

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

New England Winter Gas-Electric Forum)

Docket No. AD22-9-000

POST-FORUM COMMENTS OF POTOMAC ECONOMICS, LTD.

Potomac Economics participated in the New England Winter Gas-Electric Forums held on September 8, 2022 and June 20, 2023, on winter reliability issues in New England during periods of limited natural gas supplies. Potomac Economics appreciated the opportunity to participate in both Forums and submitted comments following the September 2022 Forum. Potomac Economics respectfully submits these comments addressing questions posted by the Commission before and after the June 20, 2023 Forum. Potomac Economics serves as the External Market Monitor for ISO-NE.

I. SUMMARY OF COMMENTS FOLLOWING THE SEPTEMBER 2022 FORUM

In our post-September 2022 Forum comments, we explained that oil units do not fully utilize their inventories and gas units rarely contract for LNG primarily because ISO-NE's markets do not give them adequate incentives to do so. The current incentives from the day-ahead and real-time markets, combined with the Pay-For-Performance framework, motivate generators to maintain adequate inventories to satisfy system requirements under a *likely* set of winter weather conditions. However, capacity markets are designed to provide the additional

compensation needed to maintain reliability under more extreme conditions. Thus, to motivate generators to maintain adequate fuel supplies for *extreme* winter weather, we recommended: a) considering gas pipeline limitations and fuel inventory constraints in ISO-NE's resource adequacy model, and b) accrediting capacity suppliers based on their marginal contribution to winter reliability.

These changes would provide financial incentives for resource owners to pursue the most cost-effective options for improving their contributions to winter reliability, and it would procure enough fuel-secure resources to satisfy winter planning requirements. This would motivate fuller utilization of existing oil inventories and investment in additional on-site fuel storage. We recommended that the Commission refrain from issuing orders that would allow out-of-market procurement of a subset of fuel-secure resources in a discriminatory fashion because it would undermine incentives for investment in competing resources that contribute to winter reliability.

The development of a capacity market solution to address winter reliability is complicated by the three-year forward auction and the deteriorating winter reliability situation over the next few years. Accordingly, we recommended that ISO-NE transition to a prompt seasonal capacity market or at least delay the next few FCAs until closer to their respective capacity delivery periods.

II. RESPONSES TO PANEL QUESTIONS FROM THE JUNE 2023 FORUM

These comments address questions for Panels 1, 2, and 4 from the June 2023 Forum. Our Panel 1 comments explain why the Commission should not approve retaining Everett through an out of market contract. Our Panel 2 comments highlight elements of the EPRI study that would provide an improved framework for performing the resource adequacy assessment, which is the basis for capacity market pricing and accreditation. Our Panel 4 comments discuss the

importance of the ISO's initiatives to reform capacity accreditation and to evaluate transitioning to a prompt seasonal capacity market. However, we discuss the need for specific changes to the resource adequacy model and capacity accreditation rules that are not part of the current ISO proposals.

A. Panel 1: Should Everett be retained?

At the June 2023 Forum and in recent NEPOOL meetings, ISO-NE has demonstrated that it will be able to satisfy electric system reliability without Everett four to nine years in the future under the vast majority of conditions by relying on a combination of oil, pipeline gas, and LNG combined with nuclear, renewables, and other generation types. Everett should not be retained through an out-of-market contract for the sake of electric system reliability. Rather, market design enhancements are needed so that every resource that contributes to electric reliability is compensated based on their reliability contribution. Such market enhancements would give gas-fired generators incentives to contract with Everett for firm gas supplies when it is less-costly than alternatives. While no LNG import terminal or other facility is a perfect substitute for Everett, efficient non-discriminatory market incentives will attract an efficient combination of fuel-secure resources in the short and long term. An out-of-market contract for a particular class of resources would undermine incentives for investment in other resource classes.

It is unclear whether Everett is uniquely necessary for local gas system reliability. Some of the comments of representatives of gas LDCs and state regulators suggest that Everett may be uniquely necessary, but they have not presented analytical support for this. In any case, this is likely outside of FERC purview.

To maintain gas system security, pipeline operators must maintain pressure at appropriate levels. Security could be undermined if injections and withdrawals are out of balance. If there is a deficiency of gas supply, interstate pipeline security is maintained by reducing withdrawals

first by electric generators and interruptible industrial and commercial customers and then through conservation and public appeals. Gas system operators should follow procedures for resolving supply deficiencies in a manner that maintains gas system security on the interstate pipeline system. Thus, Everett is not absolutely necessary for interstate pipeline security.

B. Panel 2: Reactions to the EPRI Study

The EPRI study has enhanced the ISO's tools for evaluating winter resource adequacy, although we recommend modeling enhancements to "Step 3" of the study to better reflect how opportunity costs would lead market participants to conserve fuel. With these enhancements, the models developed in the EPRI study could become the principal framework for assessing winter resource adequacy issues and an integral part of the ISO's regional system planning process.

As compared with the resource adequacy model currently used to determine the ISO-NE Installed Capacity Requirement, the EPRI study used superior approaches for:

- Building winter weather scenarios from a rich historic dataset that considers the correlations of demand and intermittent generation and associated probabilities,
- Considering natural gas pipeline constraints,
- Tracking oil and LNG inventory constraints and replenishment cycles, and
- Assuming net import levels that reasonably vary with weather conditions.

Notwithstanding these improvements, there is a key shortcoming in the EPRI study, which is that the Step 3 (i.e., resource stacking) model does not consider how the opportunity costs of generators with low fuel inventories would affect winter reliability. This shortcoming is largely responsible for the ISO's finding that continued operation of Everett tends to *increase* load shedding in the key scenarios presented to NEPOOL stakeholders.¹ In these scenarios,

¹ For example, see slides 45-46 in *Operational Impact of Extreme Weather Events, Preliminary Results of Energy Adequacy Studies for Winter 2032* presented August 15, 2023 to the NEPOOL Reliability Committee by

LNG inventories at Everett and other LNG import terminals are depleted prematurely while oil inventories remain relatively high. This outcome results from the assumption that the wholesale price of gas is lower than the price of oil, leading gas to be burned before oil. However, in a competitive market, low LNG inventories combined with severe gas pipeline constraints would cause gas prices to increase dramatically as suppliers with limited fuel inventories would seek to conserve their remaining fuel until the most valuable periods.

To address this shortcoming in the stacking analysis of the EPRI study, we have recommended that the dispatch order be modified to simulate how market participants reflect opportunity costs in their scheduling decisions. Specifically, we have recommended dispatching resources with stored fuels in order of their inventory levels measured in hours of operation remaining in the tank. Thus, if one generator has enough oil in the tank to operate for 20 hours and a second generator has enough oil in the tank to operate for 12 hours, the generator with 20 hours remaining will be dispatched first. This relatively simple decision-rule closely mimics the actual behavior of generators to conserve fuel without the complexity of simulating actual fuel prices.

The ISO's resource adequacy model uses Monte Carlo techniques to assess the combined impact of multiple generator outages impact on reliability, but the resource adequacy model does not consider the effects of limited fuel inventories, which are a critical driver of New England's reliability in the winter. The resource adequacy model's demand assumptions are focused on reliability risks from extreme *summer* weather, and the availability of intermittent renewable resources is not modeled directly. For example, 100 MW of nameplate wind turbine capacity

Stephen George and Jinye Zhao: https://www.iso-ne.com/static-assets/documents/2023/08/a10_operational_impact_of_extreme_weather_events.pdf

with availability that fluctuates based on weather is typically represented by 15 MW of flexible generation capacity. This treatment will over-simplify the characteristics and reliability value of wind generation especially when large quantities of wind capacity are added to the grid. The EPRI study models have superior features in each of these areas. If opportunity costs are reflected in the manner we recommend, then the models developed in the EPRI Study could be used to assess winter resource adequacy, set the Installed Capacity Requirement, and accredit capacity.

C. Panel 4: Market Design

The ISO is investigating reforms to the capacity market that would better adapt it to providing efficient incentives for resources that support reliability during the winter, including Resource Capacity Accreditation and a transition from the current forward annual capacity market to a prompt seasonal capacity market. We support these efforts, although we highlight shortcomings in the ISO's recent RCA proposal and the need for enhancements in the resource adequacy model as discussed above in Part B of this section.

Resource Capacity Accreditation

To attract and retain resources needed for winter reliability, it will be necessary to: (a) include the drivers of energy adequacy in ISO-NE's resource adequacy model so they are reflected in the ICR, and (b) accredit capacity suppliers based on their marginal contribution to reliability. Currently, the capacity market values gas and oil units based on their Qualified Capacity regardless of fuel availability, so it does not meaningfully consider winter risk.

Accreditation of Dual-Fuel and Oil Resources. ISO-NE has proposed changes as part of its ongoing Resource Capacity Accreditation project that would include pipeline gas limitations and limited LNG supplies in the resource adequacy model. However, ISO-NE's proposal treats

dual-fuel and oil units with more than 40 hours of inventory (and gas-only resources with contracts that allow them to operate for 10 hours per day) as having unlimited fuel. While the ISO's proposal is an improvement, a) it substantially understates winter reliability risk because it does not adequately model oil inventories during prolonged cold weather, and b) overstates the reliability value of resources with limited fuel supplies.

In the EPRI study, the ISO demonstrated that the modeling of stored energy supplies – including LNG and oil inventories – is needed to properly assess winter reliability risks during events far longer in duration than 40 hours. In our 2022 annual report, we reached the same conclusion, finding that:²

- Assuming oil units (with 40+ hours of oil storage) have unlimited fuel in the resource adequacy model artificially increases the estimated reliability of the system, causing capacity requirements to be underestimated by several gigawatts (or several BCF of LNG imports);
- Underestimating winter reliability needs will result in an artificial surplus in the capacity market, leading to depressed prices even when there is a need for more resources; and
- Realistic modeling of oil inventories is necessary to calculate appropriate accreditation values for many resource types. However, the proposed modeling by ISO-NE will:
 - Over-accredit dual fuel and oil units with small tanks, gas-only resources without firm fuel contracts, and short duration energy storage; and
 - Under-accrediting units with medium and large oil tanks and wind generators.

Accreditation of Non-Firm Gas Units. Although the ISO's RCA proposal generally determines capacity accreditation based on the marginal resource adequacy value of each type of resource, the ISO has proposed accreditation of non-firm gas generation that is effectively an average accreditation method. Thus, the ISO's proposal will substantially over-compensate non-

² See *2022 Assessment of the ISO New England Electricity Markets* by Potomac Economics, External Market Monitor, Section V.A.2.

firm gas generation, so we recommend the ISO address this by applying marginal accreditation methods to the non-firm gas generation.

Assessment of the Mandatory Forward Capacity Market

ISO-NE conducts its FCAs over three years before the associated capability period. Participation by loads in the three-year forward auction is mandatory, and it is the main avenue for suppliers to earn capacity revenues. The mandatory three-year forward FCA has limited benefits and significant drawbacks compared to a “prompt” capacity market design in which auctions take place weeks or months before the capability period.

The main purported benefits of the FCA are that it provides revenue certainty to project developers and coordinates entry and exit of capacity in advance of when it is needed. However, the FCA only provides price certainty for a single year, which does not significantly offset merchant risk for capital-intensive projects with amortization timeframes of twenty years or more.

The FCM has a dubious track record of coordinating timely entry of new resources even before the multi-year price lock was eliminated. The FCM has facilitated only modest amounts of new investment, which has struggled to begin operation on time. Just 41 percent of capacity from new large projects with initial CSOs from 2016 to 2023 entered on time, while 30 percent entered 1-2 years late and 29 percent never entered. The uncertain development timeframes for a growing share of new resources, including offshore wind, causes the FCM to create inefficient financial risk for new resources that may become an economic barrier for new investment.

The three-year forward period of the FCA is increasingly disconnected from the development time of new projects, such as solar, storage and demand aggregations, which can

often be developed more quickly than three years and are inhibited from earning timely capacity revenues. This inefficiently reduces their investment incentives.

Some commenters have asserted that forward capacity markets are less likely to require “RMR agreements” to maintain reliability because they give the ISO more time to evaluate options for maintaining reliability after a key generator announces it will retire. However, this theoretical benefit is overblown because RMR agreements usually become necessary when an older high-cost resource is valuable for reliability but is not efficiently compensated due to a flaw in the capacity, day-ahead, and/or real-time market rules. In a minority of cases, the generator is uniquely situated to maintain voltage or some other very localized service, but such cases are typically resolved with relatively small transmission upgrades that have short lead times.

In addition to the limited benefits of the FCM in facilitating new investment, it also raises several other concerns compared to a prompt capacity market:

- A prompt market simply compensates new resources when they enter service without mandatory forward commitments, which reduces the inefficient risk described above.
- The FCA creates inefficient risk for old existing units that must commit to supplying capacity three to four years in the future. Unexpected issues can compel them to buy back their obligation at great cost and this risk may cause some resources to retire prematurely. A prompt market facilitates more efficient retirement decisions because the uncertainty regarding the condition and availability of older units is much lower.
- Key FCA parameters rely on resource mix assumptions that vary from the mix that actually clears the auction. This can cause the ICR and capacity credit values to become increasingly inaccurate. A prompt market allows more accurate assumptions regarding auction parameters because there is greater certainty about the resource mix.
- The FCA is conducted earlier than necessary for pipeline gas resources to firm up their capacity offers by contracting for LNG delivery. A prompt market would facilitate contracting for firm fuel at a time when such costs could be reflected in capacity offers.

To address all of these concerns, we recommend replacing the FCM and with a prompt capacity market. The prompt auction should be conducted on a seasonal basis ahead of each summer and winter period using capacity market demand curves that reflect the marginal value of capacity in each season. The seasonal approach would allow the market to address winter reliability issues more efficiently by creating incentives for suppliers to procure firm fuel and maintain fuel inventories.

To facilitate this transition, we recommend that ISO-NE postpone upcoming forward capacity auctions. This would provide time and resources to: develop enhancements to the capacity accreditation rules and design the prompt seasonal capacity market. Continuing to hold FCAs will delay the benefits these improvements.

III. CONCLUSION

New England has the capability to satisfy its winter reliability planning needs using the existing generation and LNG infrastructure even without the Everett Marine Terminal. The key problem is that current market rules do not give resource owners adequate incentives to maximize the utilization of their assets to maintain reliability in the winter. Out-of-market retention of large resources such as the Everett Marine Terminal would undermine incentives for competing resources to invest in becoming more fuel secure.

We support the ISO's efforts to better evaluate winter reliability risks in the EPRI study, to provide better incentives for capacity suppliers to be available during extreme winter weather, and to investigate transitioning to a prompt seasonal capacity market. However, we recommend the ISO: make specific improvements to simulate the effects of opportunity costs for suppliers with stored fuels in Step 3 of the EPRI study and adapt the EPRI study models to evaluate winter resource adequacy requirements and accreditation.

We also support the ISO's efforts to improve the accreditation of resources to reflect their fuel or other energy limitations and potentially transition to a seasonal market that can reflect the region's winter supply and demand conditions that is run promptly before each season. These changes would provide efficient incentives for plant owners to maximize their inventories, obtain firm fuel supplies, and mobilize other available resources.

We also recommend that ISO-NE determine winter resource accreditation values using a resource adequacy model that considers the interaction of weather with load, intermittent generation, and gas availability and explicitly models inventories of LNG and fuel oil. Together, these recommendations would allow the market to facilitate actions by market participants in New England that will satisfy its winter reliability needs.

Respectfully submitted,

/s/ David B. Patton

David Patton
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August 28, 2023

CERTIFICATE OF SERVICE

I hereby certify that I have this day e-served a copy of this document upon all parties listed on the official service list compiled by the Secretary in the above-captioned proceeding, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated this 28th day of August 2023 in Fairfax, VA.

/s/ David B. Patton
