NESCOE
New England States Committee on Electricity

To: **ISO New England**
From: **NESCOE**
Date: **April 25, 2019**
Subject: **Impact Analysis for Long-Term Energy Inventory Security Proposal**

At the April 9, 2019 Markets Committee meeting, ISO-NE asked for input on the impact analysis it plans to undertake on its Long-term Energy Security Proposal. ISO-NE stated that it plans to provide quantitative analysis focused on its latest design criteria including the three new ancillary service products.[1] ISO-NE asked for scenarios states would like ISO-NE to run in its analysis model. This memo provides an updated list and additional details regarding those scenarios from our December 3, 2018 memo.[2]

Please recall that a year ago, NESCOE indicated that we "need more rigorous analysis of uncertainties and their likelihood to understand fully the risk reflected in the scenarios in order to develop cost-effective mitigation strategies and to prioritize potential approaches."[3] We understand ISO-NE's concerns about the level and indicative quality of available data to inform credible analyses of the probability of future unfavorable outcomes. However, it remains important for ISO-NE to construct analysis that, to the maximum extent possible, indicates quantitatively what benefits proposed solutions will provide in terms of improved levels of service.

To that end, the analysis should be conducted, and the results presented, in a manner that enables states and stakeholders to evaluate to the extent possible the energy security contributions of ISO-NE's proposed electricity market reforms. For example, presenting market impacts by resource type, as granularly as possible under the information policy (*e.g.*, by fuel type, then by vintage or other proxy for heat rate, etc.) will help estimate financial incentives for mitigating energy security risk on various segments of the region's resource portfolio. While NESCOE continues to be focused on the proposal's total costs, whether market participants' incentives will

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[1] In accordance with FERC's order in EL18-182 and its extension of the compliance deadline, ISO-NE must develop and file improvements to its market design to better address regional fuel security by October 15, 2019. ISO-NE plans to discuss formal proposals by ISO-NE and stakeholders, and related analysis, in the first half of 2019. ISO-NE has indicated that draft Tariff changes will be distributed for the August markets committee ("MC") meeting. Final Tariff language (including for amendments) will be presented at and voted upon at the September 18-19, 2019 MC. The Participants Committee is scheduled to vote the matter on October 4, 2019.

[2] The questions from NESCOE's December 3, 2018 memo and ISO New England's responses are included in the February 2019 Markets Committee materials ("NESCOE Q and A"), available at: https://www.iso-ne.com/static-assets/documents/2019/02/a7b_iso_responses_nescoe_questions_on_impact_analysis.pdf.

[3] NESCOE Memo to ISO New England RE: *Analysis to Enable Risk-Informed Judgements* (April 13, 2018), available at: http://nescoe.com/wp-content/uploads/2018/05/FuelSecRiskInformAnalysis_Apr2018.pdf.

align with pursuing actual measures that provide regional energy security at the lowest cost while not compromising environmental quality is an important part of the overall design consideration.

NESCOE appreciates that ISO-NE will "analyze the expected performance of the energy market (including operating reserves) and will use this information to provide a *qualitative* analysis of the effects on the Forward Capacity Market (FCM) and the Forward Reserve Market (FRM)."[4] Lastly, the impact analysis should provide as much qualitative information as possible, including whether and to what extent other markets, such as the FRM, will be affected and to what extent.

The revised list of state-requested scenarios is shown in Table 1 below. Table 2 provides proposed assumption descriptions for each of the components in the scenario details. Table 1 is intended to continue discussion with ISO-NE and market participants on how best to analyze the proposed market reforms. At this time, the scenarios described below relate primarily to ISO-NE's long-term proposals to change the energy markets by: (1) transitioning to a multi-day ahead energy and reserves market ("M-DAM") and (2) establishing new ancillary services that will also be included and co-optimized with energy in the M-DAM: (a) replacement energy reserves ("RER"), (b) generation contingency reserves ("GCR"), and (c) and energy imbalance reserves ("EIR"). These are referred to as "market reforms" in Table 1.

In addition to scenarios designed to examine the performance of the proposed market-based solution over a range of potential future conditions, the table also includes scenarios intended to test the performance of the proposed market design: during extraordinary fuel price conditions, with smaller incentives for energy inventory security (*e.g.*, half the quantity of RER and EIR), partial implementation of the proposed reforms (No GCR), sensitivity to load forecast error, the level and timing of participation in the M-DAM, and the level of M-DAM reserve strike prices.

Table 1: Revised List of State Scenarios for Impact Analysis

	Scenario Name	Purpose	Details
1	Reference Scenario	Examine market outcomes under expected future conditions – with and without proposed market reforms	Average winter weather, average fuel availability, legally required renewable and clean energy, and average demand
2	Best Case Scenario	Examine market outcomes when energy inventory security conditions are favorable with and without proposed market reforms	Mild winter weather, high fuel availability, renewable and clean energy to meet carbon goals, and low demand
3	Worst Case Scenario (a) One Median Cold Snap	Examine market outcomes when energy inventory security conditions are unfavorable (w/ one cold snap) with and without proposed market reforms	Cold winter weather (Cold 1 Snap), low fuel availability, and the current renewable and clean energy fleet as of 2018, and electrification demand

[4] NESCOE Q and A (emphasis added), at 2.

	Scenario Name	Purpose	Details
4	Worst Case Scenario (b) Two Median Cold Snaps	Examine market outcomes when energy inventory security conditions are unfavorable (w/ two cold snaps) with and without proposed market reforms	Cold winter weather (Cold 2 Snap), low fuel availability, and the current renewable and clean energy fleet as of 2018, and electrification demand
5	Worst Case Scenario (c) One Long Cold Snap	Examine market outcomes when energy inventory security conditions are unfavorable (w/ one long cold snap) with and without proposed market reforms	Cold winter weather (Cold Long Snap), low fuel availability, and the current renewable and clean energy fleet as of 2018, and electrification demand
6	Fuel Price Inversion	Examine market outcomes under extraordinary energy inventory security conditions with and without proposed market reforms	Same as Worst Case Scenario (c) One Long Cold Snap with additional fuel price assumption that oil is cheaper than natural gas for a portion of the long cold snap
7	Half-the-Reserve Constraints	Examine market outcomes under expected future conditions – at various levels of proposed market reforms	Same as Reference Scenario with an adjustment to the quantity in ISO-NE's RER and EIR mechanisms by half. The quantities of proposed new reserves RER and EIR are equal to 50% of the ISO's proposed amounts (TBD).
8	Only New Reserves ("No GCR")	Examine market outcomes under expected future conditions – with an adjustment to the proposed market reforms where only the RER and EIR mechanisms are implemented	Same as Reference Scenario with only the RER and EIR mechanisms in-place with current real-time operating reserve products would continue to be traded in the real-time market only. There would be no GCR component to the proposed market reforms
9	Load Forecast Sensitivity	Examine sensitivity of the market outcomes to forecast error in the load forecast with and without proposed market reforms	Same as Reference Scenario with an adjustment to the load forecast to represent forecast error
10	M-DAM Participation Sensitivity - Early	Examine sensitivity of the market outcomes to various levels of participation in the M-DAM	Same as Reference Scenario with an adjustment to the level and timing of load offers into the M-DAM - high load participation from beginning to end
11	M-DAM Participation	Examine sensitivity of the market outcomes to various	Same as Reference Scenario with an adjustment to the level and timing of load offers into the M-DAM –

	Scenario Name	Purpose	Details
	Sensitivity – Moderate	levels of participation in the M-DAM	relatively low load participation until 2 days ahead
12	M-DAM Participation Sensitivity - Late	Examine sensitivity of the market outcomes to various levels of participation in the M-DAM	Same as Reference Scenario with an adjustment to the level and timing of load offers into the M-DAM – relatively low load participation until 1 day ahead
	~~MDAM Non-Binding Bids and Offers Sensitivity~~	~~Examine sensitivity of the market outcomes to non-binding MDAM bids and offers vs binding bids/offers~~	~~Same as Reference Scenario with an adjustment to the MDAM interactions with the RER and EIR so that the MDAM bids and offers are non-binding (e.g., multi-day ahead energy/reserves/RER/EIR demand bids and supply offers are not related to MDAM outcomes).~~
13	Ancillary Service Strike Price Sensitivity	Examine Sensitivity of the market outcomes to various levels of strike prices set for the new ancillary services	Same as Reference Scenario with an adjustment to the strike price levels assumed in the analysis (*e.g.*, at par, in/out-of-the-money by 5%, 10%, or 20%)

Table 2 below provides proposed assumption descriptions for each of the components in the scenario details column above. NESCOE appreciates ISO-NE's assistance with further refining the proposed assumption descriptions into an acceptable format for the impact analysis model.

Table 2: Proposed Assumption Descriptions

Winter Weather	
Mild	Warmer than average winter – 2 degrees Celsius warming trajectory w/ HDDs that are relatively low and no cold snap
Average	Average temperatures, HDDs, and weather shape over the past 10 years
Cold - 1 Snap	Colder than average winter - relatively colder temps, more HDDs, and a cold snap of median duration (5 days)
Cold - 2 Snap	Colder than average winter - relatively colder temps, more HDDs, and two cold snaps of median duration (5 days)
Cold - Long Snap	Colder than average winter - relatively colder temps, more HDDs, and a cold snap of excess duration (10 days)
Fuel Availability	
Low	Low (pre winter program levels) levels of #2 and #6 oil and LNG send out; replenishment logistical challenges; spot cargos take 20 days
Average	Average (last winter oil levels and last 5 years average of LNG send out) levels of #2 and #6 oil and LNG send out; recent replenishment logistical timeframes; spot cargos take 10 days

High	High (90% full) levels of #2 and #6 oil and LNG send out; improved replenishment logistical timeframes; spot cargos take 5 days
~~Full~~	~~Full (technical potential?) levels of #2 and #6 oil and LNG send out; replenishment logistical solved; pre-arranged cargoes avoid need for spot cargos~~
Renewable and Clean Energy	
Retirements	Current renewable and clean energy fleet minus the two nuclear units
Current	Current renewable and clean energy fleet as of January 1, 2023
Future Law	Current renewable and clean energy fleet plus the capital additions required by law as of December 2018
Future Growth	Current and renewable clean energy fleet plus capital additions to meet power sector carbon reduction goals
Demand	
Low	Average winter load shape scaled to a load forecast that is 1% more aggressive than the 2018 CELT
Average	Average winter load shape applied to the 2018 CELT
High	Average winter load shape scaled to a load forecast that is either: (1) flat or (2) 1% less aggressive than the 2018 CELT
Electrification	Peakier-than-Average Winter load shape applied to the 2018 CELT; estimated effects of transportation and building sector electrification commensurate with economy-wide carbon reduction goals applied to the electricity demand forecast