The State of New England's Power Grid
ISO on Background

Presented by Gordon van Welie, ISO New England President and CEO
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Good afternoon everyone. I'd like to welcome all of you to the first "ISO on Background" session.

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For those of you not familiar with the ISO, ISO New England is the not-for-profit corporation established by the federal government to oversee the competitive marketplace for electricity and reliably run the regional bulk power system.

From our headquarters in Holyoke, Massachusetts we run the wholesale electricity markets to ensure they are fair and competitive. We direct traffic on the power system to keep the lights on across New England. And we plan for the future, making sure the resources are in place to meet the growing and changing power needs of our region.

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The bulk power system here in New England consists of about 300 generators interconnected by 8,000 miles of high voltage transmission lines. Within the six-state region, we have approximately 31,000 megawatts of power supply with an additional 2,000 megawatts of demand-response resources. We are tied to the neighboring power grids in New York and Canada through 13 different interconnections that allow us to import and export electricity among the regions.

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With that background on our organization, I'd like to offer a little background on this new series we are launching.

We intend to hold these briefings periodically to provide members of the media with an informal opportunity to learn more about the trends affecting New England's electricity industry. Although we are calling these sessions "ISO on Background," these are on-the-record conversations.

The sessions will be hosted by ISO New England senior managers and other subject matter experts who will help explain the inner workings of the power grid and wholesale markets. Each

presenter will provide objective analysis on timely issues to help convey their impact and the challenges they may pose for regional policymaking, system planning, and power grid operations. We will then open the call to the media's questions. We hope these briefings are informative.

Today, I'd like to focus on the rapid changes that are taking place in the makeup of the region's power grid, examine why they are happening, and discuss the implications for power grid operations, regional planning, transmission development, and reliability. We will also look at how technological advances are laying the groundwork for the development of a more advanced, efficient "Smart Grid" for New England.

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New state and federal initiatives are the driving force behind much of this transformation. Ten Northeast states signed a Regional Greenhouse Gas Initiative—known as RGGI—to reduce emissions from power plants. In addition, several states have enacted renewable portfolio standards that set ambitious targets for how much electricity will come from renewable sources over the next twenty years.

Over the past ten years, investment in new supply has been concentrated almost exclusively on large, natural gas-fired power plants. Although we expect natural gas to play a prominent role in our resource mix going forward, what's new is the growing interest in developing wind and other renewable resources. As you can see from this slide, renewable requirements are projected to increase from nearly 10 percent of total energy in 2009 to 19 percent in 2020. The interest and potential growth in this area is the real headliner for New England.

As a result, New England will be moving away from a traditional power system that consists of a few hundred large, centralized power plants toward a grid that includes thousands of smaller, more dispersed resources. These new resources include wind farms and other renewable resources, increased imports from Canada, and demand-side resources through which customers reduce or defer their electricity use.

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Today, wind and other renewable resources make up just a fraction of our region's resources, but the development of these resources has the potential to skyrocket. Developers have expressed initial interest in building approximately 3,100 megawatts of new, renewable resources in all six New England states. Wind makes up about 85 percent of the proposed renewable projects in the region.

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Demand resources and conservation efforts have also shown a growing presence on our power system. The amount of demand resources available has increased ten-fold since early 2003. In another two years' time, they will account for nearly ten percent of our region's peak demand resources. These resources have become a key part of how we manage the system, because they lower demand at critical times to help system operators keep the lights on.

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As Canada invests in new nuclear, hydro, and wind resources, there is significant potential for our neighbors to the north to send this power south and help us meet both our energy needs and our environmental goals. However, additional transmission lines will be needed to access these resources.

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A few slides back we discussed the level of interest in developing renewables in New England. This is a good sign for the region. It tells us that our markets are sending the right signals to developers to invest. It also means we're in good shape to keep pace with the projected growth in electricity use.

Although the impact of a weakened economy is putting downward pressure on electricity use in the short-term (along with the cooler-than-normal June and July weather this year), you can see from the red line here that electricity use will continue to grow in the long-term. The pace of growth may be slower than in recent years, but this projection tells us that we will continue to need to develop new sources of electricity.

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This chart demonstrates the close correlation between wholesale electricity prices and the prices of natural gas and oil.

Although conventional power plants will still provide the bulk of the region's power, the new energy landscape in New England could be dotted with wind farms, biomass, and other renewable resources and will include demand resources, conservation efforts, and storage devices such as flywheels, batteries, and plug-in hybrids.

This new frontier will help lessen our reliance on fossil fuels to produce the electricity we need, and their impact on electricity prices. It will also help meet our region's environmental goals, and give consumers more control of their electricity costs by prompting them to use less and perhaps save more.

Shifting from a power system based on large, centrally located power plants that operate predictably to a host of smaller resources that are scattered across New England and are less predictable will add significant complexity to the operation and planning of the regional power system.

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Determining when the wind will blow and for how long is an inexact science. Factor in the potential of hundreds of wind turbines across the region and you can see how difficult it will be to forecast the supply picture.

To prepare for the arrival of wind energy, ISO New England has initiated a comprehensive, year-long Wind Integration Study to assess the impact of various wind development scenarios on power system operations. The study is taking a comprehensive look at how wind energy (both on-shore and off-shore), demand, more traditional generation, and transmission will interact. We are studying historical wind patterns and projected consumer demand over time, identifying best practices to forecast wind, and determining whether new operating requirements and market rules need to be developed to maintain reliable operations.

To meet the challenges posed by growing electricity demand and integrating varied and scattered resources, industry and policy makers will need to work together to devise a set of strategies, while keeping an eye on how much these improvements will cost.

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So what will the power grid of the future look like?

The power grid of the future will look differently than it does today because it will need to adapt to the challenges of managing thousands more resources scattered throughout the region. It will need to squeeze more efficiency out of our existing resources and accommodate a more diverse set of fuel types. Ultimately, it will need to help achieve new environmental goals without compromising reliability.

In short, we need to make the system smarter.

First, to improve system reliability and adaptability, the latest technology and other innovations will be used. A smart grid is—and will be—more flexible, more responsive, and more able to ease the integration of the various and numerous resources we see on the horizon. These advanced technologies, combined with the demand-response initiatives already in place, can optimize the efficient operation of the power system and improve reliability.

Importantly, these advances will allow consumers to better manage their electricity consumption and costs.

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There is significant momentum coming from both Washington and policymakers in New England to develop the smart grid.

In Washington, the President and Congress have made upgrading the nation’s power grid a priority, dedicating billions of dollars in the federal stimulus bill to—amongst other things—modernize the grid and provide grants and loan guarantees to ramp up the development and deployment of smart-grid technology.

Individual states are considering numerous policy and regulatory changes to harness the potential of these new technologies, while the private sector is devoting an increasing amount of research and development funds to bring an expanded array of "smart" products to market.

New technologies are being developed to improve the information flow to system operators, allowing them to see real-time data about the operation of the power system, spot problems, and react quickly to correct them. Other equipment allows for two-way communications between system operators and utilities to improve and coordinate emergency response actions.

Smart devices for businesses and households are being installed, such as intelligent thermostats or smart meters that can receive signals to turn down air conditioning or shut off office equipment or home appliances to reduce consumption during peak periods.

Advanced electricity storage and peak-shaving technologies are also being developed to allow plug-in hybrid electric vehicles to re-charge overnight and help regulate the flow of energy on the grid during the day.

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As the regional grid operator for New England, we define the smart grid as the integration of the power system infrastructure with communications infrastructure and information technology infrastructure. For a grid operator, visibility—that is the ability to get information on what's happening at any given spot on the grid at any given time—and controllability are key.

Here at ISO New England, we have nearly a dozen advanced-technology projects underway to better manage computer networks and power system resources, including the alternative technologies regulation pilot project. This project will evaluate the capability of resources, such as flywheels, to provide balancing on the system. What's more, we are working with others in the industry on developing national standards for smart grid equipment.

We have a golden opportunity to create a more intelligent power grid. Fully capturing its potential will be dependent on successfully coordinating new technologies, power system engineering, and public policy. As such, all industry stakeholders and government agencies in New England and beyond will need to closely coordinate their efforts, making sure technologies are compatible and can communicate with each other regardless of borders.

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In New England, we are in good shape to handle these challenges, chiefly because of the progress we have made over the past ten years and the comprehensive and coordinated planning processes we have put in place to identify problems and encourage solutions. Each year, we work with our stakeholders to assess the needs of the system. The execution of these plans ensures power supplies are available to meet expected demands and that the transmission is in place to keep electricity flowing.

This approach has been very successful, resulting in billions of dollars in transmission investment needed for reliability over the last decade—with more still to come. This has created a robust transmission network that is providing reliable electricity to our region even as we work to build upon it and integrate new resources.

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Recognizing our successful history of cooperation, the six New England governors have asked for ISO New England's assistance in creating a regional blueprint for the transmission development needed to tap into on-shore and off-shore renewable resources. Through this process, regional policymakers hope to identify the available sources of renewable energy both here and in neighboring regions, and determine the most effective means to connect those resources to our power grid.

I share the New England governors' confidence that the region's past collaboration and planning successes will serve us well as we take on the sizeable tasks before us and create a power grid that is intelligent, responsive, reliable, and environmentally-sound.

Thank you.

If you have any questions regarding these remarks, please contact:

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