22%	⬆ 2.5%

Source: 2015 ISO New England Electric Generator Air Emissions Report, January 2017

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Power plant emissions in New England have declined significantly over the last 15 years. That's largely due to competitive markets that use more natural gas, the transmission upgrades that enable the most efficient power plants to be used, and the retirements of coal and oil generators. Public policy initiatives favoring clean energy are also factors.

However, CO_2 emissions ticked up after the Vermont Yankee nuclear power plant retired at the end of 2014. More electricity from fossil-fuel plants has been needed to fill the energy gap created with that retirement. The retirement of the Pilgrim power plant in 2019 can be expected to have a similar effect on emissions.

Slide 14—Title Slide—State of the Grid: Winter

STATE OF THE GRID: WINTER

I'd like to spend a few minutes discussing fuel security in winter. Winter is the season of greatest concern, even though New England's highest demand is in summer, when air conditioning drives up electricity use.

Let me describe how we operate the power system during winter. New England has 33,000 megawatts of regional generating capability, as well as demand resources and imports. That total capacity should be more than enough to cover winter peak demand and our required reserve margins. However, inadequate natural gas transportation and storage infrastructure create very challenging conditions for ISO system operators.

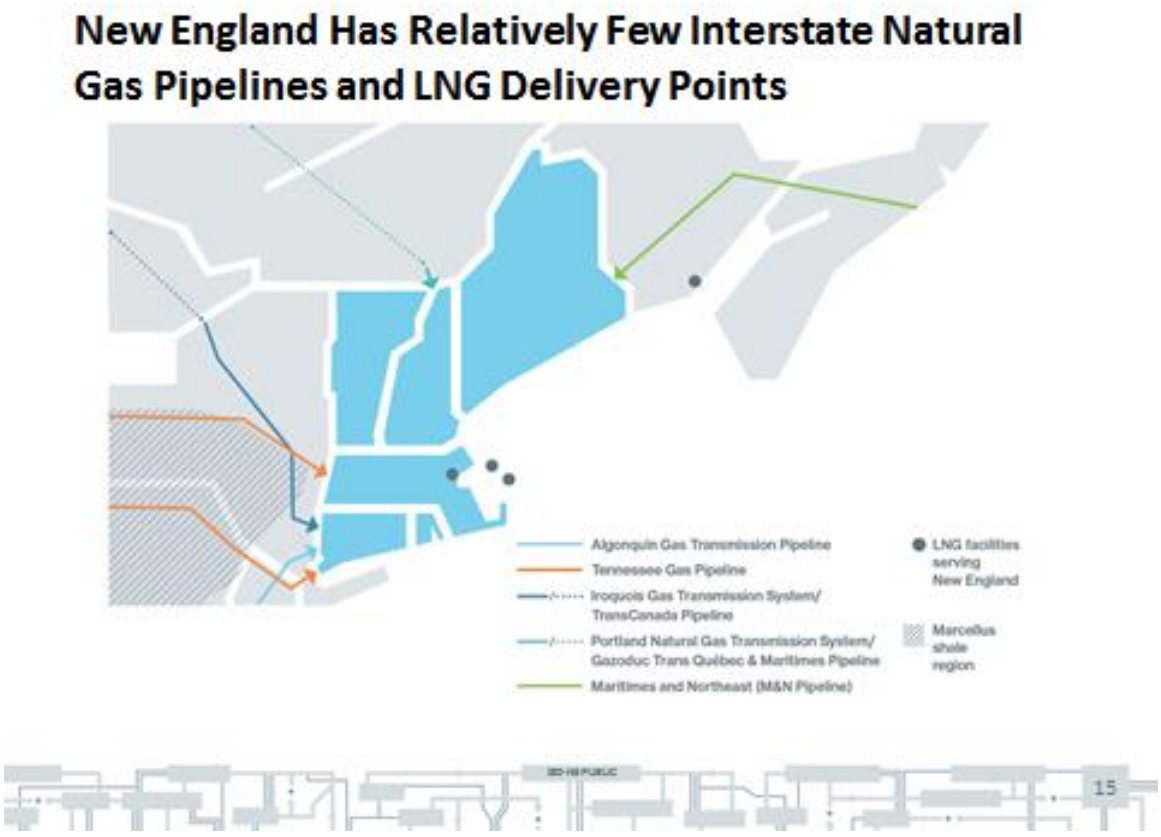
At the ISO, we've made extensive changes in how we operate the system and in the wholesale market rules to mitigate the impacts of these natural gas infrastructure challenges.

Even so, there are times when we've just skated by. We've maintained reliability by using non-gas-fired generators and employing special procedures when power supplies are running short. However, it's possible for a series of problems to occur on a complex

machine like the power system. During extreme temperatures, fuel constraints can sideline thousands of megawatts of natural gas generation; aging generators can break down; imports can be cut by neighboring grids dealing with the same weather; and oil and LNG deliveries can be delayed.

If a few of those problems coincided, ISO system operators could be forced to use stronger measures to protect the grid. Those measures could include asking the public for voluntary conservation or, in extreme cases, ordering controlled power outages. If the region's fuel infrastructure remains constrained, the risk will rise with upcoming generator retirements.

Slide 15—New England Has Relatively Few Interstate Natural Gas Pipelines and LNG Delivery Points

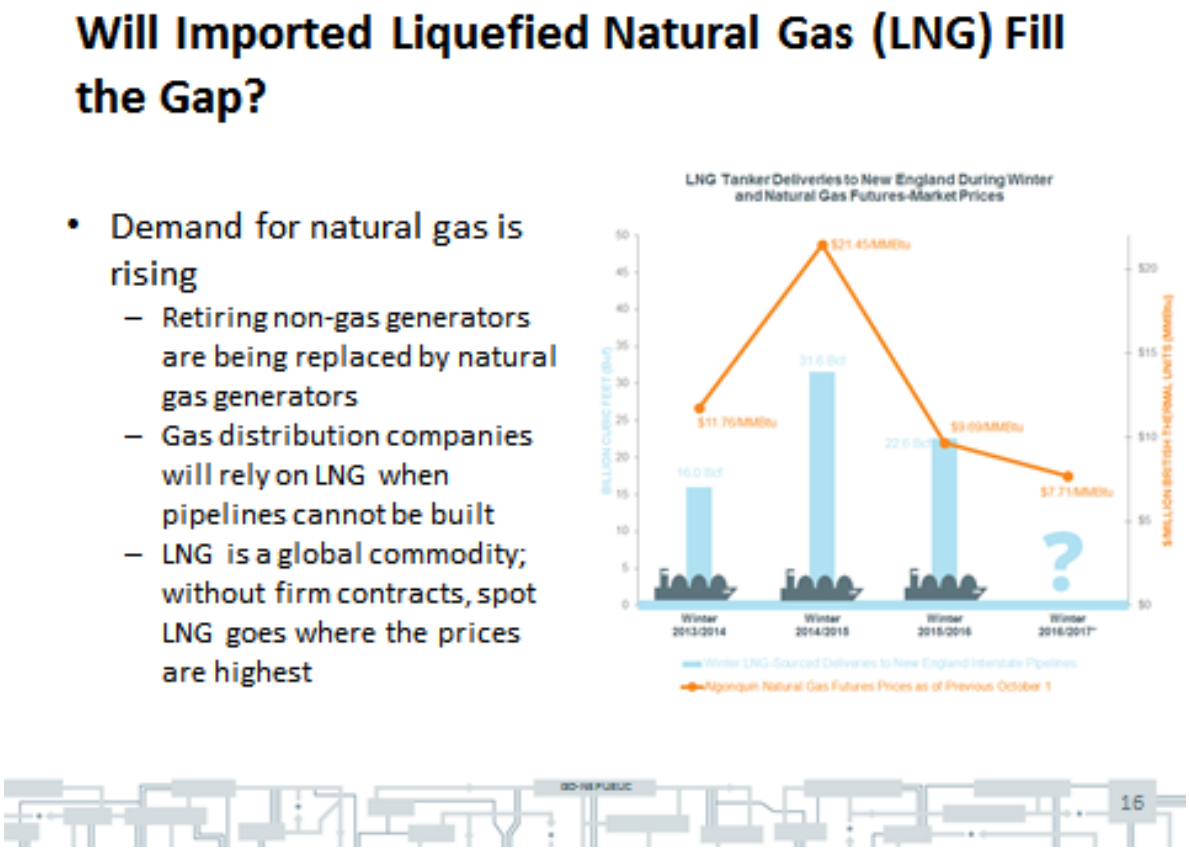


New England imports all the natural gas it uses for heating and power generation. The gas

arrives here through pipelines or in LNG tankers. But the infrastructure to deliver or store the fuel is not expanding fast enough to keep pace with the increasing demand for natural gas. When the pipelines are running full or near full just to meet heating demand on the coldest days, there's little or no room left for power plants. While the past couple of winters have been relatively mild, we can't operate a reliable power system on the hope that New England's future winter weather will always be mild.

Incremental pipeline capacity has been added recently to serve retail gas customers. Over the next few winters, some of that capacity is likely to be available for generators. However, the extra capacity for power generation will dwindle as gas utilities sign up more customers.

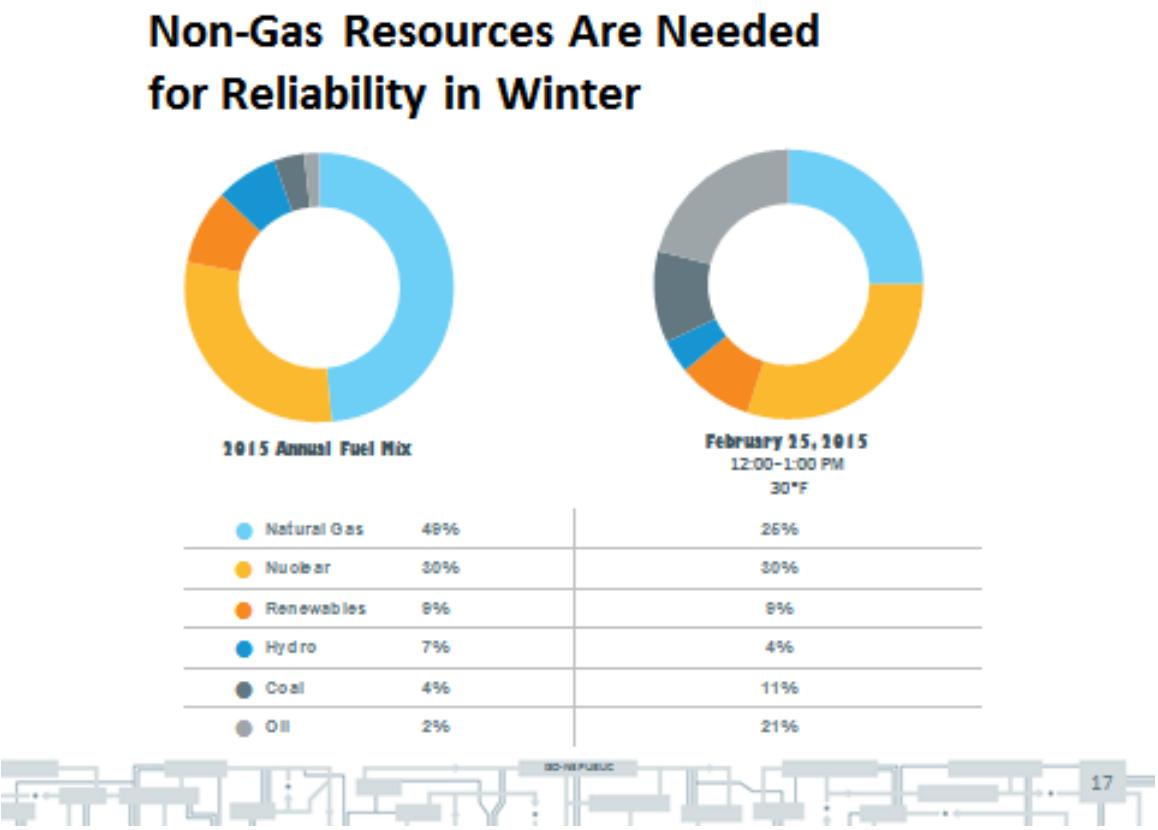
Slide 16—Will Imported Liquefied Natural Gas (LNG) Fill the Gap?



LNG has been very helpful, when it's available. But LNG is not always available in sufficient

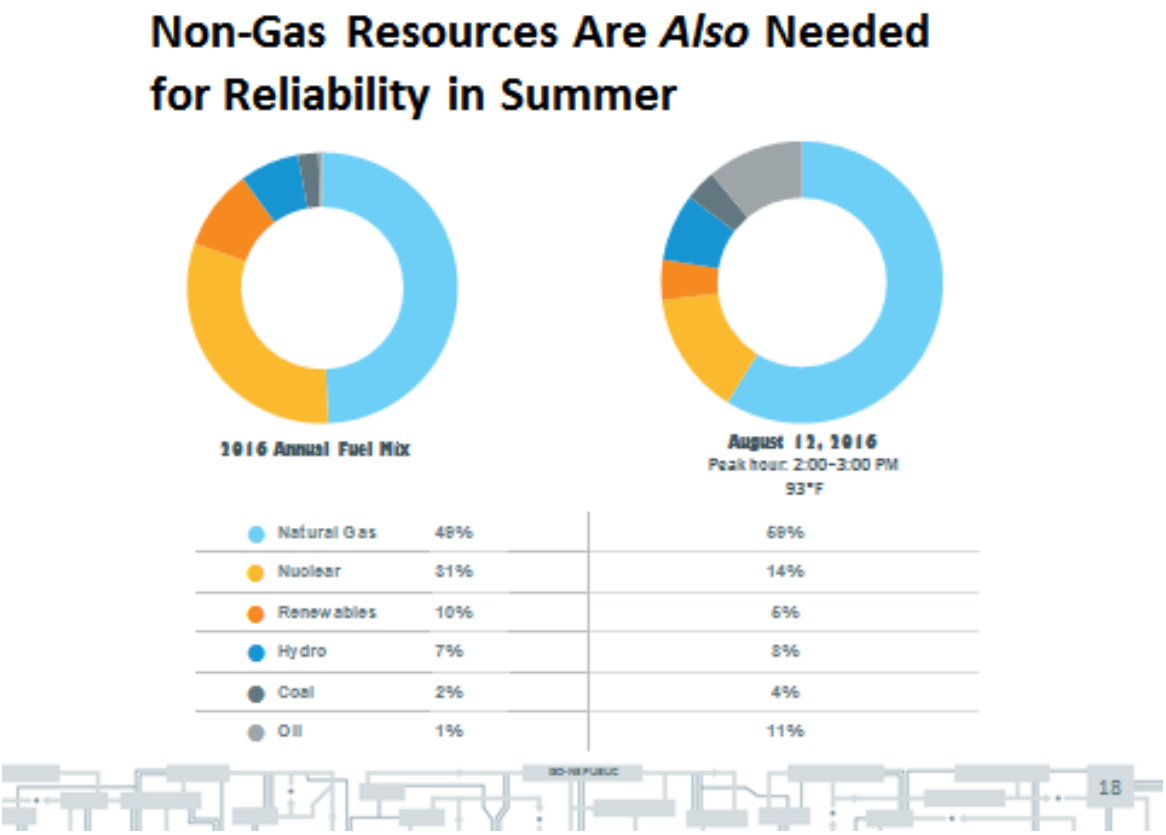
quantities, and it's a global commodity that's often priced at a premium. Contracts for LNG delivery must also be signed months in advance, and the level of additional spot LNG cargoes arriving in New England varies, depending on global LNG prices. This slide helps illustrate the variability of LNG deliveries to New England from year to year.

Slide 17—Non-Gas Resources Are Needed for Reliability in Winter



Oil, coal, and nuclear power plants can be critical for reliable power system operations on a cold winter day. For example, on this frigid day in February 2015—which was the coldest month since 1960—natural gas power plants provided just 25% of the region's power. Coal and oil power plants filled the gap by generating more than 30%. On average, though, they generated about 6% of the region's power in 2015. The availability of nuclear plants was also essential for maintaining reliability that day.

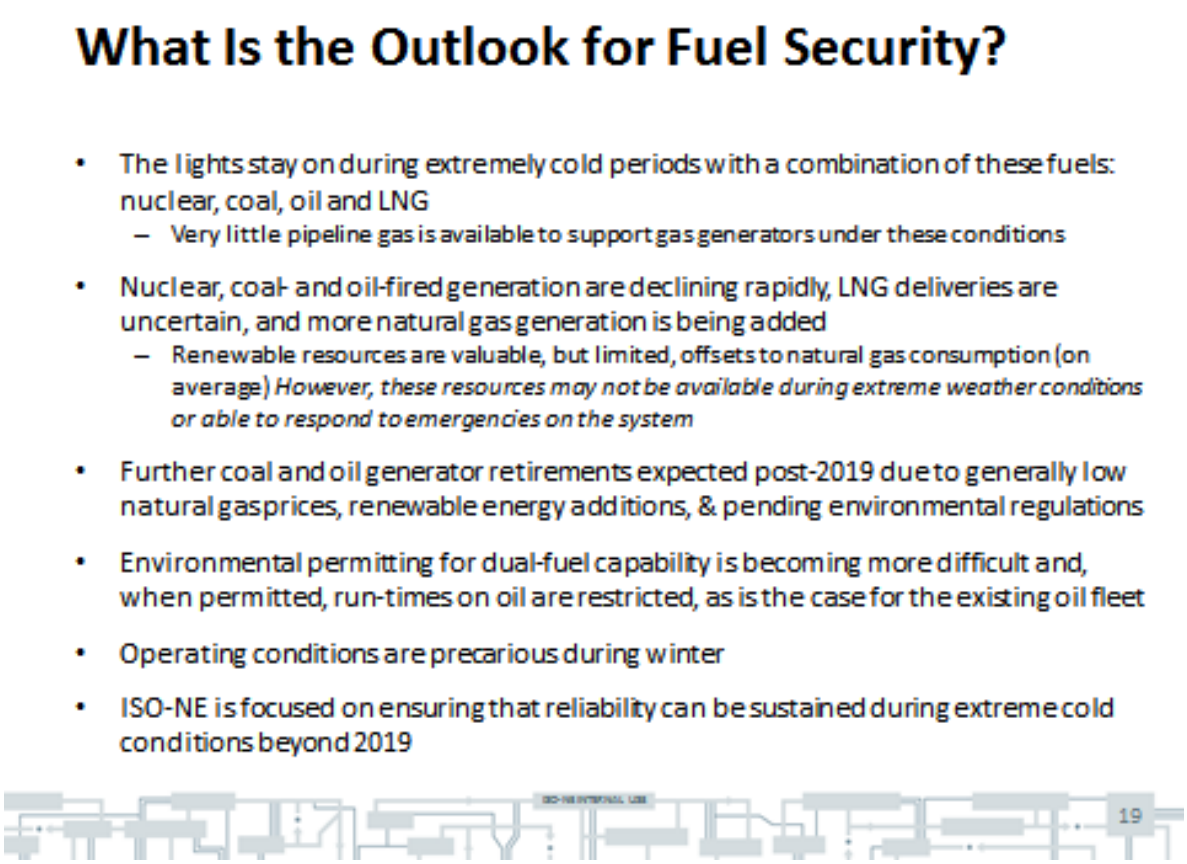
Slide 18—Non-Gas Resources Are *Also* Needed for Reliability in Summer



Power plants that use fuels other than natural gas are needed at other times, not just in winter. While more natural gas supply is typically available during warm weather, every resource type is needed when demand peaks on a hot summer day.

That need only becomes more acute when a large generator goes offline. Last summer, during an August heat wave, a large nuclear station shut down unexpectedly as demand was climbing. As you can see here, about 14% of the energy generated in New England came from nuclear power during the peak hour on August 12. On most days, nuclear power plants are generating about 30%. Coal and oil, which averaged 3% of New England's energy production last year, contributed about 14% on August 12th. I'll note again that natural gas is always a key source of energy in New England. An unexpected pipeline outage that day could have forced system operators to employ emergency actions to maintain system reliability.

Slide 19—What is the Outlook for Fuel Security?



The prospect for fuel security in coming winters is cause for concern.

By the winter of 2019, Brayton Point and Pilgrim nuclear station will be retired. They are two of the region's largest non-gas-fired power plants.

As more non-gas generators retire, there may not be sufficient resources to generate electricity when natural gas plants aren't available. Eventually, renewable resources may be the solution. The key to long-term independence from fossil fuels is renewable energy backed up by widespread, grid-scale storage. But storage will be needed at a level that won't be economically or technically feasible for many years. Connecting wind farms in northern New England or bringing hydro energy from Canada will require extensive transmission expansion, which will be costly and take years to build. Offshore wind projects

would likely require less transmission, but are typically more costly and will also take years to build.

ISO New England doesn't have the authority to directly address the region's infrastructure needs. However, we have taken actions within our purview to prevent precarious winter operating conditions from becoming unsustainable. We continue to examine a range of market-based incentives to help ensure fuel security. An example could be boosting incentives for power plants to sign firm contracts for fuel.

As a last resort, if these measures aren't enough, the ISO may have to consider more extreme measures. They could include offering special reliability contracts to some non-gas resources to convince them to postpone retirement. These contracts are likely to be costly, and retention of older oil resources will increase emissions.

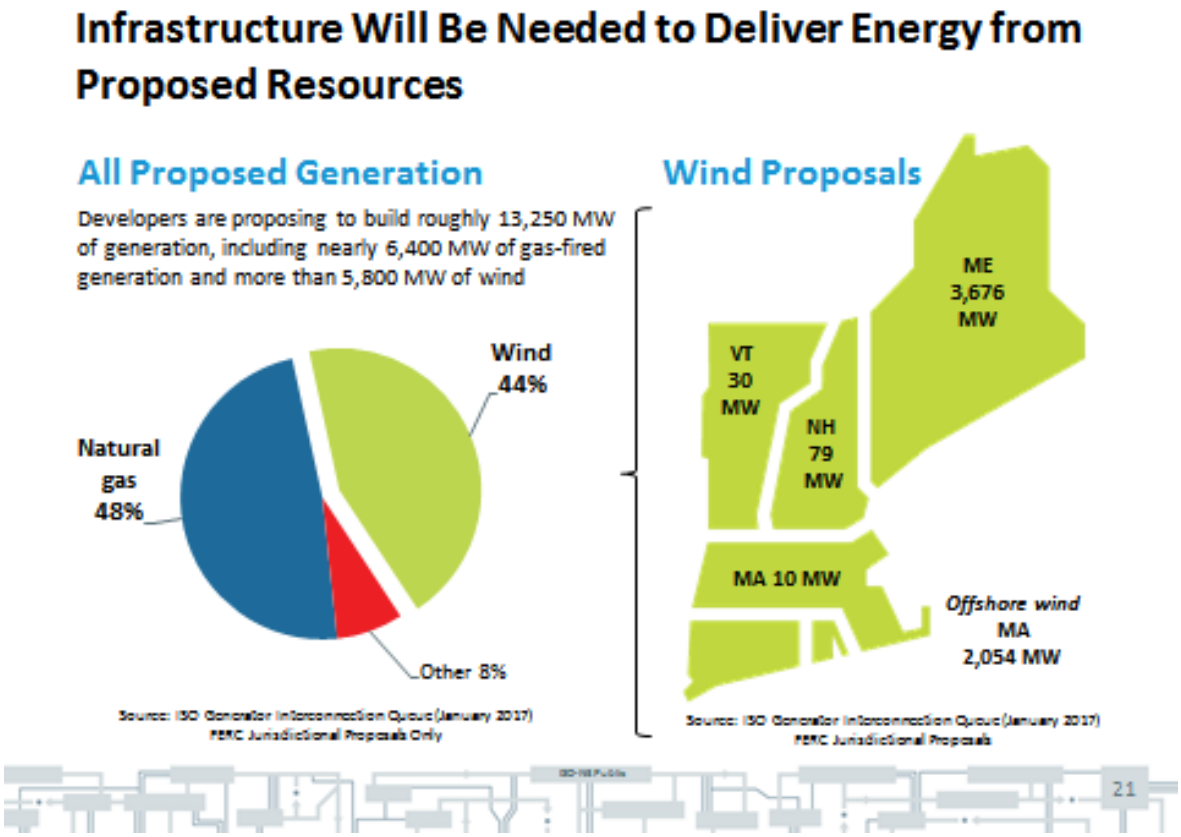
Slide 20—Title Slide—State of the Grid: The Future Grid

New England's traditional power system is evolving into a hybrid grid, where demand for electricity is met in two ways. The power system will still have large generators, including wind farms, connected to the regional transmission system. However, demand will also be met by thousands of small resources connected "behind the meter" at customers' homes and businesses.

The hybrid grid will run on significant amounts of carbon-free renewable energy, backed up by fast, flexible power plants ready to jump in and balance the variable output from wind and solar resources. This backup fleet will likely be natural-gas-fired generators, given their growing presence and their ability to come online quickly and to ramp their output up and down rapidly. Some hydro resources are also likely to be part of the equation.

The evolution to a hybrid grid, on the way to a fully renewable power system, is largely driven by the New England states' clean-energy initiatives. These include the Regional Greenhouse Gas Initiative, also known as RGGI, where carbon allowances for power plants are bought and sold. To varying degrees, the states also offer incentives for energy-efficiency programs, installation of solar panels, and development of new energy-storage technologies. State and federal incentives are also encouraging wind farm development in the region. And the three southern states issued a request for clean-energy proposals last year and have selected a menu of resources to help them meet their climate goals and requirements.

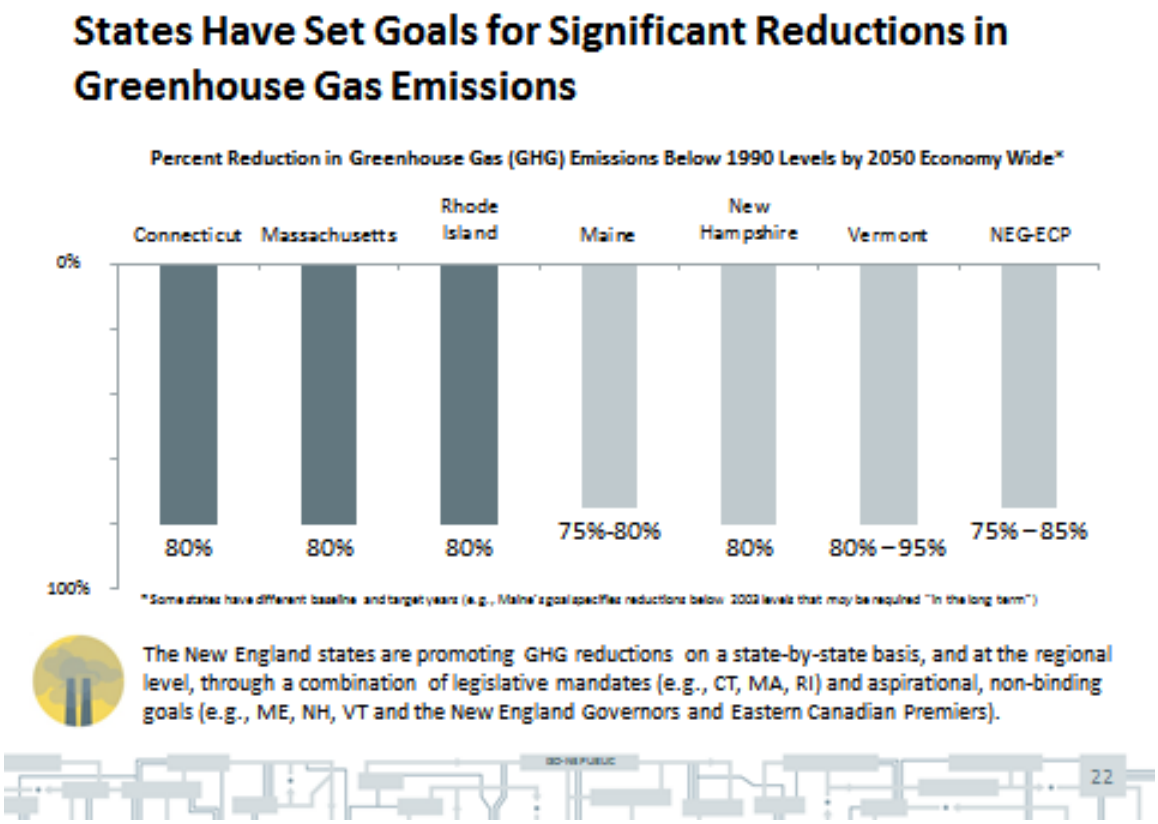
Slide 21—Infrastructure Will be Needed to Deliver Energy from Proposed Resources



This future grid can be seen in the projects developers are proposing to connect to the New England power grid. As of early January, the ISO's interconnection queue had proposals totaling more than 13,000 megawatts. Almost half of the new generation would be fueled by natural gas. Wind farms make up most of the rest. The queue also included over 700 megawatts of grid-scale solar power and almost 80 megawatts of grid-scale battery storage.

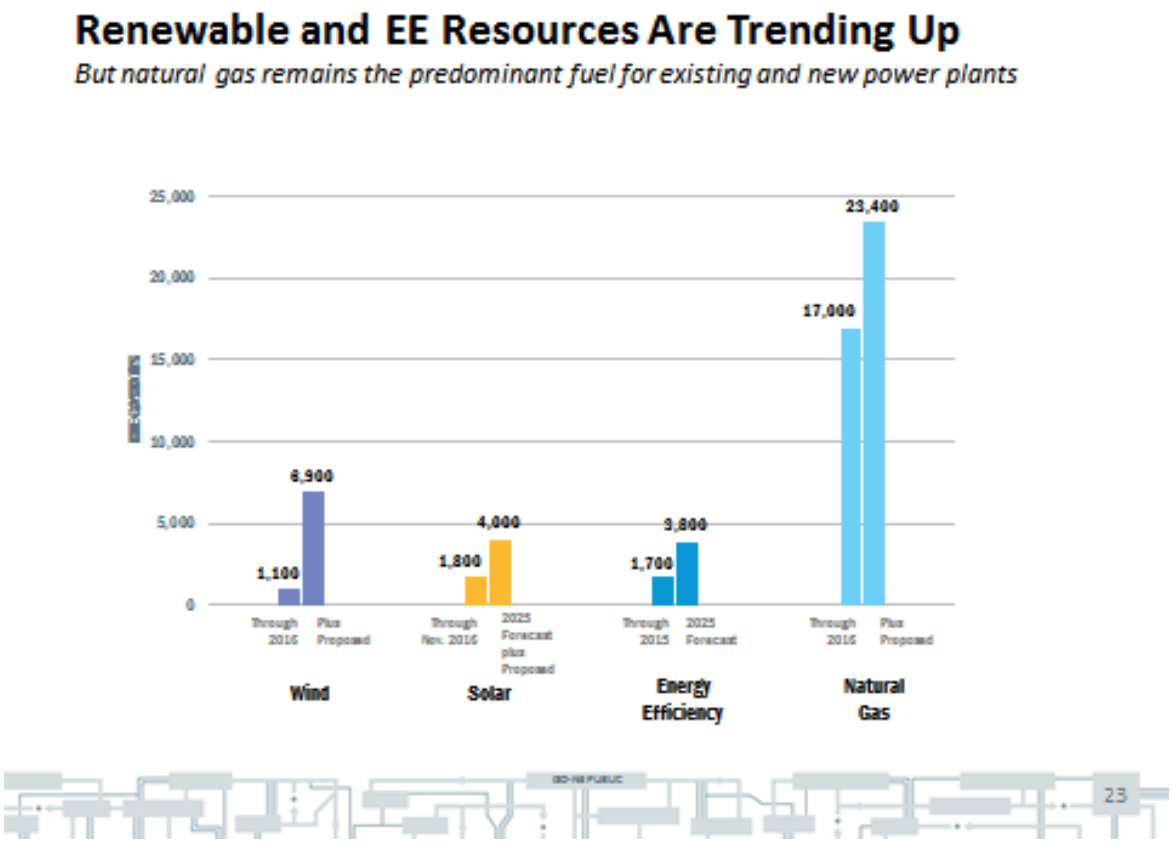
Most of the new wind farms are proposed for northern Maine or offshore Massachusetts. In northern Maine, the transmission system is sized for light local loads, and will require extensive upgrades to accommodate higher levels of generation.

Slide 22—States Have Set Goals for Significant Reductions in Greenhouse Gas Emissions



All six New England states are seeking to reduce greenhouse gas emissions. Connecticut, Massachusetts, and Rhode Island must meet legislative mandates, while Vermont, New Hampshire, and Maine have non-binding goals. Achieving these ambitious goals will require decarbonizing the economy—that is, reducing the use of fossil fuels in the transportation and heating sectors, not just in the power sector. This is likely to result in more electric vehicles and electric heating, which will require a robust power system that can meet the demand to keep the lights on, the heat on, and the cars charged.

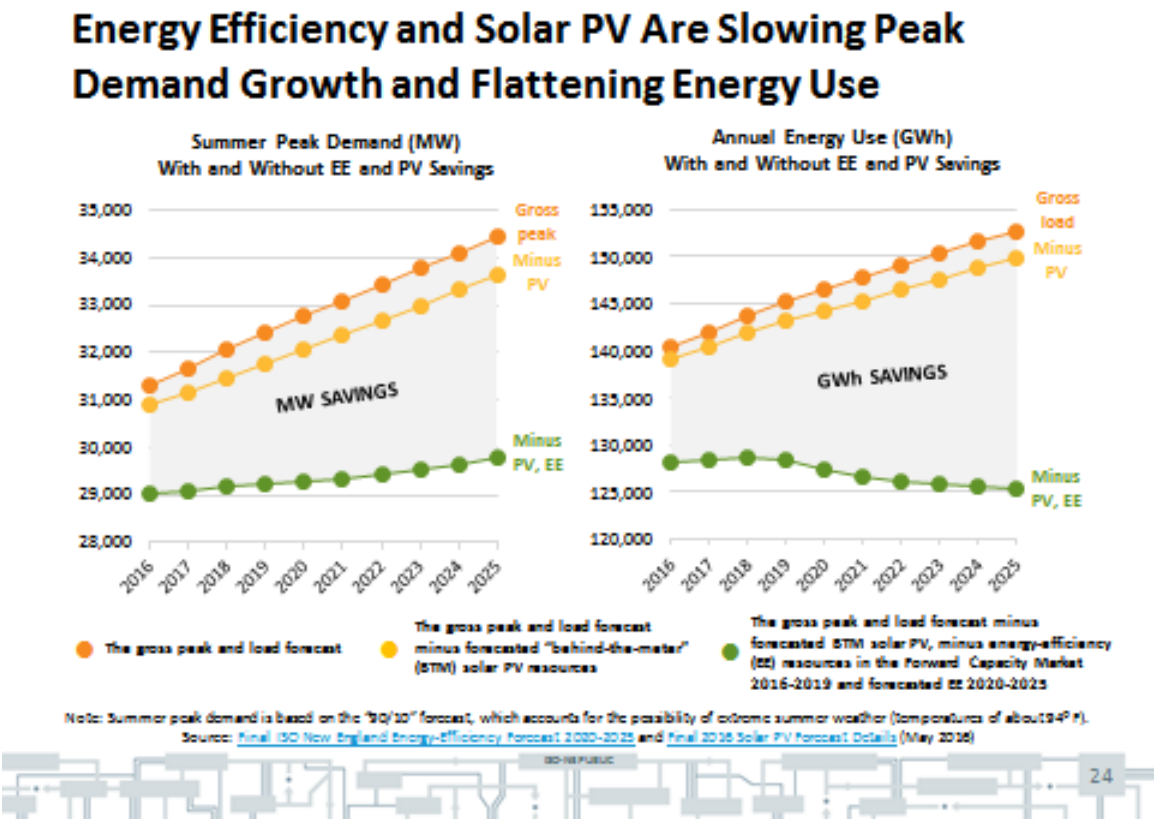
Slide 23—Renewable and EE Resources are Trending Up



Wind and solar resources can offset some natural gas use and they are growing, but they are still a small part of the regional resource mix. This chart shows current and projected levels of wind and solar resources, state-sponsored energy-efficiency, or EE, measures, and natural gas generation. The vast majority of the projected solar capacity will be installed at customer sites, where it will help reduce demand. These wind and solar capacity projections represent the maximum energy production possible from each resource. However, on average, most wind and solar resources produce less than their maximum capability.

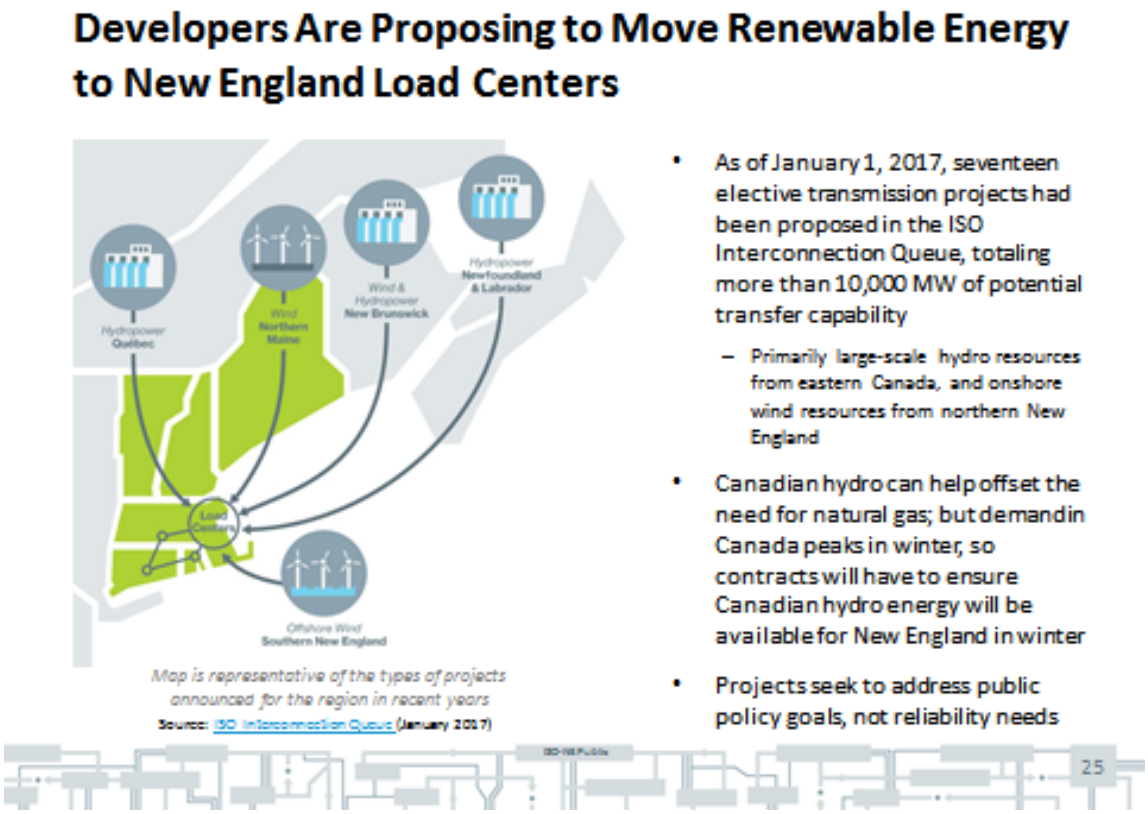
With incentives provided by the states, continued strong growth of these resources can be expected.

Slide 24—Energy Efficiency and Solar PV are Slowing Peak Demand Growth and Flattening Energy Use



Our forecasts show that PV and EE will cause summer peak demand—the hour of highest energy consumption in a year—to rise much more slowly than it would otherwise. The forecasts also show that New England's total annual energy consumption will actually decline slightly by 2025.

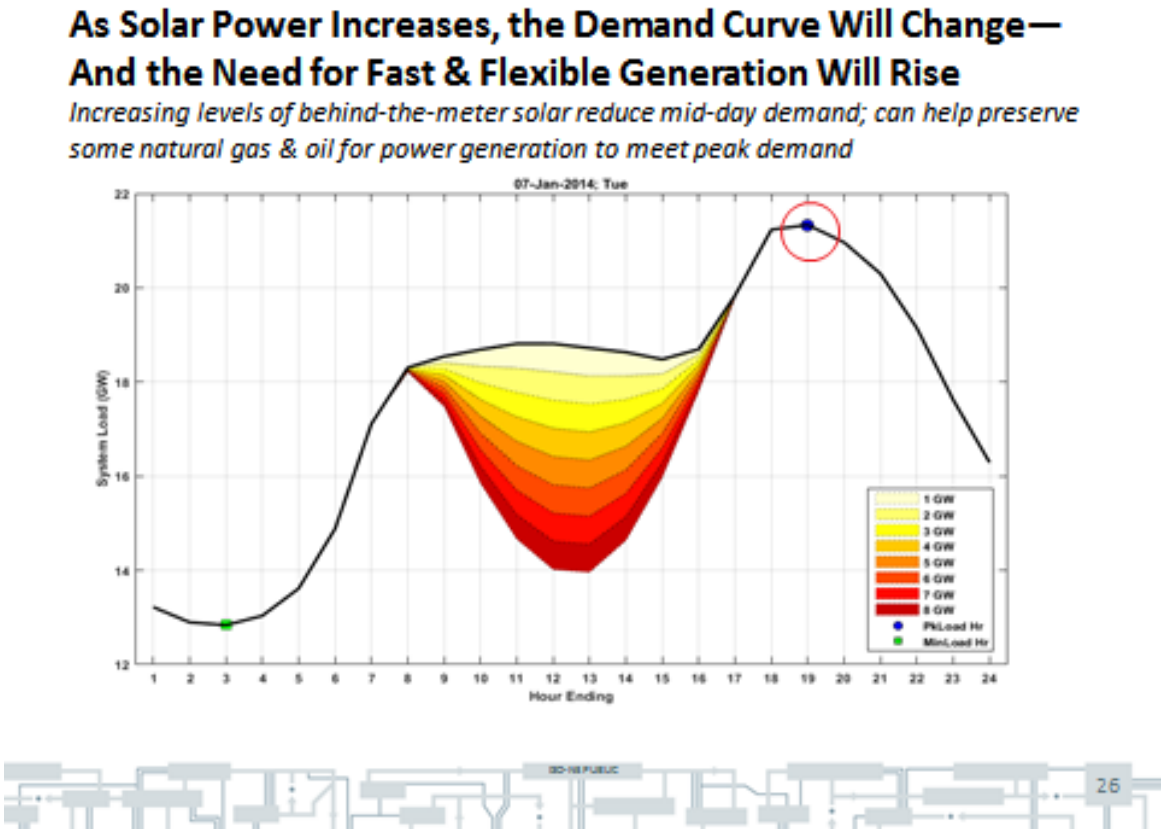
Slide 25—Developers are Proposing to Move Renewable Energy to New England Load Centers



As of January 1 this year, private transmission companies had proposed to build 17 transmission projects to move more than 10,000 megawatts of power. Some would import wind or hydro energy from Canada, and others would tap wind farms in northern Maine and offshore wind in southern New England. These are elective projects, not reliability upgrades. If constructed, these merchant transmission lines could help address some of the region's fuel security challenges and also help offset the need for more natural gas infrastructure.

However, because Canada's demand for power peaks in winter, any future long-term contracts for Canadian hydro or wind energy should ensure that power can be delivered to New England during winter.

Slide 26—As Solar Power Increases, the Demand Curve Will Change—And the Need for Fast & Flexible Generation Will Rise



The hybrid grid will include growing levels of behind-the-meter solar power, which will reduce demand for electricity on sunny days. This graphic simulates what will happen to the load curve on a winter day as increasing increments of behind-the-meter solar are added to the system. On bright sunny days, solar power can help reduce the need for natural gas and oil-fired generation during the day, saving some fuel for peak-hour generation.

However, solar power doesn't help reduce the winter peak because the sun has set by the time demand is peaking, when people are getting home from work and turning on lights and stoves.

Slide 27—Energy Storage: Pumped Storage Hydro Paves the Way for Emerging Storage Technologies

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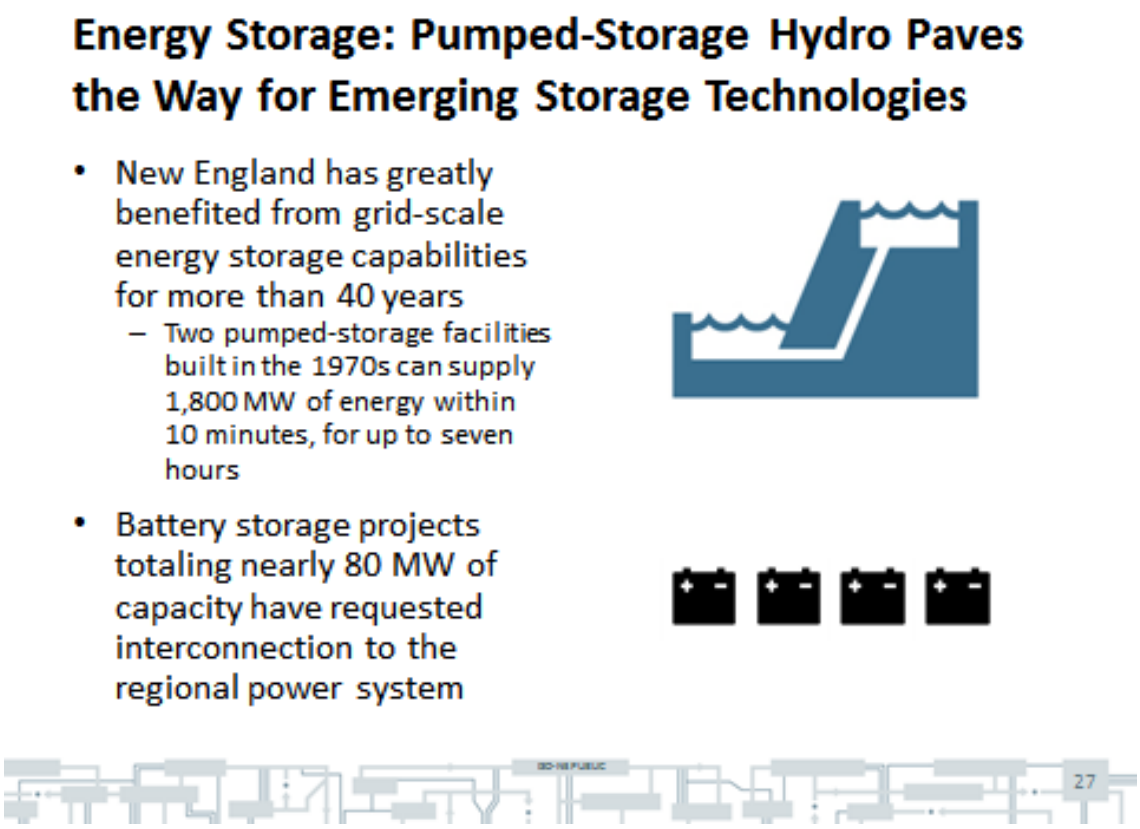


Widespread and cost-effective energy storage will be key to integrating high levels of renewable resources. New England has more than 40 years of history with storage, in the form of two large pumped-storage hydro facilities. They are capable of generating about 1,800 megawatts within 10 minutes, and running at that level for up to seven hours.

Emerging energy storage technologies, such as batteries and flywheels, are improving and will be a growing presence on the power system. These facilities are relatively small and tend to be limited to a few hours of output. As such, they can help balance the variability of renewable resources. But sufficient levels of new storage resources are unlikely to be developed in time to compensate for the upcoming generator retirements.

Slide 28—What is the Outlook for Nuclear Power?

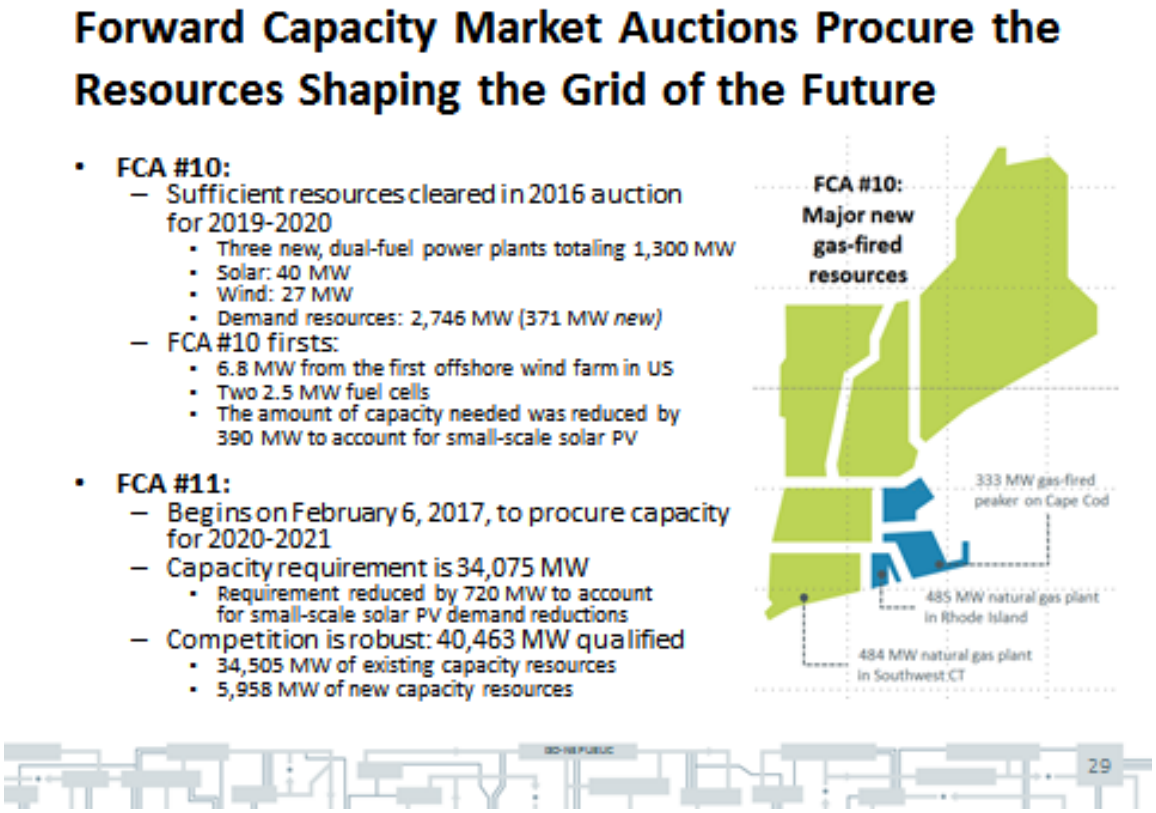
What Is the Outlook for Nuclear Power?

ISO-NE sees environmental, market, and operational concerns

- New England relies on nuclear power for a large portion of its energy (31% in 2016), but lacks a mechanism to appropriately value its carbon-free attributes
- The loss of nuclear generation has (at least temporarily) reversed the trend of declining emissions in the region
- The remaining nuclear generators have expressed concerns about the future economic viability of their facilities

Nuclear power is the region's largest source of zero-emission electricity, but uncertainty surrounds the future of the two nuclear plants that will remain in New England after Pilgrim retires in 2019. Low energy market prices resulting from low-priced natural gas are affecting the profitability of all resources, including nuclear stations across the country. In New York, Illinois, and Connecticut, state legislators and regulators have considered or are considering how to provide support to nuclear power plants so they stay online.

Slide 29—Forward Capacity Market Auctions Procure the Resources Shaping the Grid of the Future



The Forward Capacity Market, or FCM, procures the resources that will be needed in three years' time. The FCM also provides an essential revenue stream for all resources by covering capital costs that are not typically recovered in the energy market. Since 2013, the capacity auction has cleared 3,000 megawatts of new generating capacity that will help replace retiring generators. Most of the new capacity uses natural gas.

The most recent FCM auction was held last February and procured sufficient capacity to meet demand in 2019–2020. The auction included several firsts, including the nation's first offshore wind farm, which connected to the regional grid in December. And the ISO was able to use the findings from our innovative PV forecast for the first time to reduce the amount of required capacity by almost 400 megawatts.

The next FCM auction, FCA #11, will be held starting February 6 to obtain resource commitments for 2020–2021. More than 40,000 megawatts of capacity qualified to compete to meet the projected need of about 34,000 megawatts. The ISO's PV forecast was able to reduce the level of capacity required by 720 megawatts.

Slide 30—Title Slide—State of the Grid: Harmonizing Competitive Markets and Clean Energy Goals

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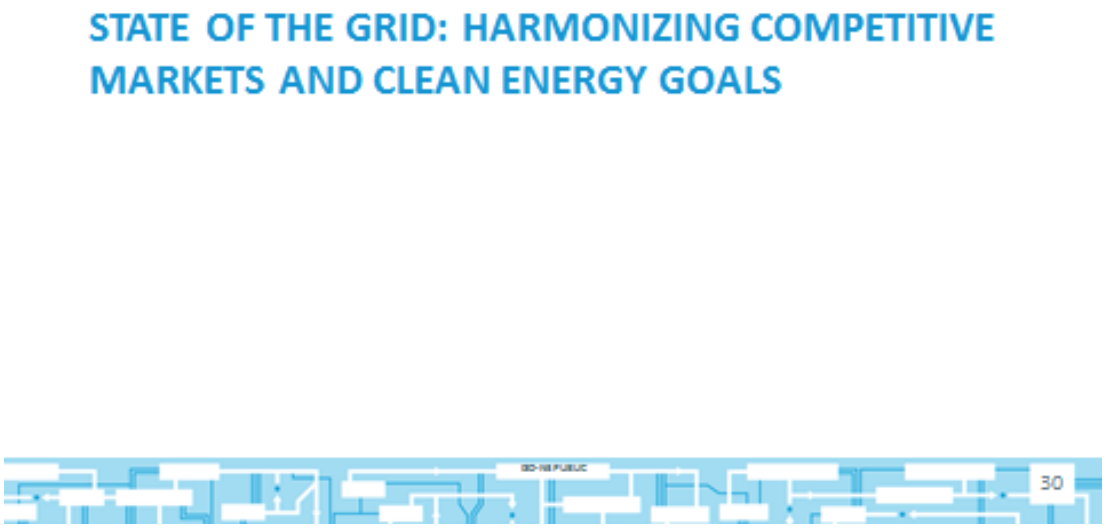
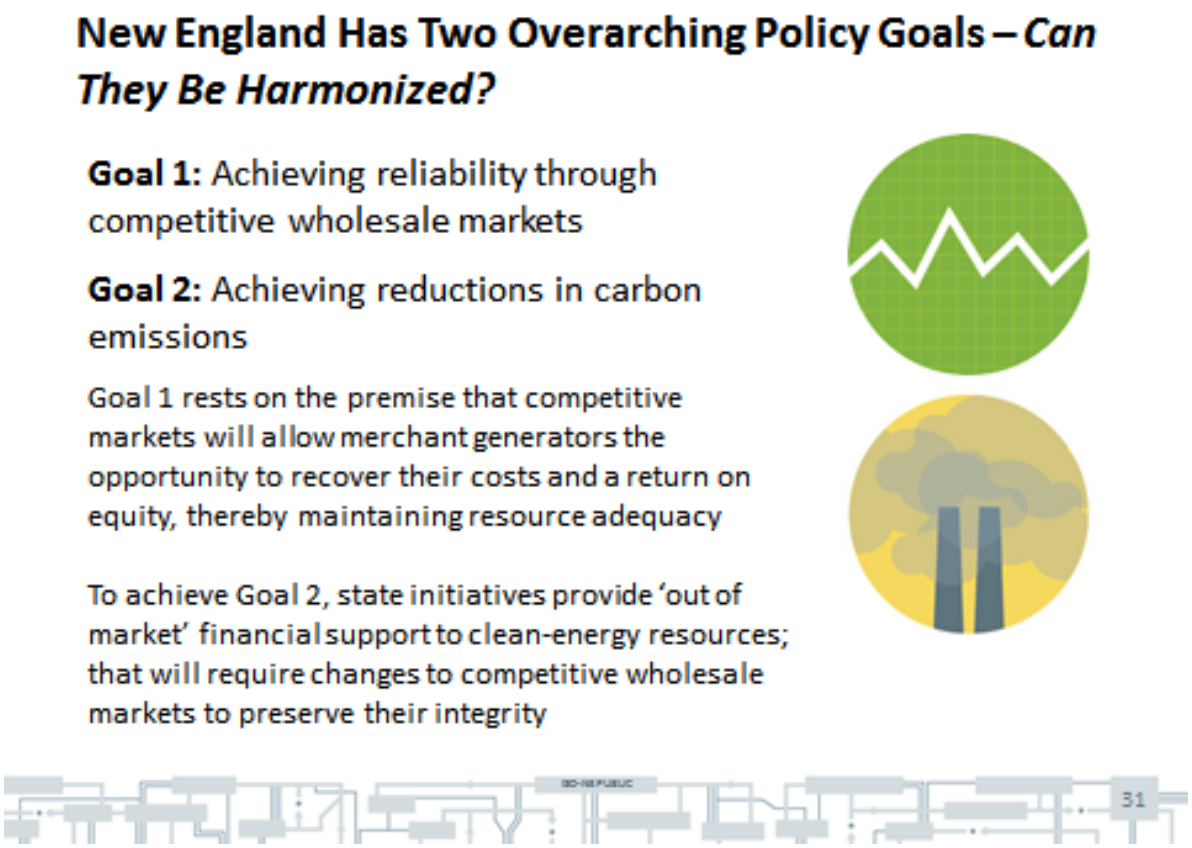


A new challenge is emerging in New England. The competitive markets have attracted much-needed investment in power plants, and the FCM is helping to sustain the resources required to meet regional needs, but the markets are vulnerable.

As the New England states step up efforts to meet their clean-energy requirements and goals, they are considering the use of long-term contracts or other incentives to attract

more clean-energy resources. However, these contracts and incentives could have unintended consequences. Resources with guaranteed revenue streams could artificially suppress prices in the marketplace. That could deter new resource investments and hinder retention of existing resources, ultimately undermining resource adequacy.

Slide 31—New England Has Two Overarching Policy Goals — *Can They Be Harmonized?*



Over the 20 years since the industry was restructured, the competitive marketplace has attracted billions in private investment, developed one of the most efficient generation fleets in the country, helped drive down wholesale prices, and spurred industry innovation.

However, competitive markets rely on accurate price formation to attract and retain adequate capacity to meet demand. Resources with outside contracts or out-of-market incentives will have a leg up on unsubsidized resources. Those unsubsidized resources are

the conventional generators that will be needed for many more years, including the natural gas power plants that will provide a backup system for renewable resources. This also includes oil and nuclear generators required to produce electricity during the winter when gas generators or renewable resources aren't available.

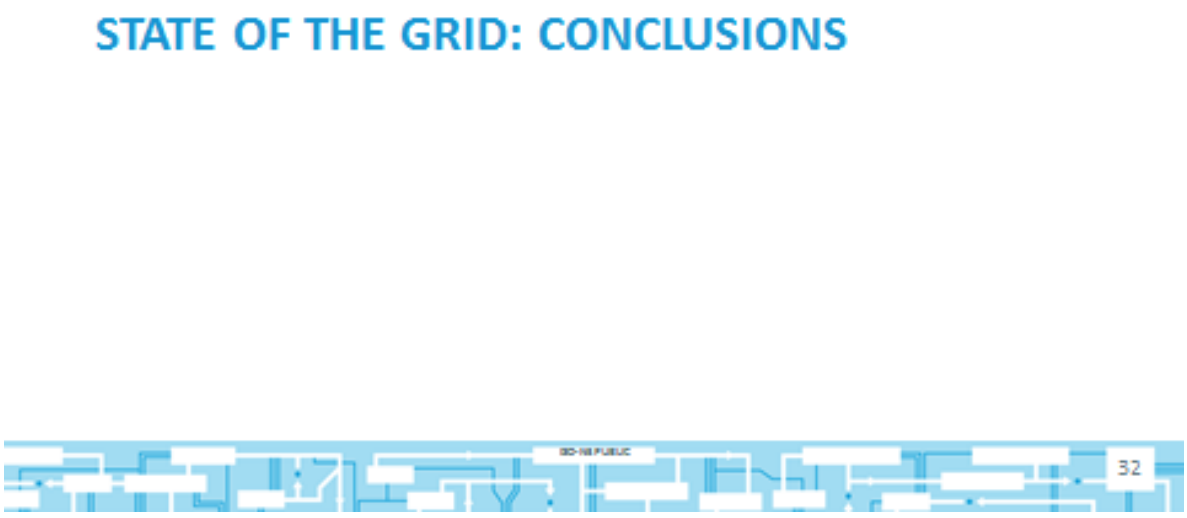
The region's challenge is to find a way to maintain competitive markets that appropriately reward both clean-energy resources *and* the conventional generators that will be needed for the foreseeable future. The states' initiatives will provide out-of-market financial support for clean-energy resources. To accommodate the resources supported by the states and to maintain the integrity of New England's wholesale markets, changes to the market rules will be required. Without these changes, price signals and revenues for both new *and* existing resources will be negatively impacted. As a consequence, resources could seek to return to a cost-of-service system. In the cost-of-service system before industry restructuring, all resources were allowed to recover their costs plus a rate of return.

Such a system will undermine the benefits of competition and deter the investments needed to maintain resource adequacy.

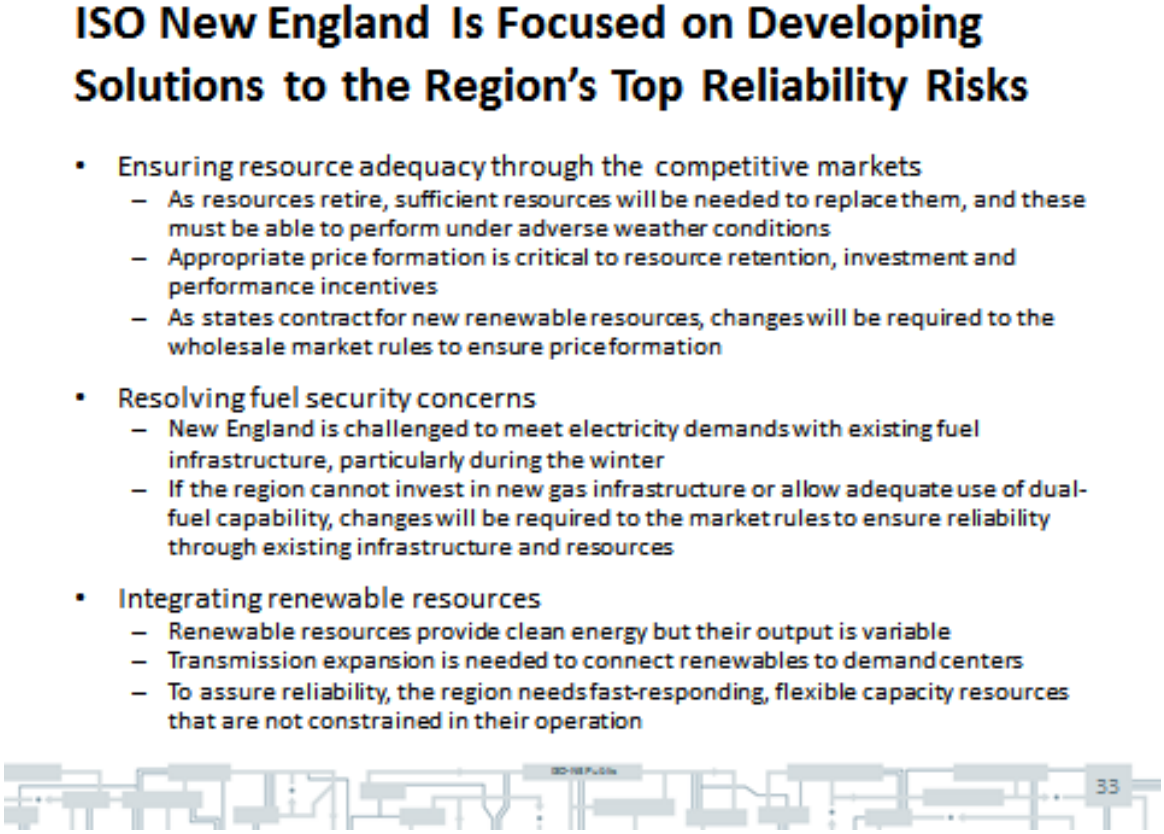
Most economists will say that putting a price on carbon is the most efficient way to achieve reductions in greenhouse gases and preserve competitive markets. Resources that emit more carbon would be more expensive and will eventually retire, leaving the field to lower-emitting resources. RGGI has created an effective marketplace for carbon allowances, but greater restrictions on carbon would be required to achieve the goals outlined by some of the participating states. Arriving at a consensus on the appropriate price for carbon has proven to be difficult.

Recognizing this, NEPOOL, the organization of market participants in New England, and the six states initiated extensive discussions over the past year to explore solutions that could achieve state clean-energy goals through the wholesale marketplace. ISO New England has listened, and we're working with stakeholders to develop market-based solutions that can preserve the markets and reliability while achieving the states' environmental goals.

Slide 31—Title Slide—State of the Grid: Conclusions



Slide 33—ISO New England is Focused on Developing Solutions to the Region's Top Reliability



In conclusion, the ISO will continue addressing the challenges that could jeopardize power system reliability, just as we've done for the last 20 years.

Most urgently, New England needs to improve fuel infrastructure so it can reliably support the grid as it evolves toward a system powered by battery-backed renewables and distributed generation. Until that evolution is complete, the region will need resources like natural-gas-fired power plants.

ISO New England doesn't have the authority to directly address the region's fuel-security challenges. The ISO can't require pipeline expansions or construction of LNG storage, or require resources to sign contracts for LNG delivery, or even to install dual-fuel capability. Environmental permits that allow generators to run on oil through long cold spells are also outside our purview, and the ISO can't impose a price on carbon.

Instead, the ISO will continue taking actions within our authority to ensure New England's families and businesses have the electricity they need, whenever they need it. However, it's

possible that before those solutions are implemented, operating conditions could force the ISO to adopt special reliability contracts to retain older resources with higher emissions. That would be a step back from wholesale market competition and a costly solution that would run counter to the states' clean-energy goals.

The ISO is supportive of the states' public policy goals and requirements. We've taken many steps to accommodate renewable resources and emerging technologies while maintaining the competitive wholesale markets. These are markets that can sustain all resource types and provide a reliable power system. However, if not addressed, the challenges I've outlined today could derail the region's progress toward a hybrid grid that can provide the electricity the region wants. That is energy that is competitively priced, reliable, and clean.

On behalf of the ISO, I can say that we look forward to continuing our collaboration with the states, market participants, consumer advocates, and all regional stakeholders to find mutually agreeable solutions to the challenges facing the region today. Thank you for dialing in today. I'll be happy to take questions now.