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President and Chief Executive Officer

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Dr. Ernest Moniz
Secretary, U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Secretary Moniz:

Thank you for the opportunity to comment on the second iteration of the U. S. Department of Energy's (DOE) Quadrennial Energy Review (QER). I appreciate the time and attention that the Department is dedicating to this important issue. In October 2014, in comments to DOE on the initial QER I noted "the power system in New England continues to undergo a significant transformation." The pace of this transformation is increasing rapidly as the system evolves toward increasing amounts of natural gas-fired generation, distributed energy resources, and renewable energy.

Major Retirements of Coal, Oil, and Nuclear Power are Underway in New England
New England continues to see substantial retirements of fossil-fired and nuclear power plants, and an additional 6,000 megawatts (MW) of "at risk" oil- and coal-fired generators may retire in the coming years. In addition, the owners of the remaining nuclear generators have expressed concerns around the future economic viability of their facilities in variety of ways, including discussions in state level legislative proceedings. This will increase our growing reliance on natural gas-fired generation, and due to the loss of nuclear capacity, will (at least temporarily) reverse the trend of declining emissions in the region. During this time, policymakers continue to promote growth in renewable energy, energy efficiency, and distributed energy resources.

Proper Price Formation is Essential for Electricity Markets to Attract Resources Needed for Reliability
Wholesale markets are the foundation for meeting the reliability needs of the regional power system at competitive prices. Through these markets, the region has seen older, less efficient plants replaced with new, more efficient and lower-emitting resources. Competitive wholesale markets have thus far achieved the objective of electric reliability while producing significant efficiencies; including helping realize the New England states' collective objectives for reducing carbon emissions. But in order to maintain reliability while facilitating this ongoing evolution of the power system, New England will need to protect appropriate price formation in the wholesale capacity market so that the market can continue to retain sufficient resources to ensure reliability, and attract investment in resources to replace those that retire. Since the majority of new resources will be natural gas-fired or renewable, the region will also need to make additional investments in natural gas delivery and electric transmission infrastructure.

New England's Power Plant Fleet is Evolving
In December 2014, Entergy closed the Vermont Yankee nuclear plant (604 MW) and plans to close the Pilgrim nuclear plant (677 MW) by June 2019. Following Pilgrim's retirement, the region will have only two nuclear facilities in operation.

The retirement of oil- and coal-fired power plants continues as well. In 2000, oil and coal generation produced 40% of New England's electricity (combined); in 2015, that number was roughly 6%. While many other regions continue to rely on coal for energy production, only three coal-fired facilities received a capacity supply obligation in our latest Forward Capacity Auction (FCA), and all three plants are considered to be "at risk" of retirement by the ISO.

New England Has Made a Major Shift Toward Gas-Fired Generation
In New England, the combination of low natural gas prices most of the year and the favorable economics of natural gas combined cycle generators have resulted in the development of a significant amount of new natural gas-fired generation. However, this has led the region to become heavily reliant on this one fuel source for electricity. While in 2000 natural gas produced 15% of the region's electricity, it produced nearly half of our electricity in 2015. The initial QER made an important observation about New England's natural gas-electric interdependencies and highlighted the electric reliability and economic consequences of the growing inadequacy of the region's natural gas infrastructure. As I discuss below, without additional investment in gas infrastructure (pipelines and storage) to supply domestic natural gas, the region will become increasingly dependent on oil and imported liquefied natural gas (LNG) as fuel sources, particularly during the winter months. And relying on oil as a fuel source is becoming increasingly tenuous due to statutory restrictions on emissions.

Efficient Wholesale Markets Are Essential to Support This Transition in New England
However, the region's fossil-fired power plant fleet is not the only part of New England's electric grid in transition. We are evolving into a "hybrid" electric grid with growing levels of energy efficiency, solar/photovoltaic (PV) investment, and a growing desire by customers to supply some of their own demand and as well as access more information about their energy usage and the electric grid.

As retail/customer choice and transactive energy systems become more prevalent in New England, retail markets will benefit if they are rooted in efficient wholesale markets that properly price electric reliability services. Bulk power generation and high-voltage transmission will remain a critical foundation of a reliable electric grid – especially as variable renewable resources become more prevalent. That grid must be maintained and efficient wholesale electricity markets will provide important signals when and where investment is required.

The U. S. Supreme Court (in *Hughes v. Talen*) recently helped clarify that the Federal Energy Regulatory Commission (FERC) has the authority to protect price formation in wholesale markets (in this instance, a capacity market). As New England has lost generating capacity in the last few years, the Forward Capacity Market (FCM) has successfully signaled where investment in capacity is needed and resulted in 4,700 MW of new resources clearing the FCAs and taking on capacity obligations since 2013.

Low Natural Gas Prices; Energy Efficiency and Renewable Energy Investments Are Impacting Wholesale Energy Prices

The nation's shale gas revolution has had a dramatic impact on New England, and there remains a close link between the price of natural gas and prices in our wholesale markets. When New England is able to access natural gas at prices comparable to the rest of the country, wholesale energy prices in New England are competitive with most other regions. In 2015, low natural gas prices returned very low wholesale energy prices; the average price of both natural gas and wholesale energy dropped to their second lowest levels in 12 years. But the region's deep interdependencies between the natural gas and electric industries continue to expose New England to extreme price volatility and reliability concerns – especially during cold weather periods (like the winters of 2013/14 and 2014/15) as pipeline bottlenecks limit the availability of natural gas for power generation. These pipeline constraints inevitably increase New England's dependency on more expensive, and in some cases more carbon-intensive fuels, such as oil and imported LNG.

During milder weather, generators will face a growing economic challenge in the coming years. Increasing levels of energy efficiency and residential solar will put downward pressure on the amount of electricity needed to be generated. At the same time, additional renewable energy resources will be entering this shrinking energy market, reducing revenues for all resources -- including those that will be needed to balance the variable nature of renewable energy sources and to supply energy during extended periods when weather conditions limit production from these sources. The capacity market, which acts as a revenue-balancing market, will become even more vital as it will be the primary source of revenues for many of these "backup" plants. This need will become even more important in the longer run as the region strives to "decarbonize" its economy by utilizing the electric sector as a clean energy source for the transportation and heating sectors. This will cause an increase in demand for both grid connected renewable energy and the grid reliability services supplied by fast responding power plants and storage technologies.

It is important to recognize the way in which much of the renewable energy is entering the wholesale market. All New England states have legislative requirements to reduce carbon emissions and increase renewable energy. In order to comply with these mandates, the states have established incentives for certain types of renewable or carbon-free energy and are currently considering entering into long-term contracts with these resources. These revenue streams exist outside of the wholesale markets and, depending on how they are structured, may interfere with the ability of wholesale markets to properly price important reliability services. From the perspective of the administrator of New England's wholesale markets, it is essential that incentives for carbon reductions or increases in renewable energy be structured in a manner that is compatible with the wholesale electricity markets. Wholesale electricity markets are structured to be resource- and technology-neutral, with the objective of procuring reliability services as efficiently as possible. The investment incentive in the market rests on the premise that *all* resources competing to provide the reliability services will face the same obligations and receive the same value (the clearing price) for providing that service, and importantly, that the clearing price in the market will reflect the true cost of providing the service.

ISO New England has highlighted an emerging issue related to the desire by certain New England states to contract for renewable or carbon-free resources. If the states also desire these new resources to clear in the FCM as price-taking resources, price formation (and consequently the investment incentive) will be undermined in that auction. This has long-term consequences for the viability of wholesale electricity markets and in turn for the continuation of vibrant retail electricity markets and the establishment of transactive energy systems at the retail level.

The issues surrounding the interplay of state-sponsored resources and pricing in the wholesale markets are of growing concern as the states push forward on initiatives and contracts for specific resources to meet their environmental policy objectives. The New England states, the New England stakeholder group, NEPOOL, and ISO New England recently initiated discussions on how best to achieve the states' environmental goals through the competitive wholesale markets and in particular, how to value public policy objectives (e.g. lowered carbon emissions) in a manner that neutrally compensates all resources that provide the desired attributes.

New England's Capacity and Energy Markets Work in Conjunction

The region's Forward Capacity Market has received a growing amount of attention from policymakers in the last several years. For the first seven capacity auctions, New England had an excess of generating capacity and capacity prices cleared at the administratively set floor price. However, a wave of generator retirements has signaled a need for investment in new power plants in New England.

And new resources have responded to signals for investment and cleared recent capacity auctions. In the last few years, FCAs have cleared new, highly efficient, fast-ramping natural gas-fired power plants in critical areas for regional reliability (Southeast Massachusetts, Rhode Island, and Connecticut) and over 1,300 MW of new demand side resources (primarily energy efficiency).

The FCM plays a critical role not only by providing an economic incentive to attract new capacity resources to New England, but by retaining (where economically efficient) existing power plants critical to electric reliability. Importantly, it also becomes the "clearinghouse" for establishing the operational accountability needed to ensure grid reliability – a function becoming increasingly important as the grid evolves to incorporate more variable and distributed resources. The essential reliability services provided by grid resources have a cost, and as the addition of renewable resources reduces energy market revenues, merchant grid resources will become increasingly dependent on capacity and ancillary market revenues.

Forward Capacity Market Improvements Focused on Evolving System

In an effort to both improve price formation and increase reliability through the FCM, in the last few years we have proposed and are implementing several substantial changes to the market.

These changes to the FCM have been important in a number of areas. The Pay for Performance (PfP) changes, first included in FCA #9 in 2015, attach a financial incentive to each capacity obligation for a capacity resources to meet (or even exceed) their obligation during tight grid conditions. PfP increases reliability in a fuel-neutral manner that allows asset owners to determine how to best meet their obligations. However, it is not the only market improvement we have made in the last few years.

- We are implementing reforms to the generator retirement process to more efficiently manage retirements and address any potential market manipulation as generators leave the FCM.
- The FCM has moved to a region-wide sloped demand curve to more efficiently procure varying levels of capacity and remove the boom-or-bust cycle that occurs when the region is just long or short on capacity. ISO New England recently filed a proposal with FERC to implement sloped demand curves in specific capacity zones.
- We continue to refine the Minimum Offer Price Rule/Offer Review Trigger Price threshold to mitigate uneconomic entry from artificially suppressing capacity prices.
- The "price lock" provided to new generators clearing their first FCA was increased from five to seven years to provide greater revenue certainty for first-time entrants.

Each of these improvements to the capacity market, widely discussed through the regional stakeholder process, will help New England attract vital new capacity resources while retaining the most competitive and efficient generators needed to maintain regional reliability.

Changing Energy Mix Will Require Additional Energy Infrastructure in New England
While we are confident in the ability of the region's wholesale markets to incent investment in new power plants, we strongly believe that additional enabling energy infrastructure is needed in New England to ensure reliability and market efficiency. As was noted in the initial QER, New England is in need of additional natural gas infrastructure to meet the growing demand for natural gas for power generation.

Constraints on the region's natural gas pipelines, particularly in combination with severe weather and/or contingencies that reduce/eliminate the output from non-gas generators, could endanger reliability and will continue to increase wholesale energy prices. The ongoing retirement of oil, coal, and nuclear generators is increasing New England's reliance on natural gas generation – exacerbating pipeline constraints and making the region more dependent on oil and imported LNG. Yet given the region's carbon reduction goals, oil is unlikely to be a long-term solution, and in the absence of additional pipeline infrastructure, will make high volume and consistently imported LNG deliveries critical, particularly in the winter months.

As the region moves forward with additional renewable energy and oil usage faces environmental restrictions (or is no longer available due to retirements), the natural gas system will in essence become the energy storage system for New England (to fuel natural gas generation during periods when renewable energy is not producing). Renewable energy in combination with emerging electric storage technologies may help offset a minor portion of the need. But the quantity of stored energy required to ensure system reliability for extended periods (during severe weather or when renewable production is unavailable) is such that natural gas-fueled generation in combination with our existing pumped storage hydro facilities is the only practical solution for balancing the system for the foreseeable future. This has important long-term reliability and market efficiency implications for New England.

The ISO Has First-Hand Experience Dealing with Reliability Concerns Caused by Pipeline Constraints
Our experience has revealed that while the region (through its FERC-approved tariff) has effective planning and cost allocation mechanisms for addressing reliability and efficiency issues on the transmission system, similar mechanisms do not exist with respect to ensuring efficient natural gas delivery to gas-fired generators. Furthermore, merchant generators have indicated that they cannot economically justify contracting for incremental gas infrastructure to meet peak seasonal demands or in response to contingencies on the electric system. The short-term solution to this problem is greater investment in dual fuel technology, but this is only viable as long as the New England states continue to allow oil usage. As the electric power system evolves to become ever more dependent on the natural gas system, the need for more effective planning of this infrastructure will become more critical.

We believe new natural gas supply infrastructure is needed in New England based on our first-hand operational experience. And we expect that these issues will continue to grow as more natural gas-fired generation replaces the retiring generators. When power plants cannot secure fuel for operations, ISO operators will dispatch other available generators – often plants that are more carbon-intensive, more expensive, and less efficient than natural gas plants – to keep the lights on during the winter months. The natural gas pipeline constraints and their impact on reliability are not theoretical; this is a very real challenge our operators have dealt with for several years. As mentioned above, New England will be in an even more precarious position when the bulk of the oil- and coal-fired units leave the system entirely. Further loss of non-gas resources, including nuclear generators, will exacerbate our reliability risks and make it extremely difficult to achieve energy balance during winter and summer peak demand conditions. In addition to the reliability implications, our experience has also shown that a highly constrained natural gas pipeline system results in high levels of pricing volatility in the wholesale energy market.

Winter Reliability Programs are Critical During Cold Weather Periods
In light of the deficiencies in the natural gas supply infrastructure in New England, we have enacted short-term programs to improve electric reliability. For several winters, we have conducted three-month Winter Reliability Programs to increase the amount of oil available for power generation in New England prior to the start of the winter season. The Programs have included incentives to secure oil prior to the coldest weeks of the year, as well as to undertake dual-fuel commissioning, contract for LNG during the winter months, and participate in previously unobligated demand response programs. FERC has approved similar Programs for the next two winters until the long-term Pay for Performance incentives take effect on June 1, 2018.

Remote Resources Require Additional Electric Transmission
In addition to new natural gas supply infrastructure, New England will need to invest in new electric transmission if it wants to integrate additional wind energy in Northern New England or import additional renewable energy from neighboring regions. Roughly 1/3 of our interconnection queue[1] is comprised of proposed wind development (4,228 MW), and the bulk of those proposals are located in Maine (3,638 MW). The transmission system serving these remote areas was built to serve small amounts of demand, not to integrate thousands of megawatts of generation. As policymakers continue to encourage the

[1] As of May 2016

development of wind resources or renewable energy imports from neighboring regions, investment will be needed in new electric transmission to move the renewable energy from these remote areas to where the energy will be consumed.

It is important to recognize that these transmission projects would not arise out of reliability need and therefore, the costs would not be socialized across the region as with other transmission development in New England. From 2003 through March 2016, the New England region has successfully built approximately $7.9 billion of reliability-based transmission (with another $4.2 billion expected by 2020). This has provided tremendous benefits to the region, including a substantial improvement in electric reliability, reductions in the amount of transmission congestion and resulting costs, the alleviation of the need to run some of the region's least efficient fossil fuel plants and importantly, has facilitated a significant turnover in the region's generation fleet. The cost of transmission infrastructure needed to interconnect new wind generation in remote areas falls to the project investors, often significantly changing the economics of the project. Thus far, individual developers have not been able to make the economic case to invest in the needed transmission infrastructure. This conundrum has led, in part, to certain New England states considering long-term energy contracts that include payment for the transmission investments – thus potentially undermining price formation in the capacity market (as described above).

One solution to this problem is for the region to make targeted, "socialized" investments in a transmission "highway" to areas that have renewable development potential (similar to what has been done in Texas with their Competitive Renewable Energy Zones). However, in order for such an approach to be effective, the states have to agree to the cost allocation formula for such an investment. Under ISO New England's FERC Order 1000 tariff changes, we have a provision to support public policy-based transmission on a socialized basis. But New England states are challenging this portion of Order 1000 due to disagreements over FERC's authority to require ISO New England to select transmission driven by public policy and the associated cost allocation formula and it currently seems unlikely that they will support utilizing this mechanism, or site projects approved by the ISO under this approach. The ISO will continue to work with the New England states, stakeholders, and FERC to seek solutions to this dilemma.

Digital and Physical Security Remain a Top Priority

The security of ISO New England's facilities is vital to maintaining electric reliability in the region. We require annual mandatory security training for all employees, and participated in the GridEx grid security exercises in 2013 and 2015. Building on existing tools, we launched the 24/7 Security Operations Center in late 2015 to provide round-the-clock monitoring of the ISO network and have implemented an extensive system of process controls, advanced detection and response systems, and redundancy in systems and control centers. Moreover, bulk power system asset owners are required to comply with cyber and physical security standards (the North American Electric Reliability Corporation's Critical Infrastructure Protection (CIP) Standards).

We recognize that due to the sensitive nature of this topic, we need to minimize public access to specific security protocols, and refrain from commenting publicly on our security procedures. We recognize the growing threats posed to the bulk power system and the importance of ensuring a fully functional

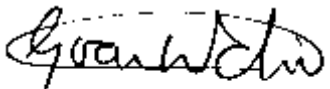
Independent System Operator, and hence we take the security of our infrastructure very seriously. As such, we will continue to work with the appropriate authorities to ensure that threat information is shared expeditiously and protective measures are continually adjusted to mitigate emerging risks.

ISO New England Welcomes the Opportunity to Assist the Department of Energy
Although I have tried to highlight the key challenges facing New England in the comments, we would be pleased to provide any additional information or insight you may need throughout the QER process.

New England's bulk power system is undergoing a rapid transformation, and ISO New England continues to work with the New England states and stakeholders as the region seeks to meet environmental objectives through competitive wholesale markets. The suite of wholesale markets are the foundation for attracting development in new resources and technologies and for retaining the most efficient set of resources to reliably serve the residents of New England. We will also continue to work with our stakeholders to address deficiencies in the infrastructure to strengthen both reliability and efficient wholesale electricity markets.

Thank you again for the opportunity to comment and for bringing attention to this important issue.

Sincerely,



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