

To: NEPOOL Markets Committee

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Subject: Energy Security Improvements: How Market Improvements Address Fuel Security

This memorandum summarizes how the ISO's current proposal for Energy Security Improvements (ESI) addresses the ISO's fuel security concerns. In recent years, the ISO has alleviated its winter fuel security concerns through short-term measures, including out-of-market mechanisms that pay selected generation resources to procure additional fuel. In contrast, ESI addresses fuel security concerns by procuring – through the markets – an expanded suite of energy and reserve products that are closely aligned with established reliability criteria.¹ By providing greater market-based compensation for energy and reserves, resource owners will have greater financial incentives to firm-up fuel or other input energy sources so their resources can perform during cold weather conditions – and whenever they are needed during the course of the year.

While this memorandum addresses the narrow question of how the market incentives provided by ESI will impact decision-making about generators' fuel inputs, it is important to underscore that ESI is focused on promoting reliable energy output – and is, by design, fuel and technology neutral. The ESI design rewards any technology that acquires a day-ahead commitment to supply energy or ancillary services and thereby contributes to the system's daily reliability requirements – including renewable resources, traditional and emerging storage technologies, and traditional fossil-fueled generators.

A Decade of Market Enhancements and the Continued Evolution of the Power System

During this decade, stakeholders and the ISO have together made significant improvements to the region's wholesale market design. Many of these improvements were driven by a recognition that, to support the reliable operation of the bulk power system, the markets must do a better job of reflecting scarcity. When scarcity is properly priced, the markets appropriately compensate and incent cost-effective investments in resources and capabilities that improve reliability when needed the most. These changes have enhanced the ISO's suite of markets in various ways, providing

¹ ISO New England Inc., *Reliability Standards Supporting Day-Ahead Ancillary Services Requirements*, Memorandum to NEPOOL Markets Committee from Market Development and System Operations, July 3, 2019; available at https://www.iso-ne.com/static-assets/documents/2019/07/a4b_iso_memo_reliability_standards_supporting_day_ahead_ancillary_services_requirements.pdf.

considerably greater flexibility for resources to update energy offer prices during the operating day as their fuel costs change, and greatly strengthening the market's price signals for energy and reserves during scarcity conditions.²

Nevertheless, given the region's increasingly constrained fuel infrastructure and evolving resource mix, the ISO has become increasingly concerned that the markets may not appropriately reflect the tightening conditions that normally precede an actual scarcity of supply – particularly during cold winter weather when the region's fuel infrastructure is constrained.³ In response to these concerns, the ISO continued on its path of developing further market improvements, including changes to better enable fuel-constrained resources to reflect their (opportunity) costs in energy market offers, and improvements to the forward-looking (21-day) information provided to market participants about expected energy supply conditions.

While the ISO was pursuing these market improvements, it undertook out-of-market actions that focused on shoring up certain generators' fuel stocks to alleviate near-term fuel security risks. The most notable action – the retention of the Mystic generating facility – was a blunt instrument intended to delay the loss of a generating resource with a reliable fuel source. This temporary action provided the ISO and stakeholders with time to further evaluate long-term market solutions to the region's energy security, consistent with recent Federal Energy Regulatory Commission direction.⁴

Over the last year, further analysis has identified that the current wholesale electricity markets do not fully compensate resources for the entire suite of capabilities that the ISO depends upon to ensure a reliable operating plan each day. Moreover, there remains a misaligned-incentives problem for those resources that undermines their incentives to make fuel supply arrangements.⁵ It is critical for the markets to provide the resources supplying these capabilities with efficient incentives to make fuel supply arrangements, so they can operate reliably when stressed system conditions occur – including potentially extended periods of cold New England winter weather. ESI is designed to address this shortcoming of the present energy market design. An additional and intentional feature of the ESI design is that it also provides incentives to resources not using “traditional” fuels to offer supply (of energy or ancillary services) in the day-ahead market, particularly during times of stress.

ESI Improves Fuel Security

ESI improves fuel security in the region – and more broadly promotes reliable energy in a fuel and technology neutral manner – in three important ways. First, it procures new ancillary services in the

² These enhancements include implementing hourly offer flexibility in the energy market, procuring replacement reserves in the reserve adequacy assessment and pricing those reserves in the Real-Time Energy Market, increasing the Reserve Constraint Penalty Factors so that they more accurately reflect the marginal value of reserves during times of scarcity, and implementing the pay-for-performance capacity market.

³ These concerns comprise what the ISO first termed the “fuel security” concern. However, the term “fuel security” is a bit of a misnomer; the ISO's fundamental concern is a scarcity of *electrical* energy.

⁴ ISO New England Inc., 164 FERC ¶ 61,003 at PP 2, 5 (2018).

⁵ See ISO New England Inc., *Energy Security Improvements Discussion Paper*, April 2019, at pp. 2-3 and Section 2; available at https://www.iso-ne.com/static-assets/documents/2019/04/a00_iso_discussion_paper_energy_security_improvements.pdf.

day-ahead market that will more completely reflect the operational needs of the system (i.e., the capabilities the ISO presently relies upon, but does not directly compensate, in developing the next-day operating plan). Second, it sends more accurate and stronger price signals to suppliers whenever these capabilities are in limited supply (i.e., during tightening market conditions, including those related to fuel limitations); those price signals will now compensate resources appropriately for that capability (i.e., those resources that are efficient and/or flexible enough to convert reserves into energy when challenging operating conditions arise). And third, it creates new financial consequences for resources that offer to provide these essential capabilities when a resource is unable to perform during tight market conditions. Together, these three inter-woven improvements provide additional incentives, and the compensation necessary, for resources to bolster their fuel and energy-source arrangements.

- **Reserve products that address uncertainties in a limited-energy system.** The ESI design will firm-up and formalize, through the market, the option to call upon 3,500 to 5,000 MW of reserves each day to help ensure reliable operations – capabilities that were previously relied upon but not compensated. Adding these capabilities to the Day-Ahead Energy Market ensures the system is prepared in advance to respond when the region faces the types of real-time stressed system conditions that, in the past, created concern over fuel security.
- **More effectively signal tight supply conditions.** For the markets to address fuel security concerns and support reliable operations, prices must appropriately reflect tightening (limited supply) conditions. That provides suppliers with commensurately increasing incentives to be prepared to perform, if needed, and appropriately compensates those resources for their reliability and flexibility. These more effective price signals will provide an early warning that market conditions are tightening when there is not yet an actual scarcity condition (i.e., a real-time shortage of energy or reserves).⁶
- **Financial consequences for non-performance.** Resources selling these new ancillary services will also be financially responsible for not supplying energy in real-time, with the proposed market design specifying the cost of not supplying energy based on the real-time energy price (which can exceed \$3,800 per MWh during periods of scarcity).⁷

By sending more accurate price signals on the value of energy and reserves and strengthening the financial obligation associated with selling reserves, ESI will meaningfully strengthen incentives for effective participant-driven supply-chain management and reliable fuel (or other input energy)

⁶ In this regard, ESI will operate in tandem with other recent enhancements that enable the markets and participants to better respond to changes in system conditions, including a mechanism to better enable fuel-constrained resources to reflect their (opportunity) costs in energy market offers, and improvements to the forward-looking (21-day) information provided to market participants about expected energy supply conditions.

⁷ It is important to note that ESI will not operate in a vacuum; rather, the combination of reserve shortage pricing in the energy market and the fully phased-in PFP penalty rate in the capacity market will create an effective energy price that can exceed \$9,000 per MWh during scarcity conditions.

supply arrangements by resource owners. This mechanism is evident in the results to date for the Impact Analysis work by the Analysis Group, Inc., which finds it profitable for many (though not all) resources to maintain greater fuel inventories under the ESI design, relative to current market rules.⁸

Providing incentives through the market for electric energy and reserves – paying for *outputs*, not *inputs* – helps the ESI design to address the region’s fuel security concerns in a cost-effective manner. Owners of resources of any type or technology have strong incentives to firm-up their fuel supplies (or other energy sources) through whatever means they find most cost-effective, so they can compete to offer energy and the new ancillary services at the least cost. By contrast, non-market mechanisms (*i.e.*, direct subsidies to selected generators to procure additional fuel) benefit only those selected resource owners, providing no incentive for the systems’ other resources – or for potential new technologies, such as storage – that may ultimately comprise the most cost-effective long-term solutions.

Transitions and Retirements

As indicated in the ESI Impact Analysis work shared with the Markets Committee, the increases in overall fuel supplies under ESI will tend to decrease energy price volatility. This may decrease revenue to some less-flexible, low-capacity-factor resources. In other words, the market’s outcomes with ESI may lead many resources to earn greater net revenue, and some to earn less net revenue.

The market signals under the ESI design will drive the resource mix toward the most cost-effective composition that reliably operates the power system. This could hasten the retirement of some resources. As the ISO has recently signaled,⁹ it will use competitive processes to achieve the reliable operation of the power system and will avoid taking out-of-market actions, which can degrade the long-term integrity of the markets.

Moreover, the ESI proposal is designed to counterbalance the reliability impact of future resource retirements.¹⁰ Specifically, if resource owners expect that a given retirement will increase the frequency of stressed system conditions, it will also increase the opportunities for all remaining resources to earn higher energy or ancillary service revenue as the system’s market prices will reflect those expected conditions. With the ESI design in place, both day-ahead and real-time energy prices during reserve shortages can reach over \$3,800/MWh, with real-time reserve prices as high as \$2,800. The increased likelihood of high market prices during stressed conditions (whether during cold winter weather or other times), provides stronger compensation and incentives for generators

⁸ Todd Schatzki, Analysis Group Inc., *Energy Security Improvements Impact Analysis*, presentation to NEPOOL Markets Committee, September 14, 2019, pp. 6-30; available at https://www.iso-ne.com/static-assets/documents/2019/09/a6_presentation_esi_impact_analysis.pdf

⁹ ISO New England Inc., *Re-entry of retired resources and Order 1000*, Memorandum to NEPOOL Participants Committee from Market Development and System Operations, April 30, 2019; available at: https://www.iso-ne.com/static-assets/documents/2019/05/20190430_re-entryretiredresources_order1000_memo.pdf.

¹⁰ The retirement notice will also signal a reduction in existing capacity that may increase the Forward Capacity Auction’s capacity clearing price, incent new resources to enter the region to replace this retiring capacity, or some combination thereof.

to make fuel arrangements in advance of the retiring resources' departure. Put in simple terms, with ESI in place the market's price signals and revenue opportunities become very strong for all generators to quickly replace a departing resource's energy supply, if that departure would materially impact fuel security.

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The ISO anticipates the ESI day-ahead ancillary services will further improve the bulk power system's fuel security by using a sensible market approach that signals, through transparent, day-ahead prices, the costs of satisfying the region's electricity needs at all times, including during periods of severely stressed system conditions. When fuel scarcity is properly priced – that is, through its impact on *energy and reserves scarcity* – the wholesale electricity markets appropriately compensate all resources that contribute to the system's reliability, and cost-effectively incent investment by resources that provide the greatest reliability value.