

To: ISO New England
From: NESCOE
Date: December 3, 2018
Subject: Impact Analysis for Long-Term Energy Inventory Security Proposal

On October 30, 2018, at a regular meeting between state and ISO-NE technical staff, 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 a quantitative analysis focused on the addition of the energy inventory reserve constraints.¹ ISO-NE asked for scenarios states would like ISO-NE to run in its analysis model. This memo provides those scenarios.

In addition, NESCOE also sets forward recommendations and questions for ISO-NE regarding the impact analysis. It would be most helpful to states' consideration of the proposed energy inventory security solutions if ISO-NE could provide written responses. If ISO-NE is able to answer some questions more quickly than others, NESCOE would appreciate receiving responses as they are completed.

An initial 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. Last, NESCOE provides some other requests of and questions for ISO-NE. Of note, NESCOE believes ISO-NE needs to provide analysis of all the proposed market design changes both individually and collectively. Such expanded analysis needs to determine, at a minimum, whether an appropriately designed and sized seasonal winter auction would make the multi-day ahead market and the energy inventory reserve constraint redundant. NESCOE also requests that ISO-NE provide analysis of the expected benefits that will flow to market participants. The latter is to help illuminate whether the design changes will meet the intended objective of solving the energy security issue.

Table 1 is intended to begin a 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 market ("MDAM" or "madam") and (2) establishing a new energy inventory reserve constraint for regional energy security ("EIRC" or "eric") to include in the co-optimized energy and reserves market. These are referred to as "market reforms" in Table 1. Once ISO-NE provides more details and information about the model and the scope of the impact analysis, NESCOE may wish to request additional scenarios and analysis related to the

¹ In accordance with FERC's order in EL18-182, ISO-NE must develop and file improvements to its market design to better address regional fuel security by July 1, 2019 or show cause why such changes are unnecessary. ISO-NE plans to discuss formal proposals by ISO-NE and stakeholders, and related analysis, in the first quarter of 2019. ISO-NE has indicated that draft Tariff changes will be distributed for the March markets committee ("MC") meeting. Final Tariff language (including for amendments) will be presented at the April 9, 2019 MC and voted upon at the May 7, 2019 MC. The Participants Committee is scheduled to vote the matter on June 7, 2019.

MDAM, EIRC, and seasonal forward procurement solution. 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 (half the quantity of EIRC), sensitivity to load forecast error, and the level and timing of participation in and binding nature of the MDAM.

Table 1: Initial List of State Scenarios for Impact Analysis

Scenario Name	Purpose	Details
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
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
Worst Case Scenario	Examine market outcomes when energy inventory security conditions are unfavorable with and without proposed market reforms	Cold winter weather, low fuel availability, and the current renewable and clean energy fleet as of 2018, and electrification demand
Fuel Price Inversion	Examine market outcomes under extraordinary energy inventory security conditions with and without proposed market reforms	Same as Worst Case Scenario with additional fuel price assumption that oil is cheaper than natural gas for a portion of a cold snap
Half-the-Reserve Constraint	Examine market outcomes under a smaller version of the proposed reforms	Same as Reference Scenario with an adjustment to the quantity in ISO-NE’s EIRC mechanism by half
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
MDAM Participation Sensitivity	Examine sensitivity of the market outcomes to various levels of participation in the MDAM	Same as Reference Scenario with an adjustment to the level and timing of load offers into the MDAM (e.g., three-days out instead of seven).
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 EIRC so that the MDAM bids and offers are non-binding (e.g., energy/reserves demand bids and supply offers in the EIRC are not related to MDAM outcomes).

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 (4-5 days?)
Cold 2 Snap	Colder than average winter - relatively colder temps, more HDDs, and either: (1) two cold snaps of median duration (4-5 days?), or (2) a cold snap of excess duration (10 days?)
Fuel Availability	
Low	Low (recent historical?) levels of #2 and #6 oil and LNG send out; replenishment logistical challenges; spot cargos take 20 days
Average	Average (commensurate w/ mkt incentives?) levels of #2 and #6 oil and LNG send out; recent replenishment logistical timeframes; spot cargos take 10 days
High	High (mid-point between average and 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

Other Requests of and Questions for ISO-NE in Connection with its Impact Analysis

At this early stage, ISO-NE has not yet made clear details associated with the model. Once ISO-NE provides more details and information about the model, and with the benefit of ISO-NE responses to the questions below, NESCOE may wish to seek adjustments to the model and how ISO-NE conducts the modeling.

1. Scope:

- a. **Chapter 3 - A, B, & C:** ISO-NE is in the process of developing proposals to address regional energy inventory security concerns. Long-term (“Chapter 3”), ISO-NE may propose significant changes to the energy market and/or implementation of a forward seasonal market. Separately, ISO-NE proposes to create a temporary new energy inventory security program (“Chapter 2B”). However, to date, ISO-NE has stated that it plans to provide a quantitative impact analysis focused only on the addition of the energy inventory reserve constraints. NESCOE requests that ISO-NE include the MDAM and forward seasonal markets in the impact analysis in addition to the EIRC. “To assist stakeholders in evaluating any major ISO initiative that affect market design, system planning, or operation of the New England bulk power system,” consistent with its mission, ISO-NE needs to “provide quantitative and qualitative information on the need for and the impacts, including costs, of” the MDAM, EIRC, and forward seasonal market, both individually and in combination (*i.e.*, on their own and together).²
- b. **Other Wholesale Markets:** It seems like the analysis is focused on the co-optimized energy and reserves market and does not include the FCM.
 - i. If the analysis is for multiple years, or at least extends beyond the FCM’s current obligations, how does ISO-NE intend to simulate turnover in the fleet without performing FCM analysis?
 - ii. Please describe the qualitative analysis ISO-NE will perform regarding implications to other aspects of the market.³
 - iii. How will the analysis include or reflect incentives from other markets (*e.g.*, Pay-for-Performance in the FCM)?
- c. **Fuel Prices and Availability:** Past energy market modeling exercises assume static inputs for fuel prices and do not include linkages to natural gas transportation, liquid fuel commodity, or Atlantic Basin futures models.
 - i. How will this analysis reflect (or accommodate the reflection of) these market dynamics?

2. Timeframe:

- a. Assuming that the implementation timeframe is 2023, what time period (*e.g.*, winter-only, annual, multi-year) does ISO-NE intend to analyze?
- b. Is there a benefit to examining market performance over a multi-year period?
- c. How many consecutive days (*e.g.*, 14 days, 90 days, etc.) does ISO-NE intend to analyze?

² ISO New England Inc. Transmission, Markets, and Services Tariff, Section I.1.3.

³ November 7, 2018 Presentation to the Markets Committee, Winter Energy Security Improvements: Market-Based Approaches, at slide 49.

3. **Geographic Resolution:** Past energy market modeling exercises assume static inputs for interfaces between external control areas.
 - a. How does ISO-NE intend to incorporate the market dynamics over tie lines and/or the availability of emergency energy from neighboring systems in the analysis?
4. **Resource Availability Restrictions:**
 - a. How will the analysis handle limited energy generators and use-it-or-lose-it-fueled resources?
 - b. Will the analysis include any other restrictions (*e.g.*, transmission security and reliability, air emissions, etc.)?
5. **Results Metrics:**
 - a. What metrics will be available in the modeling?
 - b. What is ISO-NE's view of the standard(s) by which the proposed market design will be considered to be successful?
 - c. How are costs to consumers considered in the design of the market and will the model be able to attribute certain differences in consumer cost to measurable reliability benefits?
6. **Market Participant Incentives (The Big Picture):**
 - a. Will ISO-NE provide analysis on the benefits to consumers and resources that will come from these market design changes?
 - b. How will ISO-NE interpret and use the results of the analysis to determine if the appropriate level of market participant incentives was achieved?
 - c. What information will ISO-NE need and consider when determining whether and to what extent long-term energy inventory security risks are sufficiently mitigated by the proposed market design changes?
 - d. Will ISO-NE examine the profitability of certain resource types (*e.g.*, five largest energy inventory security resource retirement contingencies) across all ISO-NE markets in light of the proposed market changes to determine whether the proposed market changes actually alleviate the need for reliability-must-run agreements for energy inventory security?
 - e. Will ISO-NE quantify the financial incentives from the proposed market design changes relative to the actual consumer costs of measures resources may pursue to mitigate energy inventory security risks to resource performance (*e.g.*, compensation and rents for a selection of generic resource types vs. procuring and storing fuel, arranging for secure transport and delivery of fuel, capital investments in performance enhancements or other means of uprating capacity that addresses energy inventory security risk?)