UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

ISO New England Inc.	**)**	**Docket No. EL18-182-000**
	)	**Docket No. ER18-2364-001**
	)	

Affidavit of Peter D. Fuller on behalf of NRG Power Marketing LLC

I. Name and Qualifications

1. My name is Peter D. Fuller, and my business address is 270 Cherry Street, Bridgewater, MA. I am an independent consultant to the energy industry and I am providing this affidavit on behalf of NRG Power Marketing LLC ("NRG"). I have nearly 35 years of experience in the energy industry, 16 in a regulated, vertically-integrated utility, and the last 18 in the independent power industry. I have been involved in the design and administration of ISO New England's ("ISO" or "ISO-NE") Forward Capacity Market ("FCM") since its inception in 2006.

2. I am a former Chair of the New England Power Pool ("NEPOOL") Participants Committee and Chair of the NEPOOL Budget & Finance Subcommittee. I also served NEPOOL from 2004-2013 as the Vice Chair of the Participants Committee representing the Generation Sector. I have also previously served as Vice Chair of the Independent Power Producers of New York and as state Chair of the Solar Energy Industries Association for New York, and previously served as Chairman of the New England Power Generators Association, from 2005 to 2010. Previously, I was Director of Market Affairs for Mirant Energy Trading from 2000-2007. Prior to joining Mirant in 2000, I held a number of positions in power supply, planning and engineering with Eastern Utilities Associates. I hold a Master's degree in Electrical

Engineering from Northeastern University and a Bachelor's degree from Bucknell University.

3. Until recently, I was Vice President of Market and Regulatory Affairs for NRG. I am currently an independent consultant to clients in the energy industry. My work for industry clients encompasses competitive wholesale market design, climate change and related environmental policies, renewable and distributed energy policy, and the intersection of public policy objectives with competitive markets. In my recent past position as Vice President of Market and Regulatory Affairs for NRG, I led policy development for NRG's state, regional and federal regulatory and policy activities primarily in the New England, New York and PJM market areas, including the company's interactions with the RTOs as well as supporting the company's asset optimization and business development efforts in the region. I have previously testified before the Massachusetts Department of Public Utilities, the Connecticut Public Utility Regulatory Authority, the Maryland Public Utilities Commission and the Federal Energy Regulatory Commission.

II. Purpose and Summary of Affidavit

4. I have been asked by NRG to address several concerns with ISO New England's fuel security compliance filing on August 31, 2018 ("ISO-NE Filing"), specifically with ISO-NE's proposal to require resources retained for fuel security purposes to offer into the Forward Capacity Auctions ("FCA") as price-takers and their proposal to limit the fuel security review to resources with Retirement De-List Bids.

5. My primary conclusions are:

a. In order to properly establish the efficient marginal price for capacity providing resource adequacy to the New England region, the expressed marginal cost of every resource seeking to provide that service should be included in the auction.

b. ISO-NE's assertion that including fuel security resources in the auction as price-takers will not result in price suppression is incorrect, since it is based on a faulty comparison.

c. ISO-NE over-states the risk of 'over-procurement' of gas-fired capacity if fuel security resources participate in the auction at their competitive prices.

d. ISO-NE is putting regional reliability at risk by not evaluating the fuel security impacts of resources delisting through mechanisms other than a Retirement De-List Bid.

e. The long-term solution to a market-based fuel security procurement and valuation mechanism for the region lies in the ancillary service or energy markets, not in the capacity market.

III. Market Participation of Fuel-Secure Resources.

A. The Efficient Price *for Resource Adequacy* Includes the De-List Bid Prices of Fuel-Secure Resources.

6. The ISO-NE Tariff requires that all resources seeking to exit the capacity market by de-listing in the FCA have a price, and the submittal of cost data enables the IMM to validate the resource's avoidable costs (Section III.13.1.2.3.2.1). The rules allowing for a 'Non-Price Retirement Request' were eliminated in 2017 and replaced with a process that requires that the IMM have the data necessary to confirm the total costs that the resource will avoid by exiting the market. This process still enables resources

to permanently exit the market regardless of the auction outcome through an 'unconditional' retirement.[1]

7. 'Retirement' in ISO-NE, as implemented as the result of a Retirement Delist Bid such as those submitted by Exelon for each of the Mystic units, encompasses the complete exit from all markets and the termination of all transmission interconnection rights.[2] Under the FCM rules a 'retired' resource can only re-enter the markets or regain its interconnection capabilities by submitting an interconnection request and going through the full process to study the resource's impact on the transmission system and other resources and to confirm the resource's deliverability to the grid and to the region.[3]

8. In this case, as part of the process for qualifying resources for participation in FCA13 in early 2018, Exelon Generation Company, LLC ("Exelon") submitted 'Retirement Delist Bids' to ISO-NE for all the units at its Mystic Station. Units 8 & 9 are modern combined cycle units, while Mystic 7 is an older, oil-fired steam unit and the Mystic Jet is a small peaker unit. In accordance with the tariff requirements, Exelon was required to submit cost data to the ISO-NE Internal Market Monitor to allow the IMM to estimate the units' retirement delist prices for use in the auction.

9. The prices associated with these bids represent the marginal cost for these units to provide the 'resource adequacy' product. Conceptually, an existing resource's delist bid price is expected to reflect its full incremental costs of operating in the future

[1] Exelon has indicated their intent to elect 'unconditional retirement' for Mystic 7 and the Mystic Jet, but has made no election to date regarding Mystic 8 & 9.
[2] ISO New England Tariff, Section III.13.2.5.2.5.3(a)(i).
[3] ISO New England Tariff, Section III.13.1.1.1.2.

capacity delivery year less anticipated net revenues from sales of energy and ancillary services.

10. The FCM is based on the concept that the auction will reveal the marginal cost of the capacity (or 'resource adequacy') product, and that all resources will be paid that price. This price can reflect the cost of a new resource when new entry is economic, or can reflect the avoidable cost of an existing resource when that resource is seeking to exit the market due to insufficient revenues.

11. The FCAs are designed to reveal the efficient marginal cost of providing *resource adequacy* to the region, whether the marginal cost is reflecting new entry or existing exit. The Mystic units have expressed their marginal costs *of providing the resource adequacy product* in terms of the costs they can avoid by permanently and irreversibly exiting the ISO-NE capacity and energy markets. These bid prices are not public, but the ISO and IMM have the bids and the supporting information. The efficient price outcome in FCA13, *for resource adequacy*, would include the Mystic units at their submitted delist bid prices (as ultimately approved by FERC).

12. ISO-NE incorrectly proposes to apply the fuel security evaluation before the auction, frustrating the appropriate economic outcome. The break-down in ISO-NE's logic comes in their implicit assumption that the fuel security analysis supersedes and takes precedence over the established market construct and rules for resource adequacy. Instead, the ISO should allow the retirement bids and their associated prices to stand and allow the auction to proceed accordingly. This will produce the correct marginal value for the resource adequacy product, whether the Mystic units receive a CSO in the auction or not.

13. If the Mystic units *do* receive a CSO in the FCA, because the clearing price is above their retirement delist bid price, no additional steps are needed to protect fuel security.

14. On the other hand, if the Mystic units' delist bid price is above the clearing price and they do not take on a CSO, ISO-NE at that point should enter into a separate agreement with the units, with appropriate obligations and compensation to ensure that the units will be available to the ISO as needed to protect the region's fuel security during the winter season of the associated Power Year.

B. The ISO is Incorrect to Suggest a Fuel-Security Constraint in FCM as a Basis for Evaluating Price Outcomes.

15. The ISO provides an inapposite standard of comparison for auction price outcomes in their filing. The ISO attempts to justify their proposed 'price-taker' treatment of resources retained for fuel security by comparing it to the auction price outcomes they would expect 'if the ISO were to develop a new constraint in the FCA that seeks to reflect the region's fuel security needs.'[4] This is an entirely inappropriate comparison, given the facts. The ISO has repeatedly emphasized that the 'fuel security' need that they are struggling to address is an *energy* problem and is categorically *not* a capacity problem.[5] Indeed, the ISO goes to great lengths in the ISO-NE Filing to stress that the appropriate approach to incorporating this requirement into the markets may well be

[4] Testimony of Christopher Geissler, EL18-182-000, August 31, 2018 ("Geissler"), page 23:4-5.

[5] *See, e.g.*, Testimony of Peter Brandien, ER18-1509-000, May 1, 2018, page 10:7-16. "Q: IS THERE A SHORTAGE OF INSTALLED GENERATING CAPACITY IN NEW ENGLAND? A: No, fuel security is not an issue of installed generating capacity. This is not about the 1 in 10 day standard for loss of load and the process for determining the amount of installed capacity the region requires to meet peak load conditions. Fuel security instead is a matter of the ability of those power plants whose capability is procured in a capacity market to obtain and use the fuel they need to produce energy to meet demand and maintain required operating reserves, even at load levels that are far below the summer peak energy needs. Said another way, this is an energy problem, not a capacity problem." *And*, ISO New England Memorandum to NEPOOL Markets Committee, 'Winter Energy Security Improvements,' September 6, 2018, pages 2-3. "While the ISO is meeting its regional resource adequacy requirement for capacity – which is based on expected summer peak demand – it is increasingly concerned about the region's ability to overcome its emerging energy security problems in the winter months." https://www.iso-ne.com/static-assets/documents/2018/09/a9_iso_memo_winter_energy_security_improvements.pdf.

through the energy or ancillary services markets.[6] Since all signs are pointing toward the market-based solution to the region's fuel security challenges being something *other than* an additional capacity market constraint, the ISO's suggested price outcome comparison is of no relevance.

16. Resources estimating their FCM offer prices are expected to net their anticipated revenues from all energy and ancillary service markets. So, if ISO-NE ultimately defines a fuel security 'product' that is either part of the energy market or a potentially new ancillary service, the anticipated future revenues from that market would be expected to be netted out when estimating the FCA offer price of a resource capable of providing the fuel security product. The only way the ISO's proposed 'price-taker' approach would accurately reflect such a structure is if the revenues from the (as yet undefined) fuel security product are so robust as to result in net costs of zero for providing the resource adequacy product. This outcome is so unlikely as to be easily disregarded, at least as a general case.

17. A much more applicable scenario for comparison would be to hypothesize a fuel security 'market' that is not part of FCM, and to estimate the cost outcomes in FCM in the presence of this hypothetical energy or ancillary service mechanism. As a means to estimate this impact, the recent Winter Reliability Program ("WRP") offers a useful data point. While any future market solution to the region's fuel security concerns is likely to differ, perhaps significantly, from the design of the WRP, the WRP

[6] *See, e.g.*, "Furthermore, without further analysis, it is premature to presume that this service is most appropriately procured in the capacity market, rather than in the energy market or as a new ancillary service." (Geissler, 24:10-12). "While the introduction of a fuel security constraint represents one conceptual approach to addressing this concern, there may be other, superior approaches to compensate resources providing fuel security in the capacity, energy, or ancillary service markets (or some combination thereof)." (Geissler, 25:8-11) Furthermore, a fuel security constraint in the capacity market represents but one of many potential approaches to ameliorate this concern. A more comprehensive analysis would also consider whether this service would more appropriately be compensated in the energy/ancillary service markets, or via a new product market entirely." (Geissler, 38:1-5).

nonetheless represents a mechanism for the valuation of additional winter fuel security, which is essentially the same objective that the region is seeking to address in the current fuel security design efforts.

18. The most recent payment rate for oil inventories under the WRP was $10.33/MMBtu.[7] The program also established a payment rate of $1.72/MMBtu for LNG but had no participants sign up for that payment level. As a result, I consider the oil payment rate to be the marginal value of the service.

19. I have estimated the hypothetical $/kW-mo revenue that a modern combined cycle unit would expect to receive if it was compensated at the equivalent of $10.33/MMBtu of oil, assuming a heat rate of 7,500MMBtu/MWh. The minimum fuel quantity is based on the WRP eligibility requirement to have at least 10 days of fuel. With these assumptions, I estimate a proxy value to a modern combined cycle unit of providing the winter fuel security attribute is approximately $0.74/kW-month as a uniform average value across twelve months.

Size	500	MW
Heat Rate	7.50	mmbtu/MWh
Residual Fuel Heat Content	6.287	mmbtu/barrel
Minimum Fuel	10	days
Inventory Requirement	143,153	barrels
Payment Rate	$ 10.33	barrel
Monthly Payment	$ 1,478,766	
Three Month Payment	$ 4,436,297	
Average Monthly Payment over the Year	$ 369,691	
Average Monthly Payment	$ 0.74	$/kW-month

[7] https://www.iso-ne.com/markets-operations/markets/winter-program-payment-rate.

20. Going forward, if there is an energy or ancillary service mechanism to value and compensate the fuel security attribute, resources would be expected to account for those revenues in their delist bid prices. While the value to be derived from a future market mechanism for fuel security cannot be known with certainty today, we can use the recent WRP results as a rough proxy for the value of the fuel security attribute. As a more applicable estimate of the efficient price outcome in an FCA in the presence of a market-based solution for fuel adequacy to use as a point of comparison, ISO-NE should adjust the current delist bid price of any fuel-secure resource by approximately $0.74/kW-month and estimate the FCA auction prices on that basis.

C. The ISO Overstates the Potential for Over-Procurement, Especially New Entry of Natural Gas-Fired Capacity.

21. NE over-estimates the risk and impact of 'over-procurement' of new natural-gas entrants into the market if fuel security units participate in FCA at their competitive prices. *First*, recent experience shows that new capacity clearing in the FCAs is mostly composed of import capacity, small-scale renewable resources, and demand resources.[8] These new resources are not indicative of a significant risk of 'over-procurement' as suggested by ISO-NE. Import capacity is treated as 'new' every year and thus does not represent incremental capacity added to the region. Demand response capacity is primarily composed of state-funded measures installed pursuant to utility contracts, and so is responding to state policy incentives rather than market prices. Likewise, small-scale renewables are typically driven by customer or state-level incentives rather than wholesale market prices.

[8] *See, e.g.*, ISO New England presentations to NEPOOL Reliability Committee. March 13, 2018, https://www.iso-ne.com/static-assets/documents/2018/04/a3_fca_12_results_summary.pptx. March 21, 2017, https://www.iso-ne.com/static-assets/documents/2017/03/a6_fca_11_auction_results.pdf. March 23, 2016, https://www.iso-ne.com/static-assets/documents/2016/03/a6_fca_10_results_summary.pptx.

		New Cleared Capacity, MW		
	FCA Clearing Price	Imports	Demand Resources	Generation
FCA12	$4.63/kW-mo	1,136	514	167
FCA11	$5.30/kW/mo	1,153	640	264
FCA10	$7.03/kW-mo	1,361	379	1,459

22. *Second*, the three large units that cleared in FCA10, the last time significant new 'traditional' generation entered the FCA, are all proposed to have dual fuel capability. In short, at relatively low FCA prices, there is very little incremental new capacity, and the majority of it is small-scale gen or demand resources. During the period when prices were sufficient to attract new entry, the incremental new capacity that cleared in the market had the dual fuel attribute that is beneficial for fuel security.

23. *Third*, even if including the Mystic units in FCA13 at their competitive prices caused FCA resource adequacy prices to rise to a level that would support new investment in generation (which the ISO suggests would be a 'costly and inefficient' outcome for the region), at most this would represent entry that is 'early' by a year or two. Since the Mystic units have submitted binding, irrevocable retirement delist bids under the ISO tariff, they will permanently exit the market and surrender their interconnection rights when they are no longer needed for fuel security. The pending cost-of-service agreement has a term of two years, and the ISO's recently-filed tariff provisions – which, if approved, provide the only basis in the tariff for retaining the Mystic units for fuel security – include a one-year term with a potential extension for a second year, but the rules are clear that no such agreement will last for more than two years. In the case of the Mystic units, that term covers the years 2022/2023 and 2023/2024.

24. As a result, the resource adequacy contribution of the Mystic units will be exiting the market no later than the start of the FCA15 period, June 1, 2024. Even if incremental capacity clears in FCA13 and has an obligation beginning June 1, 2022, any so-called 'over-procurement' of capacity for resource adequacy purposes is a temporary situation. And, as has been demonstrated recently, major new generating projects can be subject to significant delays and roadblocks, which suggests that it is reasonable and prudent to encourage a timely market response to replace retiring capacity.[9]

25. Thus, the ISO's assertion that it would be inefficient to allow prices to reflect the exit of Mystic at this time is simply wrong. But for the ISO's determination of the need for the Mystic units for their fuel security attributes, the units would be exiting the markets permanently as of June of 2022. Allowing the market to reflect their desire to exit in FCA13, even if it attracts new entry, will directly support the fundamental purpose of the capacity market which is to secure the long-term resource adequacy of the system. To that end, the detrimental effects of obscuring a priced retirement is a far greater harm to the long run functioning of these markets than the potential entry of needed capacity one or two years early.

26. *Fourth*, the ISO-NE's proposal demonstrates a one-sided focus on over-procurement and seemingly has given no consideration to the negative effects their price-taker proposal may have in triggering premature retirement of other fuel secure resources, which in turn could further frustrate the current situation.

IV. ISO's Fuel Security Review Should Be Applied Consistently To All Delist Bids

[9] *See, e.g.*, http://www.salemnews.com/news/local_news/facing-delay-footprint-tries-to-strike-deal-with-neighbors/article_1f35067c-df84-5049-a981-12d9d3a1d25a.html; http://www.providencejournal.com/news/20171124/1b-power-plant-proposed-in-ri-faces-another-delay.

27. To properly protect reliability in the context of fuel security reviews prior to the implementation of a market-based fuel security solution, it is critical that ISO-NE review *every* delist bid for its fuel security impacts. Any delist bid that clears in the FCA would have no obligation to participate in the DA or RT energy markets, so the ISO should not assume that a delisted unit would be available. By failing to apply the fuel security analysis to all resources that are signaling their intent to forego capacity revenues *and the associated obligations*, the ISO is putting the region at risk of having insufficient fuel security resources. In the following sections I describe why all delist bids could have the same effect on fuel security, how ISO-NE should integrate the review of other delist bid types into the FCA, and the appropriate level of compensation for fuel security resources associated with static or dynamic delist bids.

A. All Delisted Resources Have No Obligation to Participate in Energy Markets.

28. The ISO-NE tariff provides that any delisted unit – whether delisted through Retirement, Permanent, Static, Dynamic or Export De-List Bid – has exactly the same degree of obligation to participate in the ISO-NE DA and RT energy markets, namely, zero.[10]

29. There are six types of de-list bids defined under the ISO-NE Tariff. Two types, Retirement De-List Bids and Permanent De-List Bids, lead to a permanent exit from the capacity market; Retirement De-List Bids also lead to the permanent exit from *all* ISO-NE markets and the surrender of interconnection rights.[11] Static De-List Bids and Dynamic De-List Bids both lead to a one-year exit from the capacity market, and differ

[10] ISO New England Tariff, Section III.13.6.2.1.1.
[11] ISO-NE Tariff, Section III.13.1.2.3.1.5.

in the price levels at which they can participate in the auction – Static De-List Bids[12] are submitted prior to the FCA at prices above the Dynamic De-List Bid Threshold,[13] and Dynamic De-List Bids[14] are submitted within the FCA once the auction price drops below the Threshold price. The other two types, Export and Administrative Export, lead to capacity located in New England being obligated to serve the reliability needs of a neighboring control area.[15]

30. From a reliability or fuel security perspective, the ISO has no more basis to rely on a unit delisted via a Permanent, Static, or Dynamic De-list bid than it has to rely on one delisted via Retirement. ISO assumes, with no factual basis, that delisted (but not retired) units would be responsive to an asserted incentive to operate irrespective of the fact it has no capacity supply obligation, especially in times of stress and tight energy constraints, and thus would be available in the energy markets during peak winter conditions. This assumption overlooks several important realities associated with the decision of resource owners to delist from the capacity market.

31. The first is that the delist bid price is based on 'avoidable costs' of the generating unit. Those 'avoidable' costs are mostly composed of staffing and O&M costs associated with keeping the unit in a state of readiness to operate in the energy markets. If a resource delists after basing its price on avoiding those costs, it follows that the resource operator will follow through and 'avoid' those costs by releasing its staff and ceasing its O&M activities. Thus, the default assumption should be that any delisted unit would be unavailable to operate in the energy market, regardless of

[12] ISO New England Tariff, Section III.13.1.2.3.1.1.
[13] ISO New England Tariff, Section III.13.1.2.3.1.A.
[14] ISO New England Tariff, Section III.13.2.3.2(d).
[15] ISO New England Tariff, Sections III.13.1.2.3.1.3 and III.13.1.2.3.1.4.

the weather or the prospect of short-term scarcity revenues. It is illogical to think that a generator owner could or would maintain a unit in a state of daily readiness to respond to short term scarcity while also being able to avoid the costs of such availability.

32. To provide some context, I have estimated the potential net revenue that a hypothetical 400MW oil-fueled resource with no Capacity Supply Obligation *might* have earned in two recent periods of elevated prices. I emphasize 'might' because in both cases I make extremely optimistic assumptions about the unit's ability to be available on very short notice and operate successfully. First, assume that this 400MW resource has avoidable costs of $4.50/kW-month, or total avoidable costs of $21.6 million per year.

33. In the winter of 2017-2018 New England experienced an extended period of extremely cold weather that put pressure on the system and might be the kind of period ISO-NE has in mind when they surmise a delisted unit would be available. During the ten-day period of December 27, 2017 through January 5, 2018, real-time LMPs at the Hub averaged $184.02/MWh and were above $100/MWh for all but two hours. If our hypothetical 400MW oil-fueled unit had a dispatch price of $100/MWh and was able to perfectly hit that 10-day period and run continuously at full load, I estimate it would have earned just over $8 million in energy margin.[16]

34. In a more recent example, on September 3, 2018 New England experienced its first 'Capacity Scarcity Condition' under the Pay for Performance capacity market design, due to higher-than-forecasted temperatures and loads and several generator contingencies. The Capacity Scarcity Condition, in which the PfP performance

[16] *See* workpaper PDF-1.

charges and credits apply, lasted for 2 hours and 35 minutes, and LMPs were elevated for roughly seven hours. Making the unrealistically optimistic assumption that our hypothetical 400MW oil-fueled resource could have started up as soon as the Hub LMP went above its $100/MWh dispatch price and it ran at full load until LMPs dropped below $100, I estimate it would have earned roughly $1.9 million in energy margin and just over $2 million in PfP performance credits.[17]

35. These examples show the significant gulf between the actual costs to make a generator available to operate and the very limited revenue opportunities when operating in times of system stress. It is entirely implausible that the owner of our hypothetical 400MW resource would incur the $21.2 million cost, or any significant fraction of it, on the slim potential that if system stress conditions occur, it might – if everything goes exactly perfectly – make enough money to cover about half of its costs. ISO has offered no analysis or evidence to support their assumption that delisted resources would be available to support winter fuel security, and it should be rejected as unsupported and implausible.

36. Second, ISO's existing tariff provisions regarding Retirement De-List Bids are extremely restrictive, and resource owners may utilize any of the other delisting mechanisms to step out of the market and shed costs as a resource approaches a full and final retirement. As an initial matter, a Retirement De-list Bid is binding and irrevocable.[18] That is, once submitted, it is not a question of whether the unit will retire, only when. If the retirement delist bid doesn't clear in the first auction for which it is submitted, the bid will be carried over to subsequent auctions until it

[17] *See* workpaper PDF-2.

[18] ISO New England Tariff, Section III.13.1.2.3.1.5(c), "Once submitted, no Permanent De-List Bid or Retirement DeList Bid may be withdrawn, …"

clears.[19] In contrast, a static or dynamic delist bid that doesn't clear does not carry over to the next auction; the resource has a chance to reassess the market situation and decide whether conditions have changed sufficiently to warrant re-starting operations, or whether to re-submit a delist bid.

37. If an existing unit's static or dynamic delist bid does clear, such that the resource does not have a CSO, the unit could submit a delist bid for the next year that includes the costs of re-staffing and re-activating the unit, potentially including capital upgrades for environmental compliance. This option is not available to a unit that submits a Retirement De-List Bid. And, if conditions do not rebound over the course of several auctions, the ISO tariff provides that a unit is deemed to be retired (i.e., permanently removed from the markets and surrendering its interconnection rights) once it has had three calendar years with no commercial operations.[20] Thus, static and even dynamic delisting provide an avenue to retire a resource that is far less restrictive than submitting a 'retirement delist bid' and provides for optionality if market conditions change any time from the first submittal of the delist bid to the retirement determination, roughly six years later. As with all markets, optionality has value and future market conditions are always uncertain, so it is reasonable to expect that many resources will use this avenue to accomplish their exit from the market, rather than the inflexible Retirement De-list Bid. Importantly, clearing any of these delist bids in an FCA has the same outcome from a fuel security standpoint, which is that the resource has no obligation to participate in the energy markets and thus, the ISO cannot assume

[19] ISO New England Tariff, Section III.13.2.5.2.1(b), "… if all or part of a resource with a Permanent De-List Bid or Retirement De-List Bid does not clear in the Forward Capacity Auction (receives a Capacity Supply Obligation), the Lead Market Participant shall enter the uncleared portion of the bid into the qualification process for the following Forward Capacity Auction …"

[20] ISO New England Tariff, Section III.13.2.5.2.5.3(d).

that the resource will be available to operate for fuel security needs during the capacity delivery year.

38. This optionality corresponds to the annual periods of the Forward Capacity Market and does not suggest that a resource on this 'soft retirement' path will have an incentive, or even the ability, to start up on relatively short notice and be available for a limited period such as the winter period when fuel security concerns are at their peak. In general, a deactivated unit would only be able to re-start with a substantial amount of notice, in order to have time to re-staff and bring the unit out of mothball, and this would only be done with the intent to return to the capacity market with the associated level of revenue certainty.

39. It would be irresponsible for the ISO to make an aggressive assumption regarding reliability when faced with the fact that a resource is signaling its intention to exit the capacity market under any of the delist options. For all of these reasons, ISO-NE must assume that *any* delisted resource will not be available to support regional fuel security, and thus ISO-NE should review all delist bids for fuel security.

B. The ISO is Incorrect to Suggest a Fuel-Security Constraint in FCM as a Basis for Evaluating Price Outcomes.

40. As noted above, the appropriate approach to reviewing delist bids for fuel security is to allow all the delist bids to participate in the FCA at their competitive delist bid prices, and to perform the fuel security review only after the auction for delist bids that clear the FCA. As discussed above, this approach will produce the accurate and efficient auction price for resource adequacy. If any of the resources with cleared delist bids are found to be needed for fuel security, then the ISO can enter into appropriate agreements specifically for the fuel security service.

41. However, if the Commission upholds the ISO's approach of reviewing the fuel security impacts of delist bids on the front end of the auction, the ISO should add appropriate reviews of Static and Export De-List Bids during the static delist period (June/July), and an additional application of the review within the FCA (February) as applied to dynamic delist bids. NRG presented these concepts to the NEPOOL Reliability Committee in May and August.[21] This change would add to the number of fuel security reviews to be performed, but the additional rounds of review are not an entirely new issue – the ISO is already committed to perform this review as applied to CASPR substitution auctions following the conclusion of the FCA.[22]

C. Appropriate Compensation for Fuel Security Resources Without Retirement De-List Bids.

42. ISO-NE has proposed that resources retained for fuel security pursuant to a Retirement De-List Bid will be eligible to seek compensation based on the resource's full cost of service, as provided in the existing tariff as applied to resources retained for local transmission security.[23] It does not follow that a resource that delists for a one-year period, such as through a Static or Dynamic De-List Bid, but is retained for fuel security reasons should be paid its full cost of service. Recognizing the ability of such resources to return to the capacity market in the following year, NRG proposed in the NEPOOL stakeholder process that fuel security resources with static or dynamic delist bids would be paid their as-submitted delist bid prices, as ultimately approved by the

[21] https://www.iso-ne.com/static-assets/documents/2018/05/a9_nrg_considerations_in_fuel_security_analysis.pptx; https://www.iso-ne.com/static-assets/documents/2018/08/a18_nrg_propoal_for_retaining_resources_for_fuel_security_presentation.pptx.

[22] ISO New England, Compliance Filing to Establish a Fuel Security Reliability Standard, Short-Term Cost-of-Service Mechanism, and Related Cost Allocation for Out-of-Market Compensation, EL18-182-000, Filing Letter at p. 22.

[23] ISO New England Tariff, Section III.13.2.5.2.5.1(b).

Commission.[24] Likewise, this approved offer price would be used in the FCA to establish the auction clearing price for capacity. If the fuel security resource with a one-year delist bid obtained a CSO in the auction, no further action would be required, but if not, the ISO would then tender a 'fuel security agreement' that would ensure that the resource would be available to support winter-period fuel security in return for being paid its approved delist bid price.

V. The Appropriate Form of a Market Solution for Energy Security

43. The solution to the New England region's fuel security concerns does not lie in the capacity market. The issue is not a shortage of *megawatts of capacity*. The issue is a shortage, under some circumstances, of *megawatt-hours of energy* to continue to meet the regional demand in the face of extended cold weather where availability of certain "just in time" delivered fuels is constrained and diversity of fuel supply becomes a key reliability need. ISO-NE has repeatedly stated as much.[25]

44. The availability of the fuel input to produce electricity is not an inherent characteristic of the generator or the technology – whether natural gas, oil or coal. The fuel needs to be delivered to the generator, over time.[26] Because fuel prices are volatile and volumes needed can be variable, firm fuel delivery arrangements do not lend themselves to far-forward deals, such as on the time-frame of the forward capacity market. Thus, security of the energy input source is not something that can be or

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[24] Fuel Security - Proposed Revisions to PP10 Appendix I & Market Rule 1 13.2.5.2.5A, NRG presentation to NEPOOL Reliability Committee, August 8, 2018.

[25] *See*, notes 5 & 6, *supra* .

[26] The current discussion is taking place primarily in terms of ensuring adequate stored quantities of fossil fuels, or adequate arrangements to ensure delivery of those fuels during extended cold weather. To be sure, as the region's generation fleet transitions to more and more renewable energy and advanced energy storage devices, 'fuel' security may take on a different character, or cease to be a concern altogether. However, for at least several years into the future the region's challenges will likely remain centered on the fossil fuel supply, even as renewables provide more of the region's overall energy needs.

should be determined at the time a resource commits to a CSO. Instead, fuel to address New England's energy security issues can be arranged most efficiently several months in advance of the need.

45. The Winter Reliability Program ('WRP'), which ISO-NE used very effectively from 2013 to 2018 to create incentives for generators to secure winter inventories of oil and LNG, as well as commitments from Demand Response providers, is an example of this timing. The auction for the WRP took place in October of each year and established volumes and prices for fuel commitments for the upcoming December through February period. Similarly, ISO-NE's highly successful Locational Forward Reserve Market ('LFRM') operates on a seasonal basis, with auctions in April for the upcoming summer and in October for the upcoming winter.

46. LFRM is also a useful parallel as the region considers approaches to design a market mechanism to address the fuel security challenge. The fast-start capability that the LFRM seeks to secure is integrally related to the technology and design of the generator. However, the designers of LFRM correctly realized that while all LFRM units could be FCM units, not all FCM units could be LFRM units. In that sense, LFRM is a 'premium' product above and beyond the standard FCM capacity product. Likewise, the 'fuel security' attribute that the region is looking for can be provided by some generators, but not all generators, and thus is another 'premium' product above and beyond the standard 'capacity' product. And like LFRM, the fuel security product can and should be procured independently of capacity.

47. While there are many details to be worked out, the general shape of a market-based solution to the region's fuel security concerns will have the following characteristics:

i. The ‘product’ will be denominated in energy terms (e.g., MWh, MMBtu) and not in power terms (e.g., MW);

ii. The market for the fuel security service will be seasonal, or perhaps annual, and will take place within a few months of the delivery period (i.e., in the fall to prepare for the winter);

iii. The market will be fuel-neutral and technology-neutral; and

iv. The market will establish a fixed, performance-based payment to providers of the fuel security service.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

ISO New England, Inc.	)	**Docket No. EL18-182-00**
	)	

TESTIMONY OF PETER D. FULLER

Peter D. Fuller being duly sworn, deposes and states that the statements contained in the foregoing Prepared Expert Testimony of Peter D. Fuller are true and correct to the best of his knowledge and belief.

Peter D. Fuller

Subscribed and sworn to before me
this 9 th day of September, 2018

Notary Public for
the State of Massachusetts



My Commission expires: 02-14-2025

Unit Capacity	400 MW	Avg LMP (HE1 12/27 - HE24 1/5)	184.02 $/MWh
Unit Dispatch Price	100 $/MWh	Total Hours	240 hours
		Net Energy Margin	$ 8,065,640

Hourly Real-time LMP at ISO New England Hub (Node 4000), $/MWh

HE	27-Dec	28-Dec	29-Dec	30-Dec	31-Dec	1-Jan	2-Jan	3-Jan	4-Jan	5-Jan
1	174.09	133.87	135.13	128.94	129.61	146.39	131.90	127.52	136.60	189.22
2	192.85	128.02	133.07	140.14	156.71	134.27	124.73	125.61	138.07	168.94
3	164.02	132.99	134.04	131.77	194.93	133.55	111.96	118.44	135.39	162.48
4	172.16	124.82	133.91	144.17	167.18	141.81	123.98	129.80	126.77	139.22
5	183.83	125.49	132.93	142.53	135.42	136.80	129.40	127.89	127.13	155.24
6	234.15	120.02	133.94	131.76	126.71	135.29	153.64	158.16	125.30	142.12
7	241.15	167.49	174.82	130.64	127.74	131.52	229.85	214.16	84.45	231.96
8	228.18	334.67	198.30	140.01	108.40	127.79	188.24	239.11	123.51	436.80
9	238.81	200.38	220.63	171.71	122.72	133.99	166.28	199.99	142.36	328.63
10	212.56	170.80	233.06	228.28	129.92	195.14	154.23	181.36	194.24	279.35
11	234.01	191.58	268.42	243.19	133.14	186.30	158.93	152.70	237.58	303.43
12	205.22	193.53	287.40	230.97	139.72	160.22	149.12	167.00	304.78	369.87
13	171.86	147.16	311.42	213.98	174.33	148.29	149.68	132.90	308.37	341.68
14	133.51	133.00	220.56	194.07	179.20	138.90	151.74	138.33	270.87	302.51
15	124.44	135.96	203.15	162.67	184.74	130.96	151.75	146.47	284.42	386.52
16	140.37	145.52	179.37	160.11	205.26	139.25	148.81	151.36	303.54	290.28
17	178.98	188.51	241.58	218.15	208.54	154.93	168.74	160.17	313.98	324.25
18	191.24	238.96	247.73	221.84	214.35	172.74	172.32	166.58	369.90	396.70
19	190.77	239.14	219.89	213.03	189.87	171.89	172.00	169.90	325.92	307.71
20	163.99	240.69	189.38	206.13	190.56	160.85	180.96	172.50	305.84	269.96
21	152.98	196.24	232.60	206.21	174.28	164.92	162.44	165.28	248.49	350.70
22	122.63	145.63	222.34	159.37	142.02	158.71	126.39	160.48	180.34	324.61
23	117.23	128.88	258.87	131.87	160.32	141.51	120.02	153.31	140.04	360.43
24	102.04	131.40	143.61	111.52	131.18	72.77	122.39	139.92	148.76	345.73

Reference: https://www.iso-ne.com/isoexpress/web/reports/pricing/-/tree/lmps-rt-hourly-final

Unit Capacity	400 MW	Avg LMP (HE15 - HE21)	796.39 $/MWh
Unit Dispatch Price	100 $/MWh	Total Hours	7 hours
		Net Energy Margin	$ 1,949,900

Hourly Real-time LMP
ISO New England Hub (Node 4000), $/MWh

HE	3-Sep
1	29.04
2	27.43
3	26.37
4	26.99
5	27.00
6	29.15
7	26.51
8	25.90
9	36.29
10	56.80
11	59.43
12	56.74
13	63.77
14	75.53
15	220.22
16	574.61
17	1123.86
18	2454.57
19	787.74
20	241.43
21	172.32
22	68.63
23	44.75
24	47.11

PfP Payment Rate	2,000 $/MWh
CSC Duration	2.5833 Hours
Actual Capacity Provided	400
PfP Performance Credit	$ 2,066,667