December 2, 2021

BY ELECTRONIC FILING

The Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

RE: **ISO New England Inc., Informational Filing on Fuel Security Reliability Review for the Fifteenth Forward Capacity Auction; Docket No. ER21- -000**

Dear Secretary Bose:

Pursuant to the December 3, 2018 order of the Federal Energy Regulatory Commission (the "Commission") in Docket Nos. ER18-2364-000 and EL18-182-000,[1] ISO New England Inc. (the "ISO")[2] hereby submits this informational filing to assess the study triggers, study assumptions, and study scenarios utilized by the ISO in performing its fuel security reliability review for the fifteenth Forward Capacity Auction ("FCA 15") in comparison to the actual conditions experienced during the 2020-2021 winter months. Per the December 2018 Order,[3] this is the third and final fuel security reliability review. Further, as the Commission explained in the December 2018 Order, "this filing will be

[1] *Order Accepting Compliance Filing and Requiring Informational Filings*, 165 FERC ¶ 61,202 (2018) ("December 2018 Order").

[2] Capitalized terms used but not defined in this filing are intended to have the meaning given to such terms in the ISO New England Inc. Transmission, Markets and Services Tariff (the "Tariff"), the Second Restated New England Power Pool Agreement, and the Participants Agreement. Market Rule 1 is Section III of the Tariff.

[3] *See* December 2018 Order at P 1 (directing the ISO to submit information filings on fuel security for the three Forward Capacity Market auction cycles for which the fuel security reliability rules are to be in place, which are FCAs 13, 14 and 15).

for informational purposes and will not be noticed for comment or subject to Commission order."[4]

As more fully described below, like the prior two winters, the 2020-2021 winter was warmer than average and mild, as compared to the winter of 2014-2015 used in the base modeling assumptions for the fuel security review. During the winter of 2020-2021, the region did not experience sustained periods of well-below normal temperatures. While New England has benefitted from milder winters, well-documented energy security risks remain a threat to the reliability of the electric system in New England, and increasingly unpredictable and extreme weather events will further expose the system's vulnerabilities to that risk.[5]

New England faces increased energy security risks, especially during extreme and long-lasting weather events, as the resource mix continues transitioning from resources capable of providing energy on-call in real-time to resources reliant on just-in-time fuel/energy sources. In the future, with climate change driving the clean energy transformation and the potential for more frequent extreme (potentially, colder) weather, the region could face increased, yet-to-be assessed, energy adequacy and system failure risks under adverse conditions. These risks could unfold from the potential simultaneous loss of gas-fired and renewable generation during extreme cold weather, as recently experienced in Texas, and could be exacerbated further by the potential loss of large single sources as a result of contingencies (*e.g.*, a nuclear facility; the Hydro-Quebec Phase II HVDC transmission facility; LNG facilities). That, coupled with increased demand from the future electrification of the heating and transportation sectors, could result in greater energy shortfalls (*i.e.*, insufficient energy available to meet electricity demand and maintain reserves) when grid operating challenges arise, such as extended cold weather during periods of high demand.

While these tail risk events are, by definition, "infrequent," their operational impacts must be adequately assessed and understood to allow the region to determine what steps it wants to take to maintain reliability in these operating conditions. Therefore, ISO-NE will be discussing with stakeholders approaches to studying the region's tail risks related to extreme weather events in 2022.[6] That study process will focus, initially, on understanding the modeling approaches to quantifying such risks and, subsequently, on understanding if and how the region should protect against the risks. Coming out of this study, ISO-NE will assess whether there is a need to develop market-based reliability

---

[4] December 2018 Order at P 39 n 72.

[5] *See* ISO New England Inc. Presentation to NEPOOL Participant Committee, *NEPOOL Participant Committee Report* at 15-20 (Nov. 3, 2021), https://www.iso-ne.com/static-assets/documents/2021/11/november-2021-coo-report.pdf.

[6] ISO New England Inc., *ISO New England's 2022 Annual Work Plan* at 9 (Oct. 8, 2021), https://www.iso-ne.com/static-assets/documents/2021/10/2022_awp_final_10_08_21.pdf ("2022 Annual Work Plan").

approaches. ISO-NE is looking to ensure that enough flexible supply is available each day to manage uncertainties in an increasingly energy-limited power system.

Because winter weather conditions significantly change from year-to-year, it is not prudent to draw conclusions about the region's energy adequacy risks from the fuel security review for the 2020-2021 winter.

I. DESCRIPTION OF THE FILING PARTY; COMMUNICATIONS

The ISO is the private, non-profit entity that serves as the regional transmission organization ("RTO") for New England. The ISO operates the New England bulk power system and administers New England's organized wholesale electricity market pursuant to the Tariff and the Transmission Operating Agreement with the New England Participating Transmission Owners. In its capacity as an RTO, the ISO has the responsibility to protect the short-term reliability of the New England Control Area and to operate the system according to reliability standards established by the Northeast Power Coordinating Council ("NPCC") and the North American Electric Reliability Council ("NERC").

All correspondence and communications in this proceeding should be addressed to the undersigned for the ISO as follows:

Graham Jesmer, Esq.*
ISO New England Inc.
One Sullivan Road
Holyoke, MA 01040-2841
Tel: (413) 540-4557
Fax: (413) 535-4379
E-mail: gjesmer@iso-ne.com

*Persons designated for service

II. INTRODUCTION

The December 2018 Order accepted the ISO's compliance filing of Tariff provisions that address a fuel security reliability evaluation the ISO is to perform for three Forward Capacity Auctions—FCAs 13, 14, and 15. Pursuant to these provisions, the ISO is to assess whether a resource that has submitted a Forward Capacity Market bid to retire from the wholesale markets must be retained by the ISO to address the region's fuel security needs.[7] The rules, in question were intended to be in place on a temporary basis so the ISO could fully assess and implement Tariff changes to address fuel security needs through market mechanisms. The rules require the ISO to perform a fuel security study for any resource that submits a retirement bid, using a fuel security model that assesses the impact of the retirement on the ISO's ability to reliably operate the bulk power system under stressed winter conditions. If, under the modeled scenarios, either of two Tariff-defined trigger conditions occur, the ISO is required to retain the resource for fuel security.

In accepting the ISO's proposed fuel security reliability review rules, the Commission noted that the process is newly developed, is based on a number of assumptions, and may need to be modified as the ISO develops additional experience.[8] It therefore directed the ISO to submit an annual informational filing as follows:

> We recognize that the Fuel Security Study process, performed over the planning horizon, is a newly developed process, is based upon a number of assumptions, and is not addressed by the NERC Reliability Standards. As ISO-NE gains additional information and experience, we expect that the study assumptions, methods, scenarios, and triggers may need to be further refined and updated. We also note that, as discussed below, the Fuel Security Study process may be necessary to evaluate the impact of retiring resources on regional fuel security beyond FCA 15. In light of this potential future need for the proposed process, we direct ISO-NE to submit an annual informational filing regarding the applicability of its study triggers, study assumptions, and study scenarios compared to actual experiences, starting with the winter of 2018/19. Specifically, following the winter, we direct ISO-NE to submit an informational filing comparing the study assumptions and triggers from the modeling analysis to actual conditions experienced in the winter of 2018/19. The informational filing should also include a

---

[7] *ISO New England Inc.*, Compliance Filing to Establish a Fuel Security Reliability Standard, Short-Term Cost-of-Service Mechanism, and Related Cost Allocation for Out-of-Market Compensation, Docket Nos. EL18-182-000 and ER18-2364-000 (filed August 31, 2018) ("Fuel Security Reliability Standard Filing"). Mr. Brandien's testimony included with the Fuel Security Reliability Standard Filing is referred to herein as the "Brandien Testimony." The Tariff provisions for the fuel security reliability review are contained in a new Section III.13.2.5.2.5A to the Forward Capacity Market rules, and the trigger conditions are defined in a new Appendix L to Market Rule 1. In addition, the set of scenarios and assumptions used in the fuel security study are detailed in Appendix I of the ISO's Planning Procedure No. 10 (referred to herein as "Appendix I"). The version of Appendix I used in the FCA 14 fuel security reliability review is available at https://www.iso-ne.com/static-assets/documents/2020/02/pp-10.pdf.

[8] December 2018 Order at P 39.

> description of lessons learned, and explain if changes to study assumptions and triggers are necessary for future studies.[9]

The Commission noted in a footnote that "this filing will be for informational purposes and will not be noticed for comment or subject to Commission order."[10]

III. OVERVIEW OF THE FCA 15 FUEL SECURITY RELIABILITY REVIEW INFORMATIONAL FILING

The fuel security reliability review is designed to examine the system response to the retirement of an existing resource during extended cold weather conditions when the region's fuel delivery mechanisms are under significant stress. For this reason, the fuel security reliability review is performed using data inputs from the winter of 2014-2015, during which New England experienced a series of extended cold weather that would ultimately stress the capability of the natural gas pipeline system and the availability of stored fuels. The model is therefore very sensitive to changes in weather conditions, as the large majority of inputs are directly impacted by winter weather patterns, including temperatures, precipitation, sun profiles, and wind profiles. Because winter weather conditions change significantly from year-to-year, drawing conclusions about the methodology employed for the fuel security reliability review from any single year of winter weather conditions is not prudent, unless there is clear evidence of a significant underlying concern with the methodology that is highlighted by a particular winter weather pattern during the winter under review.

The 2020-2021 winter was warmer than average and mild (approximately five degrees warmer on average) in comparison to the severe winter of 2014-2015 used in the base modeling assumptions for the fuel security reliability review. As is explained in more detail below, there were few notable occurrences of cold winter weather during the winter of 2020-2021, and New England did not experience any sustained periods of well-below-normal temperatures. As a result, no fuel constraints were experienced that raised reliability concerns. It is therefore not prudent to draw significant conclusions about the fuel security reliability review methodology from the 2020-2021 winter.

In the remainder of this informational filing, the ISO presents data on the inputs and triggers used for the FCA 15 fuel security reliability review, and compares that to data from the winter of 2020-2021 winter. Few conclusions can be drawn from this comparison regarding the fuel security reliability review methodology.

---

[9] *Id*.

[10] *Id*. at P 39 n 72.

To provide context, however, the filing begins with an overview of the review process and a discussion of the actual conditions experienced during the 2020-2021 winter.

IV. DEVELOPMENT OF STUDY ASSUMPTIONS AND STUDY SCENARIOS FOR THE FUEL SECURITY RELIABILITY REVIEW

The fuel security reliability review is a 90-day winter energy analysis that is designed to examine an entire winter season (December, January, and February) using pre-defined scenarios that assess the system response to the retirement of an Existing Generating Capacity Resource.[11] The methodology and assumptions are largely detailed in Appendix I to the ISO's Planning Procedure No. 10.[12] The pre-defined scenario cases consist of three Liquified Natural Gas ("LNG") supply cases, each comprising six different scenarios, for a total of 18 scenario cases.[13] The LNG supply cases represent different maximum levels of daily LNG injections, and each scenario within an LNG supply case accounts for varying levels of electricity imports and dual-fuel resource fuel inventories.[14]

The review utilizes a number of static input assumptions defined in Appendix I. These include: peak load, winter energy profile, Local Distribution Company ("LDC") gas demand, pipeline capacity, satellite LNG facility vaporization, oil-only inventory levels, resource seasonal claim capability, installed PV forecast and sun profiles, wind resource nameplate values and wind profiles (onshore and offshore), demand response resource capacity values, equivalent forced outage rate on demand ("EFORd"), estimated hourly MW relief for each action of the ISO's Operating Procedure No. 4 (actions taken during a capacity deficiency event),[15] exports, pumped storage levels, and conventional hydro-electric generation capacity.

Many values assigned to the static input assumptions are established using data from the 2014-2015 winter. The ISO used the 2014-2015 winter because, while that winter did not include the coldest days recorded in the past ten years, it had the most sustained consecutive cold days as measured by heating-degree days. This provided a wider perspective on the cumulative use of oil and LNG inventories over the 90-day winter period, and the need to replenish those inventories as cold weather persists.

---

[11] Fuel Security Reliability Standard Filing, transmittal letter at p. 7.

[12] *See* Appendix I.

[13] Fuel Security Reliability Standard Filing, transmittal letter at p. 7.

[14] *Id.*, transmittal letter at p. 8 and Brandien Testimony at p. 8.

[15] ISO New England Operating Procedure No. 4, Action During A Capacity Deficiency ("OP-4"), *available at* https://www.iso-ne.com/static-assets/documents/rules_proceds/operating/isone/op4/op4_rto_final.pdf.

Several static input assumptions are also established using data from the target Capacity Commitment Period. For example, while the hourly electricity demand profile is based on the 2014-2015 winter, this demand is adjusted to reflect the 90/10 peak load forecast for the winter period of the target Capacity Commitment Period. Therefore, the fuel security reliability review for the winter associated with FCA 15 used the projected winter peak load of 20,613 MW for the 2024-2025 Capacity Commitment Period.[16]

Finally, some static inputs are based on current data, and are to be adjusted annually to reflect updated data.

V. ACTUAL CONDITIONS EXPERIENCED IN 2020-2021 WINTER

Overall, the 2020-2021 New England winter was milder than the 2019-2020 winter, and New England did not experience any arctic outbreaks or sustained periods of well-below-normal temperatures. As a result, no fuel constraints were experienced that raised any reliability concerns.

The 2020-2021 average winter temperature in New England was 30.6 °F, which was 1.8° F above normal, consistent with the National Oceanic and Atmospheric Administration's seasonal outlook of above normal temperatures. A monthly temperature breakdown showed that both December (+2.3° F) and January (+3.3° F) averaged above normal, but February was slightly below normal at -0.4° F. There were two short periods of notably cold temperatures during the season. The first occurred between December 16 and 19, where over that four-day stretch the average New England temperature was 10° F below normal. The second occurred between January 29 and 31, when average temperatures were below normal by 14.3° F, 13.1° F, and 13.7° F on each day, respectively, with January 29 registering as the coldest single day of the winter.

New England (8-City weighted) experienced above-average precipitation for the 2020-2021 winter, at 1.0" above normal. Above normal snowfall was observed throughout the region with 45.3" being reported, 8.5" above the average of 36.8".

The 50/50 and 90/10 winter peak demand forecast for 2020-2021 was 20,166 MW and 20,806 MW, respectively. Actual winter peak demand was 18,756 MW on December 17, 2020.

The total seasonal LNG injections scheduled to the pipelines were slightly higher than the previous five winters.[17] Excelerate did not dock a ship at the offshore buoy this

[16] The 90/10 peak load value is adjusted to net out the impacts of projected Energy Efficiency. The load values are taken from the most recent Capacity, Energy, Loads and Transmission Report ("CELT Report") published by the ISO.

[17] LNG injections are from the Canaport LNG terminal in New Brunswick, the Excelerate buoy connected to the underwater Algonquin Hubline, and the Distrigas facility in Everett, MA. The LNG injections for the 2020-2021 winter were slightly above the average over the prior five winters but less than the base model winter of 2014-2015.

winter, so all LNG was from land-based facilities. As discussed below, there was an increase in gas demand from the previous winter.

Fuel inventories and potential emissions restrictions for oil, coal and natural gas-fired resources were monitored throughout the winter via weekly surveys. Oil-fired resources entered the winter in December 2020 with tanks filled to approximately 58%, which was marginally greater than tank levels at the start of the prior winter. With the mild winter weather, oil resources were rarely in merit and ran infrequently. They ended the winter with tanks approximately 55% full. Some minor replenishment was reported but its impact was de minimis.

The generation fleet generally performed well throughout the winter. The lowest observed capacity margin during the winter was a 500 MW (approximate) surplus on January 24, 2021. The ISO did not make any supplemental out-of-market commitments for fuel security at any point during the winter.

For the winter of 2018-2019, the ISO implemented enhancements to its offer requirements to more easily allow generators to include fuel-related opportunity costs in their energy market supply offers. The ISO also implemented a weekly 21-day energy assessment forecast that provided participants with a rolling forecast of system conditions and forecasted energy surpluses, which afforded participants an opportunity to take action to procure fuel in advance of a forecasted energy deficiency. Due to the mild 2020-2021 winter conditions, there was minimal utilization of the opportunity cost mechanism (two generators, each with capacities ≤ 5 MW took advantage of the mechanism between February 6th and February 12th). Furthermore, the weekly 21-day energy assessment forecast did not produce any forecasted energy deficiencies; the minimum forecasted energy surplus for the winter was 9,667 MW on January 29th, 2021, which was reflected on the January 26th 21-day energy assessment forecast.

VI. COMPARISON OF STATIC INPUTS USED IN FCA 15 FUEL SECURITY RELIABILITY REVIEW TO ACTUAL 2020-2021 WINTER CONDITIONS

This section VI explains the static input assumptions used for the FCA 15 fuel security reliability review and, for comparison, provides data for each assumption from the 2020-2021 winter. As noted above, for the large majority of assumptions no conclusions are drawn from the comparison; winter 2020-2021 was a mild winter by comparison to the more severe winter that the fuel security reliability review attempts to model. Furthermore, it is difficult to draw conclusions from experience in a single winter.

1. Peak Load and Winter Energy Profile

Appendix I requires that the fuel security reliability review use the 90/10 winter peak load (after taking into account the effect of energy efficiency) for the relevant Capacity Commitment Period, as specified in the most recently available draft Capacity, Energy, Loads, and Transmission ("CELT") Report that is available at the time the review is performed.[18] This value, along with the hourly system demand from the 2014-2015 winter, is used to create an hourly winter load shape comprising the ratio of the CELT peak load for the relevant Capacity Commitment Period to the 2014-2015 winter peak load.[19]

For the FCA 15 fuel security reliability review, the ISO utilized a 90/10 winter peak load value of 20,613 MW for the 2024-2025 Capacity Commitment Period, which was the value presented to the Planning Advisory Committee in April of 2020.[20] The actual peak load for the 2020-2021 winter was 18,756 MW, which occurred on Thursday, December 17, 2020.

The table below compares the winter demand profiles in MWh using the demand profile of winter 2014-2015 (*i.e.*, the profile used in the FCA 15 fuel security reliability review) and the demand profile of winter 2020-2021, both scaled for the projected 90/10 load of 20,613 MW for the 2024-2025 winter. Due to the more stressed conditions during the 2014-2015 winter, the electrical demand based on the demand profile from the winter of 2014-2015 is approximately 3,015,000 MWh higher than the electrical demand based on the 2020-2021 winter profile.

	Using 2014-2015 profile	**Using 2020-2021 profile**
Adjusted Electric Demand for 2024-2025	33,757,497 MWh	30,369,162 MWh

2. Fuel Supply Inputs

a. LDC Gas Demand

Under Appendix I, LDC peak gas demand for the FCA 15 analysis was modeled at 5.054 Bcf/day. This value is calculated using forecasted gas demand data, with growth adjusted to not exceed the addition of any new gas supply capacity, and with the gas

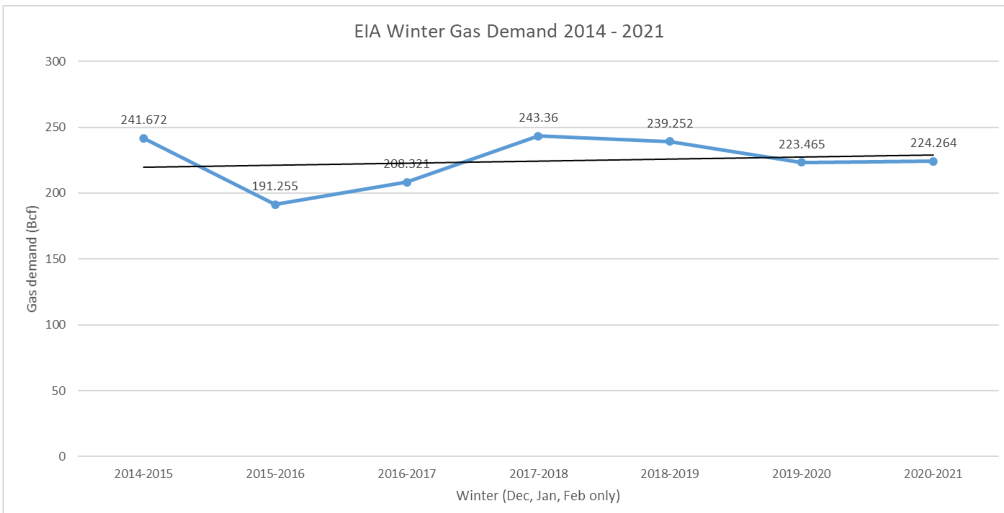
18 Appendix I, section 3.A.i.

19 Appendix I, section 3.A.ii.

20 Projected 90/10 winter peak load for the 2024-2025 winter from the 2020 CELT Load Forecast, *available at* https://www.iso-ne.com/static-assets/documents/2020/04/forecast_data_2020.xlsx.

demand capped at the value utilized in the prior year's fuel security reliability review (5.181 Bcf/day).[21]

As noted above and shown in the graph below, the overall gas demand during the 2020-2021 winter was lower than the previous winter, but was in line with the average demand for the last six winters. Increased pipeline capacity from incremental expansion projects[22] permit LDCs to utilize additional gas from pipelines rather than utilize gas being held in their satellite LNG tanks. The peak gas demand in the model, as reflected in the data from the United States Energy Information Administration ("EIA"), is for all local distribution company gas demand supplied from pipelines, along with local and remote LNG supplies to meet residential, industrial and commercial demands.



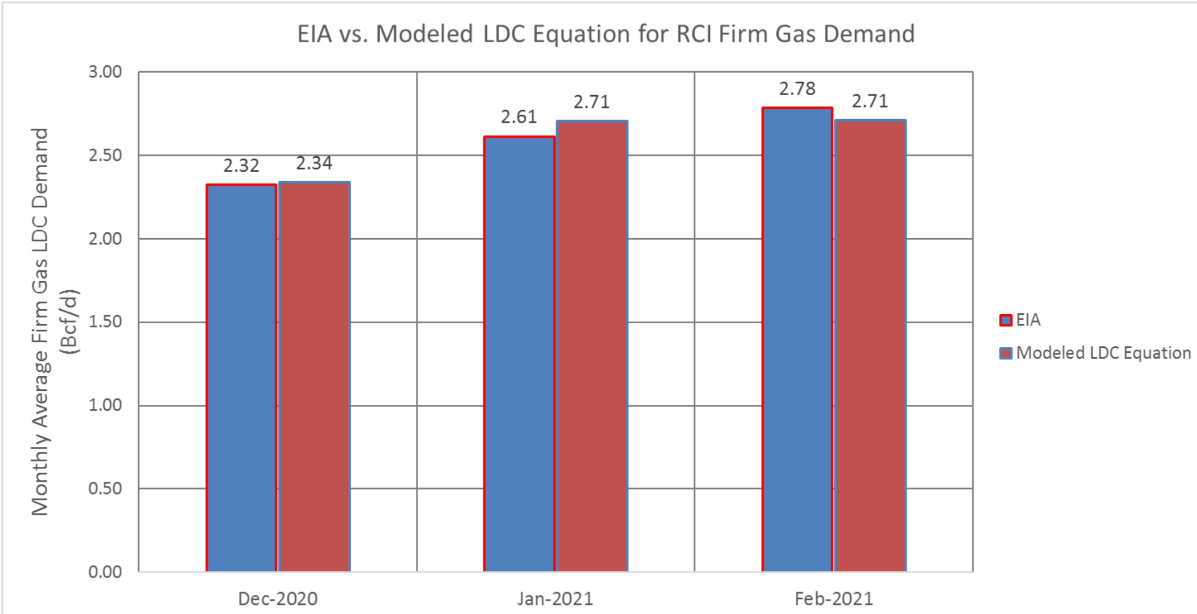
Nevertheless, as displayed below, the gas demand observed in the 2020-2021 winter from EIA[23] data is consistent with the LDC gas demand modeled for the FCA 15 fuel security reliability review using the methodology set forth in Appendix I. This comparison reinforces the established methodology for modeling LDC gas demand.

---

[21] Appendix I, section 3.A.iii.

[22] Three relatively small expansion projects which are currently in progress— Portland Xpress, Westbrook Xpress and Tennessee Gas Pipeline (TGP) Line 261 Upgrade—are scheduled to increase pipeline capacity by 0.18 Bcf/day to 4.03 Bcf/day within the next several years.

[23] The data from EIA was compiled from natural gas consumption data for the six New England states for the months of December 2020, January 2021, and February 2021, *available at* https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_m.htm.



b. Natural Gas Pipeline Capacity

Natural gas pipeline capacity is determined for the target Capacity Commitment Period based on vendor-supplied information that is updated annually.[24] For the FCA 15 fuel security reliability review, the ISO modeled 3.70 Bcf/day of natural gas pipeline capacity, which was established based on then-current index of customer data on firm pipeline capacity contracts and forecasted capacity expansions for each of the four New England pipelines (Algonquin Gas Transmission, Iroquois Gas Transmission, Portland Natural Gas Transmission, and Tennessee Gas Pipeline). The following explains how this value was determined:

- Data from the first quarter of 2019 on firm pipeline contracts indicates a total capacity into New England on existing pipelines of 3.85 Bcf/day.

- Relatively small expansion projects—Tennessee 261 Upgrade, Portland Xpress and Westbrook Xpress—to be in service before the FCA 15 Capacity Commitment Period, will increase pipeline capacity by 0.18 Bcf/day to 4.03 Bcf/day.

- There are 0.33 Bcf/day in firm contracts to Long Island, New York from the Algonquin Gas Transmission into Iroquois pipeline at the Brookfield, Connecticut interconnection. The ISO observed these flows to Long Island several prior winters.[25] Upon further evaluation, the ISO determined that 0.33 Bcf/day of

[24] Appendix I, section 3.0 "Natural Gas Assessment" and section 3.A.iv.

[25] The ISO also reevaluated flows from 2015-2020 as well, and observed the same flows to Long Island through New England.

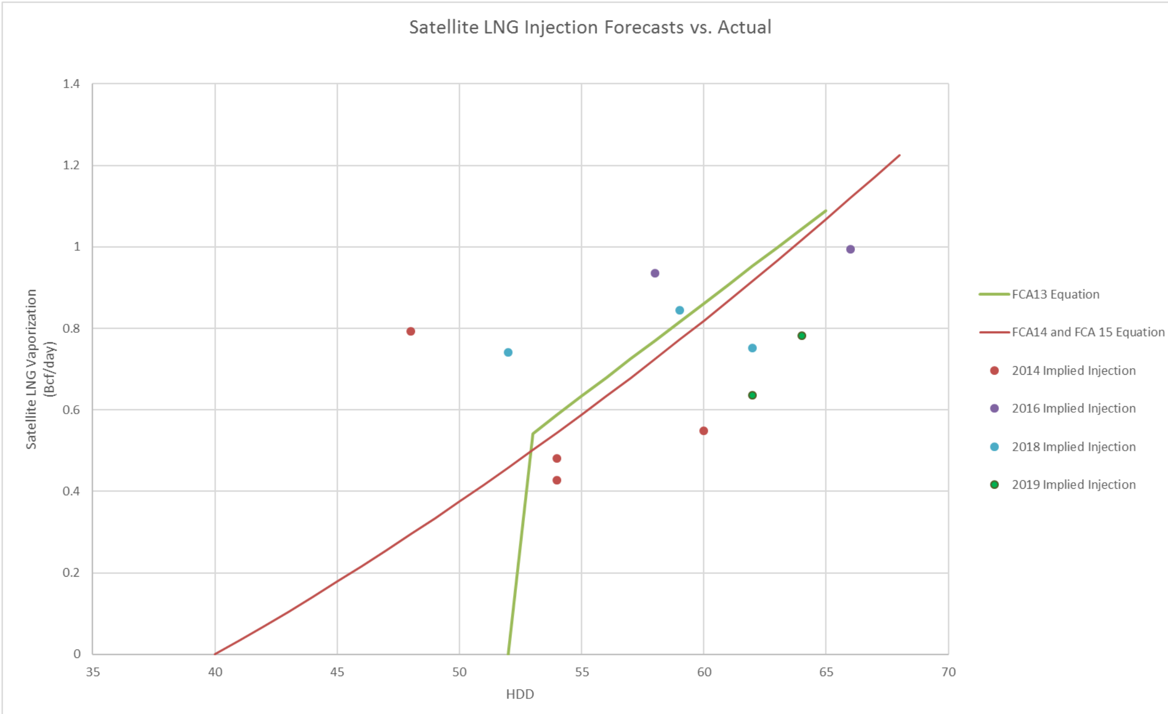
capacity must be netted from the capacity to New England to account for the firm contracts that have been in place since the 2008 Brookfield interconnection was brought into service.

c. Satellite LNG Facility Vaporization

The ISO does not have access to data that shows the amount of natural gas supplied in New England from the vaporization of LNG held by LDCs in smaller satellite storage facilities throughout New England. For the FCA 14 fuel security reliability review, the ISO charted the forecasted gas demand for the 2017-2018 winter, and compared that to the actual non-power gas demand for the 2017-2018 winter (demand data collected from publicly available bulletin boards).[26] This comparison produced a "gap" between the forecasted total gas demand and the actual non-power gas demand that grew as the heating degree days ("HDD") increased (*i.e.*, as temperatures dropped) in the winter. This "gap," or the difference between the two, provides a chart of the "implied" satellite LNG vaporization at each HDD. This data shows that satellite LNG vaporization begins when the HDD is approximately 40 (25 degrees Fahrenheit), and increases as temperatures drop. This same data—*i.e.*, the implied satellite LNG vaporization—was developed for the winters of 2014, 2016 and 2019, and plotted on a curve, which produces the following equation for determining satellite LNG vaporization for the FCA 14 analysis. The red line on the curve represents the satellite LNG facility vaporization rates, in MMBtus per day, at each HDD point as used in the FCA 15 fuel security reliability review.

$$\text{Satellite LNG Vaporization} = 0.4355*(\text{HDD})^2 - 3.113*(\text{HDD}) - 572.3$$

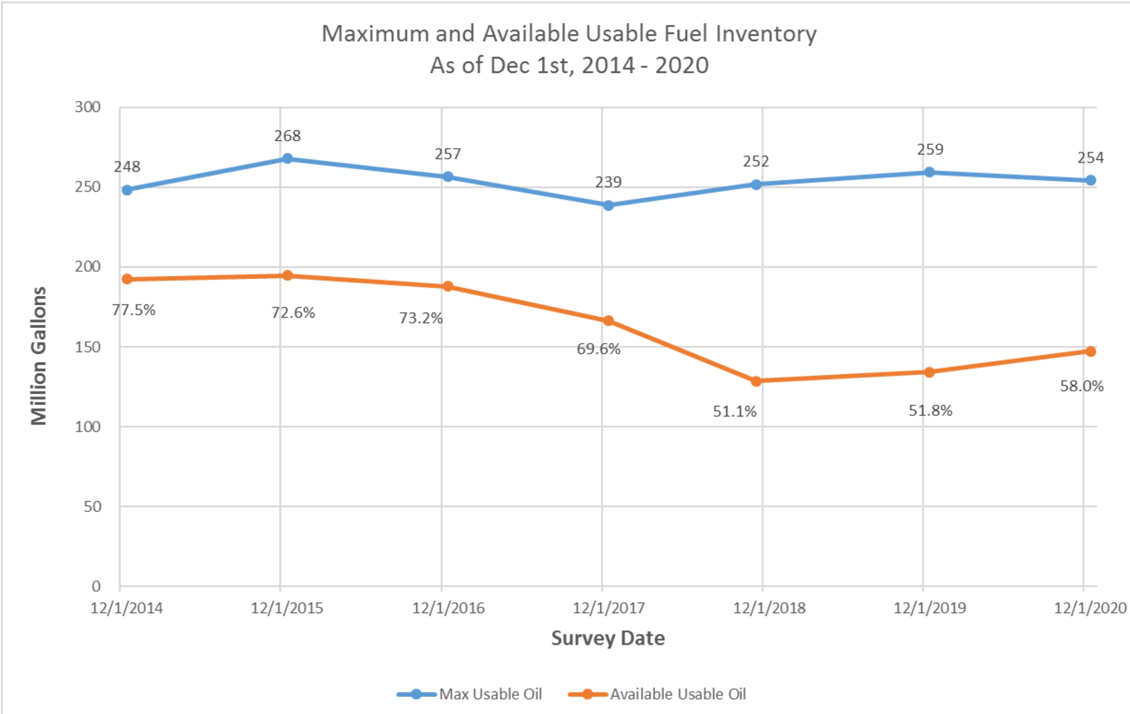
[26] *See* Appendix I, section 3.0 "Natural Gas Assessment."



d. Oil Unit Inventory and Replenishment Levels

Under Appendix I, oil unit inventory levels for oil-only resources and dual-fuel resources that operate primarily on oil during the winter are set using the December 2017 fuel survey results submitted to the ISO by participants with oil-fired generators.[27] Tank inventories are then replenished using a proxy rate of 202 barrels per hour (approximately one tanker truck per hour) when the reorder level is reached. The figure below shows the maximum fuel tank levels and the available fuel levels as reflected in the December fuel survey results provided for the last four years. For the FCA 15 fuel security reliability review, inventory levels were set at 69.6 percent of the maximum inventory levels, as reflected in the December 2017 fuel survey results.

[27] *See* Appendix I, section 3.A.vi and ISO New England Operating Procedure No. 21, Energy Inventory Accounting and Actions During an Energy Emergency, Appendix A, *available at* https://www.iso-ne.com/static-assets/documents/rules_proceds/operating/isone/op21/op21a_rto_final.pdf.



For FCA 15, Appendix I requires the use of the December 2017 fuel survey results, and not the updated December 2020 fuel survey results, in order to account for possible increases in oil inventories due to participation in the ISO's Inventoried Energy Program.[28] That program will provide incremental compensation to resources—including oil-fired resources—that maintain inventoried energy during cold periods when winter energy security is most stressed. To reflect the potential participation in this program by oil-fired units, the ISO modeled oil inventories for the FCA 15 fuel security reliability review using the oil inventory level recorded for December 2017—the last year of the ISO's winter reliability program that compensated resources for maintaining fuel

[28] *ISO New England Inc.*, Inventoried Energy Program, Docket No. ER19-1428-000 (filed March 25, 2019). The Inventoried Energy Program was accepted by the Commission by operation of law, *see* Notice of Filing Taking Effect by Operation of Law, Docket No. ER19-1428-001 (Aug. 6, 2019). Following a denial of rehearing by operation of law, *see* ISO New England Inc., 169 FERC ¶ 61,013 (2019), several parties appealed the Commission's orders to the United States Court of Appeals for the District of Columbia ("D.C. Circuit"). *See Belmont Mun. Light Dep't v. FERC* (D.C. Circuit), Case Nos. 19-1224 *et al.* The D.C. Circuit subsequently granted a request from the Commission for a voluntary remand of its order, *see* Belmont Mun. Light Dep't v. FERC (D.C. Circuit), Case Nos. 19-1224 (Apr. 21, 2020), following which the Commission issued an order on the merits accepting the Inventoried Energy Program, *see* Order Accepting Tariff Revisions, 171 FERC ¶ 61,235 (2020). The Commission subsequently denied rehearing requests by operation of law, *see* Notice of Denial of Rehearing Requests by Operation of Law, Docket No. ER19-1428-004 (August 20, 2020).

during the winter months.[29] While the terms of the two programs are not the same, the higher oil levels reflected in the December 2017 inventory data are a reasonable estimation of inventory levels for FCA 15 given the additional compensation that both programs provide, as compared with the oil inventory data from the 2018-2019 winter where no additional compensation program was in place.

Replenishment is modeled at 202 barrels per hour (approximately one tanker truck per hour). The mild 2020-2021 winter did not require the oil-fired resources to replenish on a frequent basis because these resources operated very infrequently. During the winter of 2020-2021, the ISO observed 2.6% replenishment of maximum capability due to the mild conditions. Given the mild winter conditions, operating experience from the winter of 2020-2021 does not provide a basis for changing the replenishment methodology used in the fuel security reliability review.

3. Resources Available For Dispatch

a. Resource Seasonal Claimed Capability Values

Resource capability values are established using the winter Seasonal Claimed Capability ("SCC") values from the most recently published CELT Report for all Existing Generating Capacity Resources qualified for the instant FCA and energy-only resources active in the ISO markets. For non-commercial Existing Generating Capacity Resources that are not in the CELT Report, the fuel security reliability review uses the resource's winter Qualified Capacity value.[30]

The following table shows the winter SCC values of resources by generation type for FCAs 14 and 15, as well as columns for the differences between the two values and the reason for the change. This data is from the May 2019 (for FCA 14) and May 2020 (for FCA 15) CELT Reports, supplemented where necessary with winter Qualified Capacity values per the requirements of Appendix I.

Generation	FCA 15 Total (MW)	FCA 14 Total (MW)	Updates (MW)	Details on changes
Nuclear	3,347	3,343	4	SCC Adjustments

[29] Market Rule 1, Attachment K, Winter Reliability Solutions for 2015-2016, 2016-2017 and 2017-2018.

[30] Appendix I, section 3.A.vii. In accordance with Appendix I, energy-only generators (*i.e.*, those without a Capacity Supply Obligation in the capacity market) that are not in the CELT Report are modeled using the resource's winter Seasonal Claimed Capability value.

Pump Storage	1,852	1,785	67	Resource Uprate, SCC Adjustments
Hydro	1,647	1,586	61	SCC Adjustments
Natural Gas Only	9,305	7,779	54	SCC Adjustments
Combined Cycle Dual-Fuel	9,307	9,334	(27)	SCC Adjustments
Coal	439	535	(96)	Retirements
LNG Only (Mystic 8&9)	1,693	1,700	(7)	SCC Adjustments
Oil Units	5,263	7,103	(1,840)	Retirements, SCC Adjustments
Bio/Refuse	913	989	(76)	Retirements, SCC Adjustments

b. Photovoltaic Forecast and Sun Profile

Under the Appendix I requirements, the photovoltaic forecast for the target Capacity Commitment Period is established using the PV Forecast-Nameplate values for the year of analysis, as calculated from the draft CELT Report that is presented to stakeholders in the spring of the year when the reliability review is being performed, adjusted to account for capacity factors generated from the 2014-2015 sun profile.[31] In addition, in service PV resources that are not reflected in the draft CELT Report, as well as non-commercial PV resources that will be in service for the target winter but are also not in the draft CELT Report, are modeled using their nameplate values.[32]

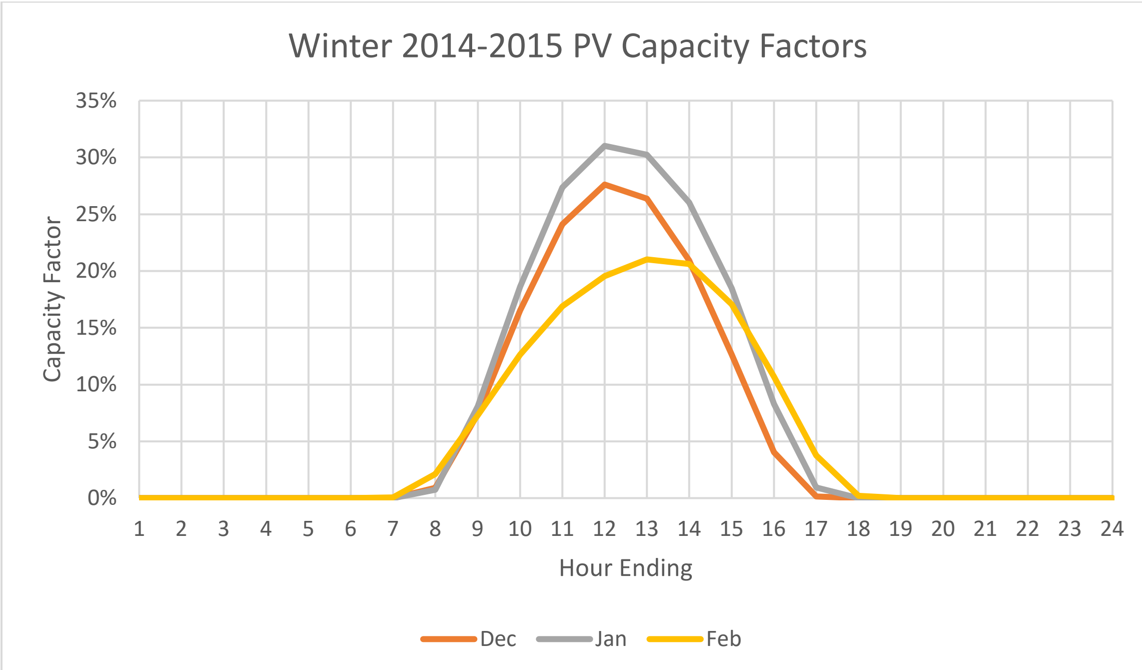
For FCA 15 the ISO modeled 6,153.3 MW of photovoltaic resources, which was the nameplate value of the forecasted PV resources for the 2024-2025 winter included in the final 2020 PV Forecast, published in April, 2020.[33]

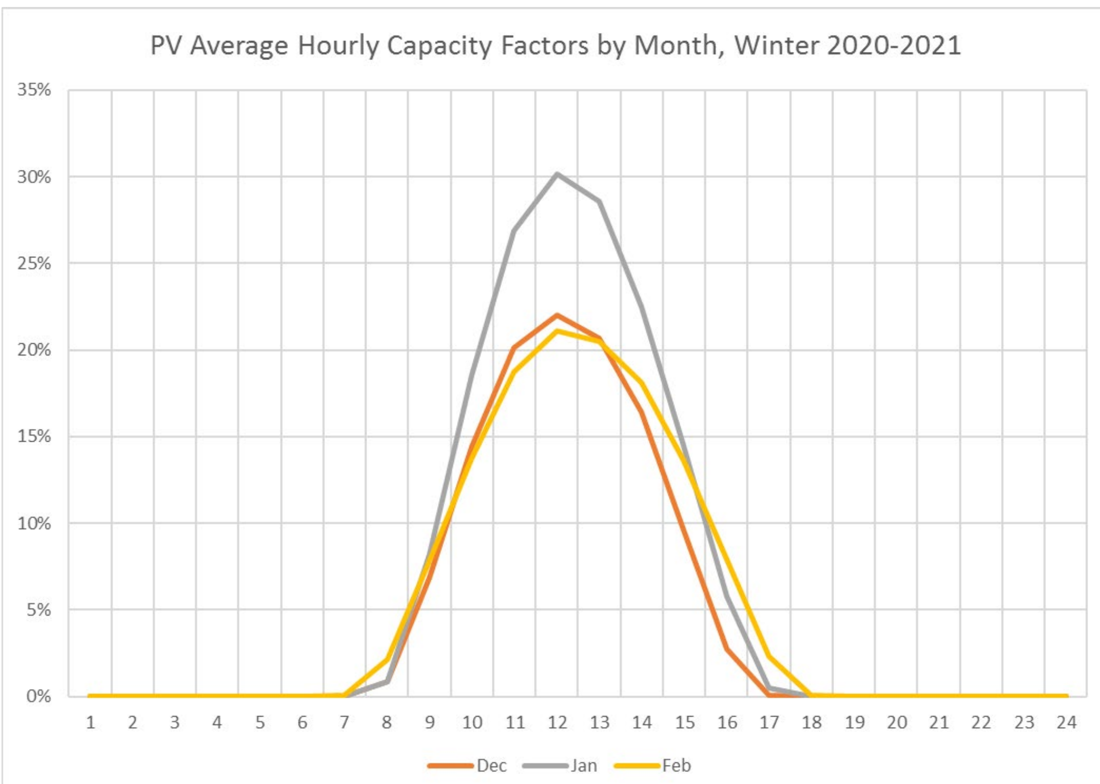
The 2014-2015 sun profile values are graphed directly below, and then are compared to the sun profile observed for the 2020-2021 winter in the graph that follows.

[31] *See* Appendix I, sections 3.A.viii and 3.A.x.

[32] *Id*.

[33] *See* Appendix I, section 3.A.viii.





The PV resources generally performed at a somewhat higher capacity factor in 2020-2021 than under the modeled scenario for the FCA 15 fuel security review due to differences in the sun profiles between the two winters modeled. These differences simply reflect variations in sun profiles between the two winters and are not indicative of winter weather conditions that warrant changes to the manner in which PV resources are modeled for purposes of performing the FCA 15 fuel security reliability.

c. Onshore and offshore wind capacity values and wind profiles

The capacity values for onshore and offshore wind resources are established using the nameplate values of the wind resources for the modeled Capacity Commitment Period from the most recently available CELT Report, with the capacity factors determined using the 2014-2015 onshore and offshore wind profiles.[34] In addition, in service wind resources that are not reflected in the draft CELT Report are modeled using the nameplate values for the resources, and non-commercial wind resources that will be in service for the target winter but are also not in the draft CELT Report are modeled using the nameplate equivalent of the resource's Capacity Supply Obligation received in the most recent Forward Capacity Auction.[35]

For the 2024-2025 Capacity Commitment Period associated with FCA 15, the aggregate nameplate value is 1,524 MW for onshore wind and 1,533 MW for offshore wind.[36] For comparison, for the winter of 2020-2021, the nameplate capacity of onshore and offshore wind resources was 1,361 MW and 29.25 MW respectively.[37] As these numbers reflect, the region is anticipating a significant increase in offshore wind resource capacity during the next several years.

The onshore and offshore hourly wind profiles for the 2014-2015 winter as used in the FCA 15 fuel security reliability review are graphed below. For comparison, immediately below each wind profile used for the FCA 15 fuel security reliability review, a second graph contains the winter monthly capacity factors using the 2019-2020 winter wind capacity factor data.

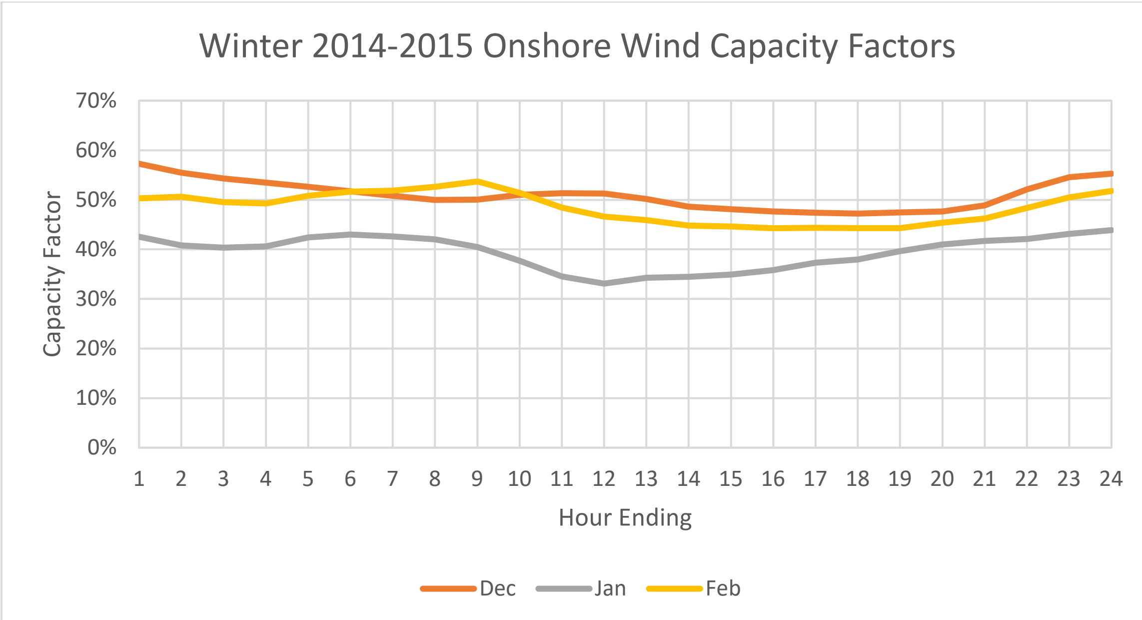
---

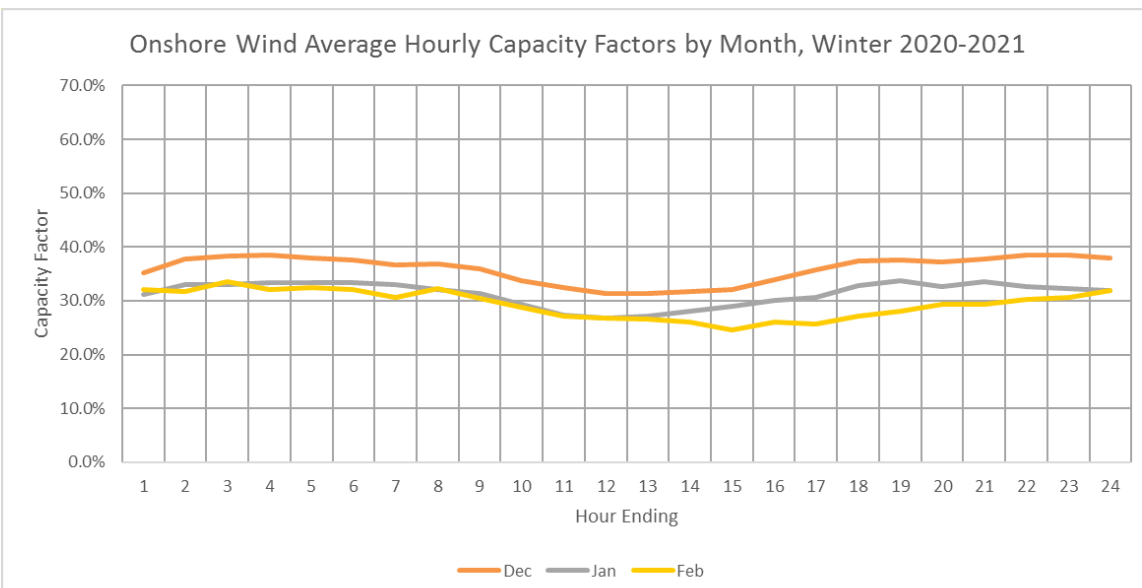
[34] *See* Appendix I, sections 3.A.ix, 3.A.xi and 3.A.xii.

[35] *Id*.

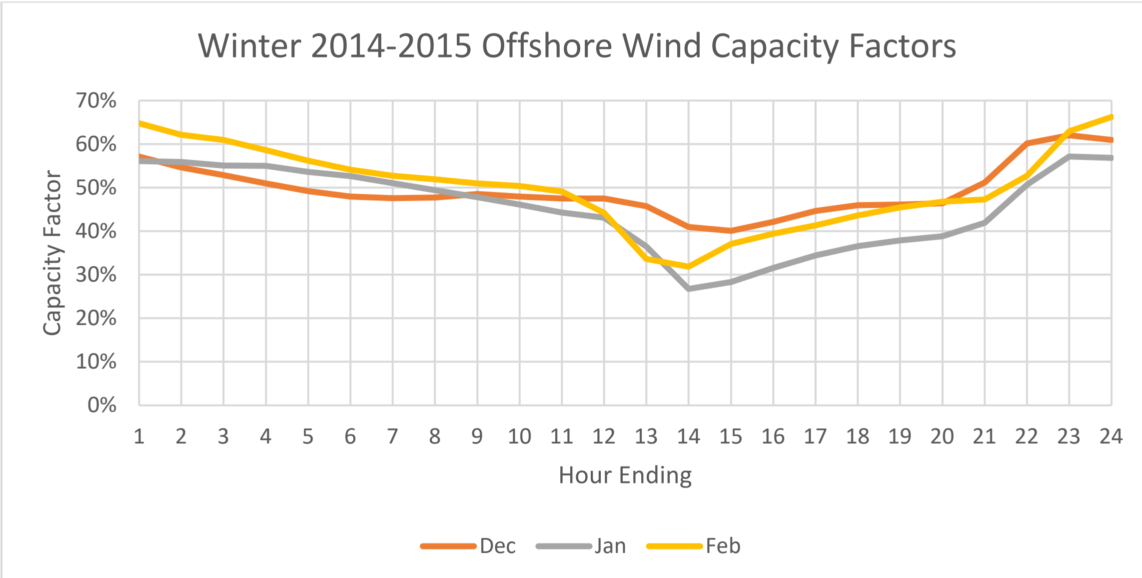
[36] Additional onshore and offshore wind capacity based on contractual commitments and clearing in FCA 14 are addressed in section VI.4.b below.

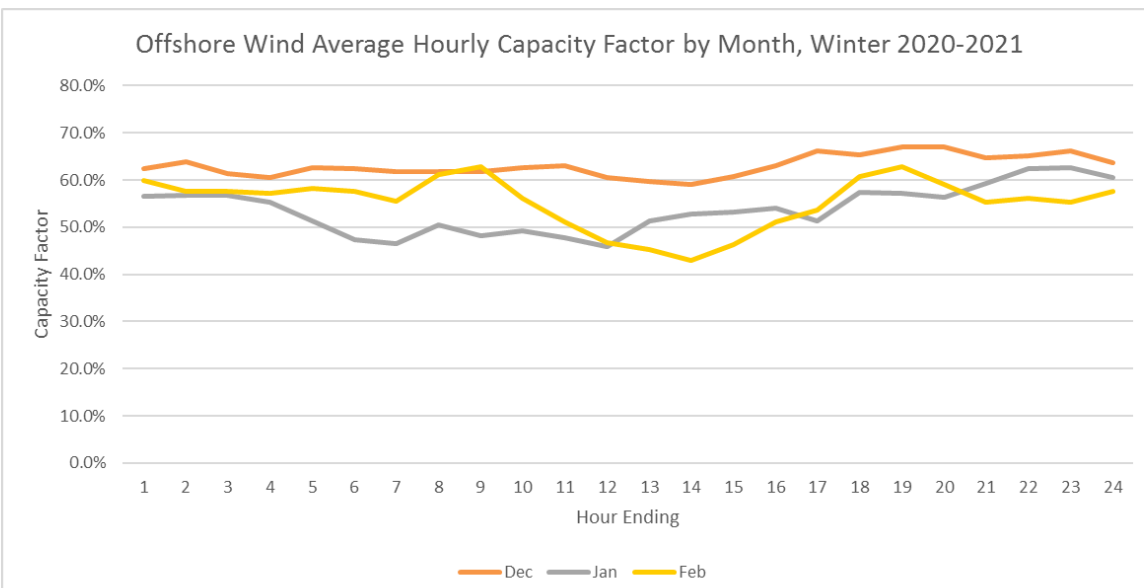
[37] *See* the 2021 CELT Report, Generator List data, *available at* https://www.iso-ne.com/static-assets/documents/2021/04/2021_celt_report.xlsx.





The onshore wind resource fleet performed, on average, at a lower capacity factor during the winter of 2020-2021 than did the fleet modeled for the FCA 15 fuel security reliability review using the winter 2014-2015 onshore wind profile. This is a result of differences in the wind profiles resulting from variations in weather conditions between the two winters, and does not warrant changes to the manner in which wind resources are modeled for purposes of performing the FCA 15 fuel security reliability review.





The offshore wind profile from winter 2014-2015, which was used in the FCA 15 fuel security reliability review, shows a dip in wind speeds during the middle of the day for each of the three winter months. While the two sets of profiles are driven by different weather conditions, they are largely consistent and support the manner in which offshore wind is being modeled in the fuel security reliability reviews.

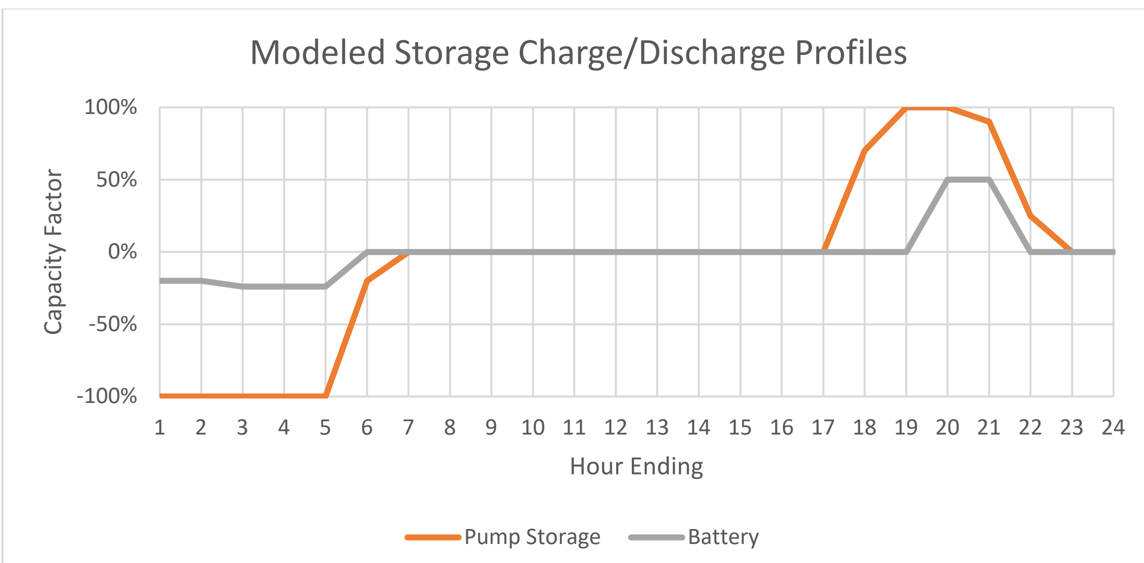
d. Demand Response Resources

Demand Response Resources are modeled in the reliability review based on their current winter Seasonal Claimed Capability capacity values.[38] For FCA 15, 388 MW of active Demand Response Resources were modeled in the fuel security reliability review, because this represented the capability of the active Demand Response Resources that were available to System Operators in the prior (*i.e.*, 2019-2020) winter for dispatch.

The Seasonal Claimed Capability of Demand Response Resources varied throughout the 2020-2021 winter (starting the winter at 378 MW and ending at 416 MW). for the winter of 2020-2021; these resources performed in accordance with ISO dispatch instructions when called upon.

e. Pumped Storage and other Electric Storage Devices

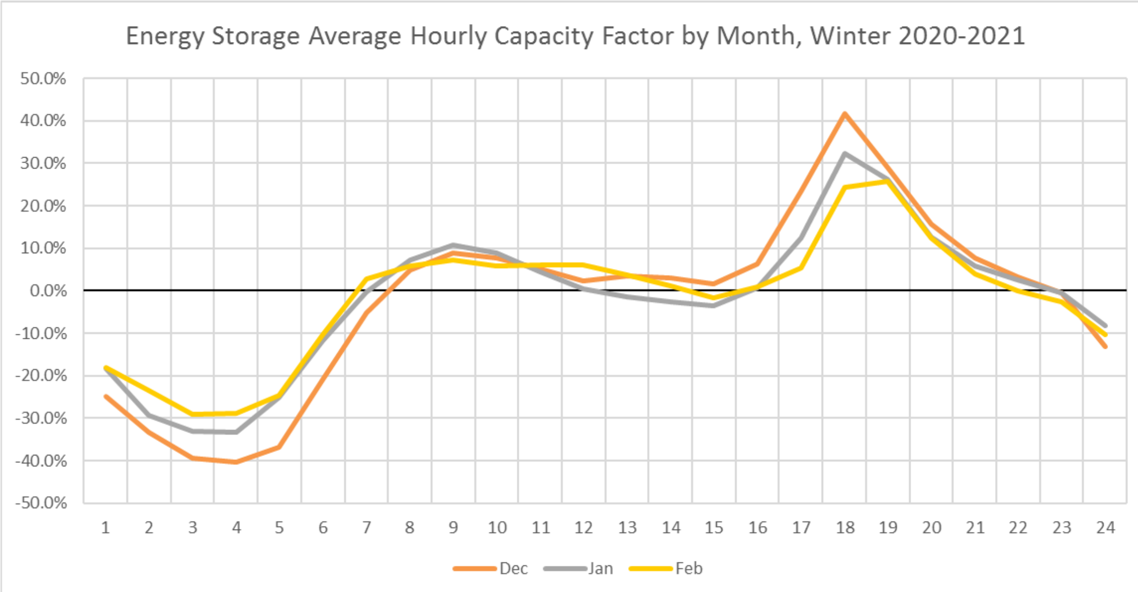
Pumped storage and other storage facilities are modeled using a daily storage profile to reflect the characteristic operation of the resource by storing energy during low load periods and generating energy during the higher load periods.[39] The figure below represents the storage resource charge/discharge profile utilized for the FCA 15 fuel security reliability review, which was generated using data from the observed behavior of storage facilities during the 2016-2017, 2017-2018 and 2019-2020 winters.



The figure below represents the charge and dispatch data for storage resources during the winter of 2020-2021. As the graph displays, storage resource operation during the winter of 2020-2021 was consistent with the historical charge/dispatch profile used for the FCA 15 fuel security reliability review, with storage-dispatch taking place in off-peak hours and discharging-dispatch taking place in higher load hours.

[38] *See* Appendix I, section 3.A.xiii.

[39] Appendix I, section 3.A.xvii.



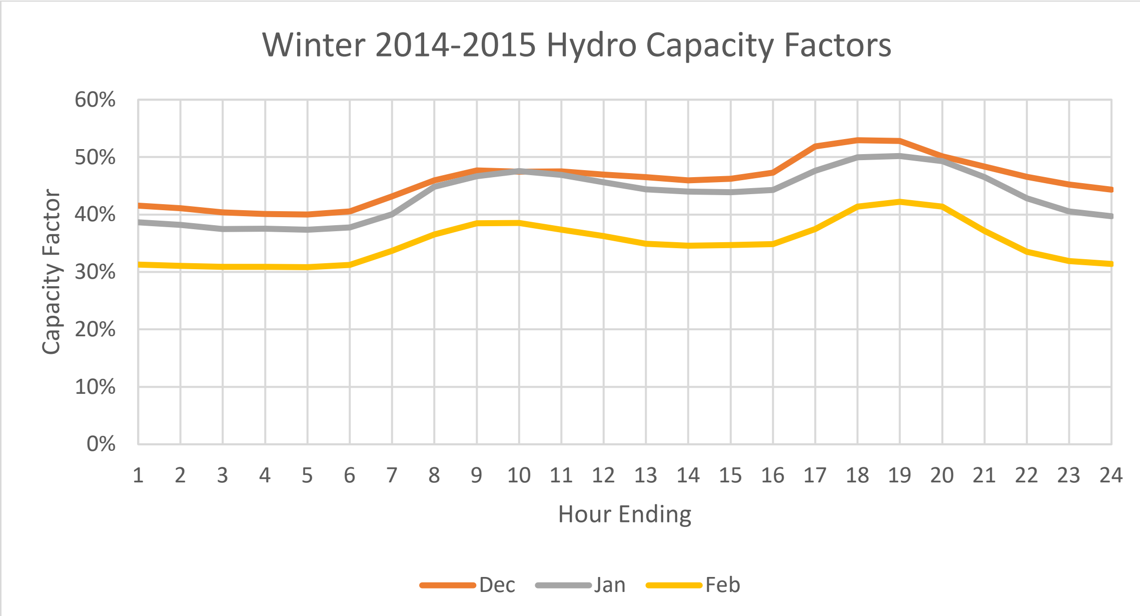
f. Conventional Hydro-Electric Generation

For the FCA 15 fuel security reliability review, conventional hydro resources were modeled at an hourly output based on the observed hourly profile from the winter of 2014/2015, which was applied to the winter Seasonal Claimed Capability values for hydro-electric resources from the latest CELT Report.[40]

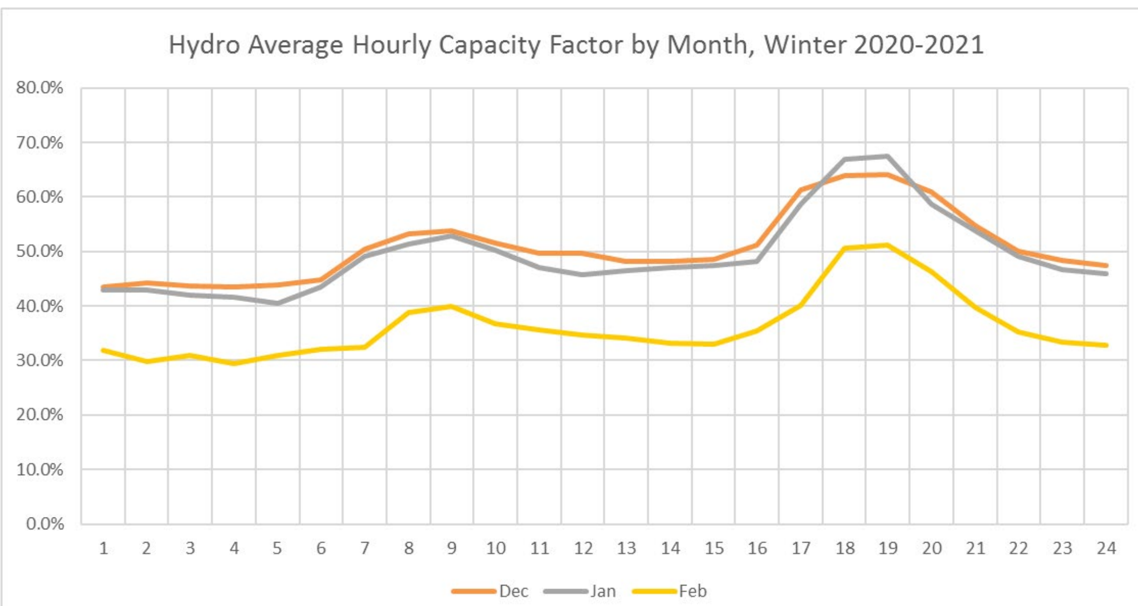
For the FCA 15 fuel security reliability review, the average hydro capacity factor was 41.7%, and the winter Seasonal Claimed Capability value for conventional hydro resources was 1,647 MW, which produced an hourly average dispatch value of 686 MW.

The graph below represents the hourly profile based on conditions from the base winter of 2014-2015.

[40] Appendix I, section 3.A.xviii.



For comparison, the graph below shows average hourly capacity factors for hydro resources by month for the winter of 2020-2021.



For the winter of 2020-2021, conventional hydro resources had similar capacity factor profiles to the profiles from the winter of 2014-2015, with slightly higher capacity factor values in some hours. The higher performance values, relative to the winter of 2014-2015, reflect higher water runoff due to higher levels of precipitation during the winter of 2020-2021.

4. Other Factors Relevant for Static Inputs

a. Equivalent Forced Outage Rate Demand (EFORd)

EFORd values are established using the Generating Availability Data System ("GADS") data provided by resource operators. Consistent with the manner in which EFORd values are calculated for other reliability-related purposes (*e.g.*, the calculation of the Installed Capacity Requirement), for the FCA 14 fuel security reliability review the average of the GADS data from the prior five years (2014 through 2018) was used in establishing EFORd values.[41] For comparison purposes, the GADS data was updated for the 2020 year (2015 through 2019) showing an approximate 12% decrease in EFORd values for the various technology groups. This is not surprising given the less severe winter weather, which put less strain on generation resources, decreased forced outages and helped to improve performance. This reduction in EFORd values has been reflected in the EFORd values used for the FCA 15 fuel security reliability review as follows (for FCA 15, EFORd values were calculated using GADS data from the years 2015 through 2019):

Resource Type	FCA 15 EFORd Capacity Reduction (MW)	FCA 14 EFORd Capacity Reduction (MW)	Difference
Dual-Fuel	454	1,085	-631
Oil	643	730	-87
Natural Gas	645	234	411
LNG	38	17	21
Coal	76	76	0
Nuclear	44	40	4
Pump Storage	49	29	20
Other Renewables	68	82	-14
Total	**2,017**	**2,292**	**-275**

b. Estimated Relief From Actions During Capacity Deficiencies

[41] Appendix I, section 3.A.xiv.

The reliability review assumes that the actions from ISO New England Operating Procedure No. 4, Actions During a Capacity Deficiency, are deployed to relieve system stress in the event the conditions being modeled indicate that energy and reserves cannot be met with available capacity.[42] The following table summarizes the estimated hourly MW relief assumed for the FCA 15 fuel security reliability review from the implementation of the OP-4 actions.[43]

Progression of Emergency Actions	Action Description	Estimated Hourly MW Relief
OP-4 Action 1	Begin to allow depletion of 30-minute reserves	700
OP-4 Actions 2-5	Voluntary load curtailment of Market Participants' facilities (0 MW assumed for load relief during winter months) Schedule Emergency Energy Transactions (500 MW assumed for scheduled transactions)	500
OP-4 Actions 6-11	Voltage Reductions Public appeals	500
10-Minute Reserve Depletion	Dispatch reserve resources for energy	1,400

[42] Appendix I, section 3.A.xv. OP-4 is available at *available at* https://www.iso-ne.com/static-assets/documents/rules_proceds/operating/isone/op4/op4_rto_final.pdf.

[43] In the fuel security reliability reviews, the ISO measures the operational impacts of the retirement of the Existing Generating Capacity Resource using the same operational metrics applied in the OFSA and Mystic Retirement Studies – that is, full utilization of OP-4 actions, depletion of 10 minute operating reserves, and load shedding under OP-7. In the fuel security review, as the system stress intensifies in each of the scenarios assessing the loss of the generation resource being studied, the study model progresses through the series of actions specified in OP-4, in sequence. The fuel security reliability review calculates the load affected as the ISO progresses through the non-emergency and emergency actions under OP-4. *See* Fuel Security Reliability Standard Filing, Brandien Testimony at pp. 18-19.

Load Shedding	ISO orders local control centers operated by transmission owners to reduce a specific percentage of system load Transmission Owners manually open distribution system breakers to disconnect blocks of customers	As needed

For the winter of 2020-2021, the region did not experience any capacity deficiency events that warranted reliance on actions under OP-4.

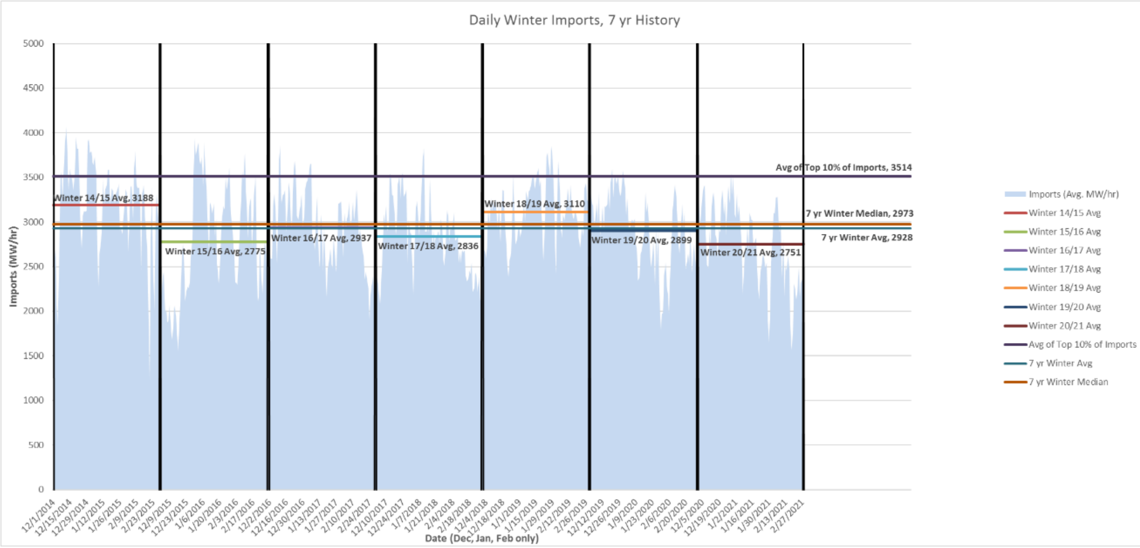
VII. COMPARISON OF VARIABLE INPUTS USED IN FCA 15 FUEL SECURITY RELIABILITY REVIEW TO ACTUAL 2020-21 WINTER CONDITIONS

To perform the fuel security reliability review, the ISO performs a total of 18 scenario analyses by varying three sets of inputs, reflecting different levels of energy imports from neighboring control areas, LNG injections into the gas pipeline transmission system from the region's three LNG facilities, and dual-fuel resource oil tank inventory levels. In this section VII the ISO reviews each of these variable inputs and compares them with observed performance during the winter of 2020-2021.

1. Energy Imports

Under Appendix I, the total net flow into New England from the interfaces with New York, New Brunswick and Hydro-Quebec is to be modeled at 2,800 MW, 3,000 MW and 3,500 MW, with each level of imports creating a separate scenario to be tested.[44] As the following graph indicates, total net flow into New England for the 2020-2021 winter was consistent with net flows into New England in prior winters and consistent with the five year average. The average flows of 2,751 MW/hour for the 2020-2021 winter were the lowest observed over the last seven winters, all of which are in line with the average of 2,928 MW and the lowest assumed imports of 2,800 MW. They were well below the highest assumed imports of 3,500 MW utilized in the fuel security review scenario analyses. Accordingly, the 2020-2021 winter import data does not support a change to the import values used for the FCA 15 fuel security reliability review.

[44] Appendix I, section 3.B.i.

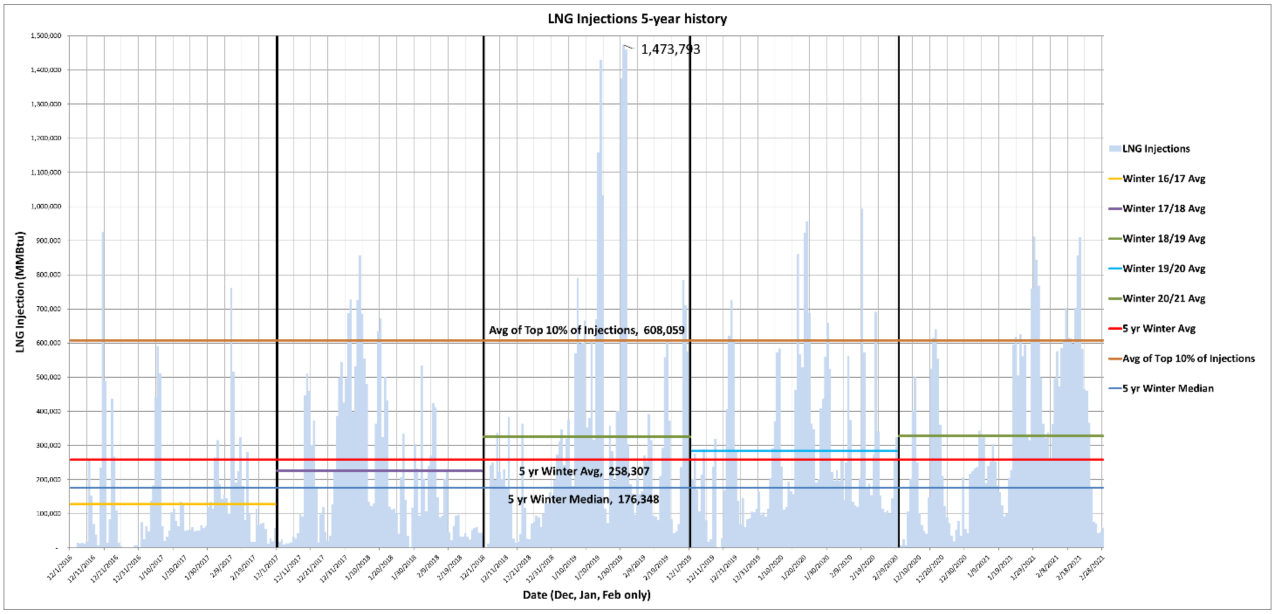


2. LNG Injections

Total LNG injections into the pipeline transmission system by the region's three LNG facilities—Canaport, Distrigas and Excelerate—are modeled at three injection levels under Appendix I: 0.8 Bcf/day, 1.0 Bcf/day and 1.2 Bcf/day.[45] Separate scenarios are run for each injection level.

The graph below shows LNG injections over the last five winters. The 2020-2021 winter did not contain any significant duration of cold weather. While the LNG injections during the three winter months were above the five year average, the region experienced LNG injections greater than the minimum simulated LNG injection scenario of 0.8 Bcf only on four days (January 29 and 30, February 17 and 18 with daily average temperatures of 11.9°F, 13.1°F, 25.4°F and 24.1°F, respectively). For the 2020-2021 winter, the region did not observe LNG injections at the higher modeled injection values of 1.0 Bcf/day or 1.2 Bcf/day. The mild 2020-2021 winter did not generate the required observations to warrant a change to the modeled LNG injections.

[45] Appendix I, section 3.B.ii.



The average daily scheduled LNG injections for the 2020-2021 season were approximately 0.33 Bcf/day, which is significantly less than the most "conservative" case of 0.8 Bcf/day modeled for the FCA 15 fuel security reliability review. The low observed LNG injections for the winter 2020-2021 is indicative of the relatively mild winter for the region. For these reasons, the ISO did not increase the level of LNG injections modeled in the fuel security reliability review for FCA 15.

3. Combined Cycle Dual-Fuel Resource Tank Inventory

Under Appendix I, dual-fuel resource tank inventories for combined cycle resources that operate primarily on natural gas during the winter are modeled with two replenishment levels—125 percent of the resource's tank level as of December 1, and 200 percent of the resource's tank level as of December 1.[46] Separate scenarios are run for each tank level.

For the FCA 15 fuel security analysis, the two replenishment levels equated to approximately 66 million gallons and 105 million gallons of replenishment fuel for the two scenarios. For the 2020-2021 winter, approximately 6.5 million gallons of replenishment were observed for the dual-fuel fleet, which equates to 2.56 percent of the maximum inventory. Given the relatively mild winter, it is expected that dual-fuel resources did not require significant amounts of replenishment. The low replenishment levels observed for the 2020-2021 winter therefore do not warrant a revision to the replenishment values utilized in the variable inputs for the fuel security reliability review.

[46] Appendix I, section 3.B.iii.

VIII. TRIGGER CONDITIONS

Under the fuel security reliability review rules, a resource's Retirement De-List Bid will be rejected if, under the modeled scenarios, either the retirement of the resource results in the depletion of 10-minute reserves below 700 MW in any hour in the absence of a contingency in more than one of the LNG supply scenarios, or the retirement of the resource results in load shedding in any hour pursuant to the ISO's Operating Procedure No. 7.[47]

The mild 2020-2021 winter conditions did not present the ISO with an opportunity to test the adequacy of these trigger conditions, because no capacity deficiency or abnormal conditions events occurred during the mild winter. Nevertheless, it is useful to revisit the rationale provided for the less conservative 10-minute operating reserve trigger condition, and to consider whether conditions during the 2020-2021 winter are consistent with that rationale.

The 10-minute operating reserve trigger calls for the depletion of 10-minute operating reserves down to 700 MW. Were the ISO to deplete 10-minute operating resources, this would constitute a violation of the applicable NERC Balancing Standard requirement related to the maintenance of Contingency Reserves.[48] The ISO has been clear that it will not violate NERC reliability criteria—*i.e.*, system operators would shed load if required to protect the interconnection for the next contingency. Nevertheless, in response to pressure from stakeholders who argued that using depletion of any amount of 10-minute reserves as the trigger was too conservative, the ISO agreed to permit reserve depletion down to 700 MW for purposes of performing the fuel security reliability review.[49] To justify this treatment, the ISO noted that the fuel security reliability review is occurring three years in advance of the capacity delivery period, and so it is possible that changes will take place—for example new market-based incentives—that would improve fuel procurement practices.[50]

Two market-related mechanisms were implemented in 2018 to assist with increasing resource preparedness for severe winter weather. These include the ISO Operating Procedure No. 21 three week look-ahead and enhancing the capability of Market Participants to reflect opportunity costs in resource Supply Offers in the Energy Markets (referred to as the "EMOC adder"). The experience from the 2020-2021 winter did not provide the ISO with sufficient information to assess whether implementation of these market-related mechanisms provide a basis for modifying the fuel security reliability review triggers. Due to the mild winter conditions there was minimal need to

---

[47] Market Rule 1, Appendix L.

[48] Fuel Security Reliability Standard Filing, Brandien Testimony at p. 21.

[49] *Id.*, Brandien Testimony at pp. 22-23.

[50] *Id.*, Brandien Testimony at p. 22.

utilize the opportunity cost mechanisms. Furthermore, as noted above, the weekly 21-day energy assessment forecast did not produce any forecasted energy deficiencies.

IX. CONCLUSION

The ISO requests that the Commission accept this informational filing regarding the FCA 15 fuel security reliability review.

Respectfully submitted,

ISO NEW ENGLAND INC.

By: *Graham Jesmer*

Graham Jesmer, Esq.
ISO New England Inc.
One Sullivan Road
Holyoke, MA 01040-2841
Tel: (413) 540-4557
Fax: (413) 535-4379
E-mail: gjesmer@iso-ne.com