

**Planning Advisory Committee  
WebEx Teleconference  
March 16, 2022**

Attendee	Organization
J. Truswell - Chair	ISO New England Inc.
M. Lyons - Secretary	ISO New England Inc.
J. Adadjo	Eversource Energy
Z. Ahmed	ISO New England Inc.
M. Ainspan	NRG
M. Allen	VELCO
R. Andrew	Eversource Energy
E. Annes	Connecticut DPU
J. Ansah	Daymark Energy Advisors
C. Benker	Eversource Energy
P. Bernard	ISO New England Inc.
M. Birchard	Acadia Center
J. Black	ISO New England Inc.
P. Boughan	ISO New England Inc.
J. Breard	ISO New England Inc.
J. Burlew	ISO New England Inc.
D. Burnham	Eversource Energy
D. Capra	NESCOE
D. Cavanaugh	Energy New England
L. Cecere	Vermont DPU

B. Chamberlain	Olivewood Energy
R. Collins	ISO New England Inc.
W. Coste	ISO New England Inc.
F. Dallorto	ISO New England Inc.
J. Dannels	Shell Energy
B. D'Antonio	Eversource Energy
L. Delaney	Borrego Solar
J. Dong	Eversource Energy
M. Drzewianowski	ISO New England Inc.
J. Fenn	Versant Power
B. Forshaw	CMEEC
B. Fowler	Wheelabrator North Andover Inc.; Exelon Generating Company LLC; Nautilus Power; Dynegy Power Marketing, LLC; Entergy Nuclear Power Marketing LLC; Great River Hydro, LLC
N. Gangi	ISO New England Inc.
G. Ghanavati	Eversource Energy
A. Gillespie	ISO New England Inc.
M. Gonzalez	ISO New England Inc.
J. Gordon	CPV Towantic
L. Guilbault	HQ US
P. Holloway	Massachusetts DOER
D. Hurley	Synapse Economics
N. Hutchings	ISO New England Inc.
J. Iafrati	Customized Energy Solutions
E. Johnson	ISO New England Inc.

S. Judd	ISO New England Inc.
S. Kaminski	New Hampshire Electric CoOp
S. Keane	NESCOE
S. Kirk	Exelon Generation Company
A. Kniska	ISO New England Inc.
R. Kornitsky	ISO New England Inc.
M. Kotha	ISO New England Inc.
N. Krakoff	Conservation Law Foundation
A. Krich	Boreas Renewables
M. Krolewski	Vermont DPU
B. Kruse	Calpine
F. Kugell	Avangrid
R. Lafayette	Eversource Energy
E. Laine	ISO New England Inc.
S. Lamotte	ISO New England Inc.
J. Litynski	Synapse Economics
W. Lu	ISO New England Inc.
J. Lucas	Eversource Energy
X. Luo	ISO New England Inc.
E. Mailhot	ISO New England Inc.
K. Mankouski	ISO New England Inc.
J. Martin	New England Power Company
T. Martin	New England Power Company
B. Marszalkowski	ISO New England Inc.
C. Marquis	Advanced Energy Economy
A. McBride	ISO New England Inc.

S. Mintz	RTO Insider
A. Mitreski	Brookfield Energy Marketing
A. Nichols	ISO New England Inc.
S. Nikolov	ISO New England Inc.
B. Oberlin	ISO New England Inc.
L. Ortiz	Anbaric Development
H. Pathan	Eversource Energy
D. Phelan	New Hampshire Public Utilities Commission
H. Presume	VELCO
S. Rastegar	ISO New England Inc.
C. Richards	PPL Energy Plus
V. Rojo	ISO New England Inc.
J. Rotger	Galt Power, Cross Sound Cable, BP Energy, Mercuria Energy and DTE Energy
E. Runge	Day Pitney
R. Russo	RLC Engineering
K. Schlichting	ISO New England Inc.
D. Schwarting	ISO New England Inc.
M. Scott	New England Power Company
C. Sedlacek	Eversource Energy
P. Silva	ISO New England Inc.
A. Singh	ISO New England Inc.
J. Slocum	Massachusetts Public Utilities Commission
R. Snook	Connecticut DEEP
P. Sousa	Marble River
K. Sreenivasachar	ISO New England Inc.

R. Stein	Generation Group Member, NRG Power Marketing, HQ Energy Services, PSEG Energy Resources & Trade, SunEdison
B. Swalwell	Tangent Energy
Z. Teti	Avangrid
B. Thomson	MMWEC
J. Turcotte	ISO New England Inc.
R. Vega	ISO New England Inc.
P. Vijayan	ISO New England Inc.
A. Weinstein	Dynegy Marketing and Trade
B. Wilson	ISO New England Inc.
B. Woebbe	ISO New England Inc.
P. Wong	ISO New England Inc.
A. Worsley	Transmission Analytics
F. Zeng	ISO New England Inc.
J. Zhang	ISO New England Inc.

**Item 1.0 – Chairs Remarks**

Ms. Jody Truswell welcomed the committee and reviewed the days’ agenda.

In the coming days, there will be a short survey that will be sent to the members of the PAC to gauge interest and comfort levels to return to in-person PAC meetings. The survey will be similar to the one that was sent to the NEPOOL Reliability Committee. Second, the ISO is planning to come to the April 28<sup>th</sup> PAC meeting with two items: Preliminary Results from the Second Cape Cod Resource Integration Study and also some results from the Curtailment Analysis for Proposed Interconnections - Pilot Study.

**Item 2.0 – Proposal to Change K Street 345 kV Breaker Status**

Ms. Eva Mailhot (ISO-NE) provided an overview of the proposal to change the K Street 345 kV breaker status. As part of the Greater Boston 2012 upgrades, a third reactor was added at K Street 345 kV for voltage control. The Greater Boston upgrades also addressed short circuit concerns at K Street 115 kV, and the resulting substation was operated as normally closed.

Resource changes in Boston and SEMA/RI are expected to result in increased loadings on the Stoughton-K Street 345 kV cables. ISO-NE is proposing to change the operating status of breaker 103P or 103S at K Street to normally open. With this change, loss of one Stoughton-K Street cable results in one 345/115 kV autotransformer at K-Street to be left energized, but carrying no power flow. Operating K Street 345 kV breaker 103P or 103S as normally open will significantly reduce the loadings on the Stoughton-K Street 345 kV cables for post-contingency conditions. This will allow for more flexibility when operating the Southeastern New England area. The reduction in loading may also have the potential to increase transfer capability as well.

In response to stakeholder questions, ISO-NE provided the following statements:

- ISO-NE made a decision to share this project proposal with the stakeholders prior to discussing it with the impacted TO for transparency purposes.
- If the K Street 345 kV Breaker Change project moves forward, some additional analysis will be run as part of the project such as rerunning the interface transfer limit studies for Boston Import. It is too early to determine if this would impact the FCA 17 auction. An Eversource representative stated that this is the first time that they have been made aware of this proposal and they will need to perform their own evaluation to see if they will support this project or not.
- The project will not move forward if the analysis results show the transfer limits will be reduced.

### **Item 3.0 – Transmission Planning Technical Guide Update – Short Circuit**

Mr. Bob Russo (RLC Engineering for ISO-NE) provided an overview of the updates to the Transmission Planning Technical Guide regarding short circuit assumptions. This is a result of a transition to Aspen OneLiner Version 15 which is expected through March 2022. This network analysis software is used to perform short circuit calculations. This transition to the new Aspen Version 15 was discussed among the New England entities responsible for conducting short circuit calculations in October 2021. Comments on the changes are due to ISO-NE by April 1, 2022.

There were no questions from the committee on this topic.

### **Item 4.0 – 2050 Transmission Study: Preliminary N-1 & N-1-1 Thermal Results**

Mr. Andrew Kniska and Mr. Reid Collins (ISO-NE) provided an overview of the preliminary N-1 and N-1-1 thermal results for the 2050 Transmission Study. In 2050, summer daytime peak load is expected to be just over 40,000 MWs and winter evening peak load is expected to be just under 57,000 MWs. The resource mix assumes that coal, diesel, and municipal solid waste will be retired. In 2050, N-1 results show 284 line segment overload violations and 55 transformer overloads. The N-1-1 results show 681 line segment overload violations and 93 transformer overloads. Roughly, half of the line miles in New England are overloaded (4,500 of 9,000 line miles). The key takeaways from the study assumptions are a shift from a summer peaking system

to a winter peaking system. A large shift to renewable resources (56,665 MWs of nameplate PV and just under 35,000 MWs of nameplate wind). Electrification of heating and transportation is expected to double the amount of the peak load expected in 2050. A significant amount of new or upgraded transmission will be needed to serve load under the assumptions considered in this study. Comments on the presentation are requested by March 30<sup>th</sup>. The next steps are: to run sensitivities on 2050 Winter Peak to establish the relationship between load level and overloads, to perform further analysis to determine if summer-only overloads can be solved via different solar resource distributions and to begin development of possible transmission solutions.

In response to stakeholder questions, ISO-NE provided the following statements:

- The results of the additional sensitivities for FGRS Scenario 3 proxy unit mixes to satisfy resource adequacy criteria will come out in another month or two. ISO-NE is not sure how those FGRS results would be integrated with the 2050 Transmission Study, especially depending on the type of resources that resolve the resource adequacy mix.
  - ISO-NE did not use exact weather data for specific winter peak hours when developing assumptions for the output of PV and wind resources. However, we did use previous established weather assumptions based on conservative expectations for resource output under typical winter peak conditions in the model.
  - This presentation provides preliminary overload results, the specific overloads were posted to the PAC website in spreadsheet form. Possible solutions will be investigated in the future.
  - ISO-NE imports power from NY in all three study years, though the study does not identify the specific resources that are supplying the imported power.
  - The study assumptions include a HVDC interconnection to Quebec at Coolidge, VT.
  - The offshore wind resources are projected to interconnect on the large 345 kV locations on the coast for all of ME, NH, MA, RI and CT. Interconnections were projected in CT at Montville and Norwalk.
  - Some of the overloads may be able to be reduced by curtailing resources in the summer or by load reduction in the winter. This will be investigated in further sensitivity analysis in the coming months.
  - ISO-NE may consider a single collection point for the southern New England offshore wind facilities with multiple injection points to flow the power where it is needed most.
- Comment – Dave Burnham express appreciation for the study and ISO’s work.
- In addition to recommending rebuilds of the existing transmission system, ISO-NE is also looking into new transmission solutions on expanded or new rights-of-way that could mitigate the overloads.
  - Study sensitivities are in the development stage now and will be presented to PAC upon completion.

**Item 5.0 – 2021 Economic Study - Future Grid Reliability Study (FGRS) Phase I – Additional Production Cost Simulation Metrics**

Mr. Richard Kornitsky and Mr. Wayne Coste (ISO-NE) provided an overview of the additional production cost simulation metrics for the 2021 Economic Study - Future Grid Reliability Study (FGRS) Phase I study. Most natural gas units had an annual capacity factor below 30%. Annual net revenue for the natural gas units were negative in all scenarios. Note that as part of this analysis, all generators were de-rated by their forced outage rate and no pipeline forced outages were assumed. The ISO noted that increased LDC gas demand and additional gas generation in NY and NJ could further reduce availability of fuel from pipelines.

In response to stakeholder questions, ISO-NE provided the following statements:

– The combined cycle resources are not setting the LMPs during ramping. They are being committed out of merit order for reliability. Unit's may be online because they are needed later and the unit commitment process needs to respect minimum up and down times. The units are then made whole by NCPC payments. ISO-NE agreed to better illustrate the hourly revenues in future documents.

- A stakeholder commented that ISO-NE should look into how to add pipeline capacity into the Grid View model. ISO-NE mentioned that the pipeline analysis was done outside of GridView since it doesn't have the capability to model pipeline constraints. The ISO is exploring new methods to model these constraints in our newly acquired production cost software program, PLEXOS.

- The study assumption of the gas analysis is that we do not have a 2040 forecast for gas use by LDC's. Lacking a 2040 forecast, the ISO assumed LDC consumption in 2040 is similar to the last forecasted year, which is 2025.

#### **Item 6.0 – 2021 Economic Study - Future Grid Reliability Study (FGRS) Phase I – Additional Ancillary Services Results - Part 5**

Mr. Patrick Boughan and Mr. Ben Wilson (ISO-NE) provided an overview of the additional ancillary services results for the 2021 Economic Study - Future Grid Reliability Study (FGRS) Phase I study. The scenarios were run using the Electric Power Enterprise Control Simulation (EPECS) program. The program can portray specific reserve products such as TMSR, TMNSR and TMOR and their expected revenues. Ramping reserves were calculated subject to available reserve capacity. Exhausted ramping reserves indicate net load is moving faster than the generators can ramp. S0 and S1 reserve behaviors and revenues were reasonable within the current ISO reserves market, but moderate increases in wind and solar penetrations would likely require independent market products aimed at addressing uncertainty and variability. S3 revenues highlighted the shortfalls of the current ISO reserve market in a high renewable penetration and transport/heating electrification scenario. Increasing the requirements of existing products helped increase the system ability to meet variability, but led to a huge cost increase. Adding flexible electric vehicle battery storage increased system reliability performance and decreased costs. All S3 cases showed that the system needed to use the remaining fast-start generators regardless of whether they were labeled as reserves or not.



In response to a stakeholder question if the battery resources are providing 10 or 30-minute reserves, ISO-NE stated that they were not due to the structure of the modeling program.

**Item 7.0 – 2021 Economic Study - Future Grid Reliability Study (FGRS) Phase I – Resource Adequacy Screen and Probabilistic Resource Availability Analysis – B and D Results – Part 5**

Mr. Fei Zeng and Ms. Manasa Kotha (ISO-NE) provided an overview of the B and D results for the 2021 Economic Study - Future Grid Reliability Study (FGRS) Phase I - Resource Adequacy Screen (RAS) and Probabilistic Resource Availability Analysis (PRAA). The presentation focused on the remaining study results for Alternatives B & D. The observations from Scenario 3B showed using EVs as storage effectively reduced the risks of Scenario 3, but an additional 1,300 MW of proxy 100 MW CT units were needed to meet the LOLE criterion. Results from sensitivity runs indicated that the first 50 GWh of the total 200 GWh storage was the most effective in reducing risks. Under At-Criterion condition, Alternative B had more loss-of-load hours, higher unserved energy, and longer outage durations. The observation from Scenario 3D showed the addition of a large amount of renewable and battery resources effectively eliminated risks. The next steps will include additional work approved by the stakeholders, to explore different types and combinations of proxy resources to meet resource adequacy criteria and resulting metrics from production cost (emissions, prices, etc.) and ancillary services analyses (ramping, reserves, regulation).

In response to stakeholder questions, ISO-NE provided the following statements:

- Most of the storage results performed as expected.
- Adding additional storage resources would improve system performance and reduce outage hours, but regardless of the amount of batteries on the system, it still would not satisfy the 0.1 LOLE criteria. There needs to be sufficient resources to charge batteries to better utilize them.
- The energy consumption values for EV's were revised downward during the day because the assumption is that the vehicles are in use and not charging.
- A stakeholder commented that battery storage can provide reserves and should be modeled that way in the study.

**Item 8.0 – Transmission Planning Process Guide and Transmission Planning Technical Guide Updates – Longer-Term Transmission Planning**

Mr. Michael Drzewianowski (ISO-NE) provided an overview of the updates to the Transmission Planning Process Guide and Transmission Planning Technical Guide for longer-term transmission planning beyond the current 10-year window. These changes were made to Attachment K and approved by the TC in November 2021 and the PC in December 2021. The Tariff changes were filed with FERC in late December 2021 and accepted with an effective date of February 25, 2022. As a result, the Process Guide and Planning Guide have been updated to

correspond to the changes in Attachment K. Comments to ISO on the document revisions are due by April 1<sup>st</sup>.

There were no questions from the committee on this topic.

### **Item 9.0 – Update on Draft 2022 CELT Forecast**

Mr. Jon Black and Ms. Victoria Rojo (ISO-NE) provided an update on the Draft 2022 CELT Forecast. The forecast includes Energy Efficiency, PV, Heating Electrification, Transportation Electrification and gross summer and winter demand forecasts. The next steps include incorporating Moody's February 2022 macroeconomic outlook, the final FCA 16 results and finalizing the 2022 EE and PV forecasts. Additional information on the CELT 2022 gross and net forecasts is scheduled for the April 28<sup>th</sup> PAC meeting although it could be delayed to another date depending on when the FCA 16 results are finalized so that the forecasts can be finalized.

In response to stakeholder questions, ISO-NE provided the following statements:

- ISO-NE has just begun the work regarding the passive demand resources (PDR) CSOs to reflect what actually cleared in the FCA 16 auction. As the work is still underway, we are unable to share that data at this time. This meeting presents the most recent information we have.
- Regarding the electrification forecast and the projections for heat pump installations being used for A/C in the summer months, ISO-NE anticipates that in the southern NE states, many new heat pumps will likely replace less efficient A/C units since higher A/C penetration exists in southern states, and a smaller number will be installed in homes either without A/C or with partial cooling from window A/C units. ISO-NE is still investigating the potential impacts of heat pumps on summer peak demand, especially for the northern states where the existing A/C penetration is lower.
- The graph representing the 50/50 summer peak is very jagged for past years but then smooths out going forward in future years. ISO-NE stated that the past summer peaks are actual seasonal peak values that vary due to different weather conditions affecting the peak each year. Beyond the historical period, the graph represents the forecasted 50/50 summer peak load that reflects consistent assumptions regarding weather conditions at the time of the peak, which is why the graph is smooth over this period.

ISO-NE is working on completing the 2022 CELT report by May 1, 2022.

### **Item 10.0 - Draft Regional System Plan Transmission Projects and Asset Conditions – March 2022 Update**

Mr. Abhinav Singh (ISO-NE) reviewed the March 2022 update for the Draft Regional System Plan Transmission Projects and Asset Conditions. This update is performed three times a year in March, July and October. There were no cost estimate changes greater than \$5M between October 2021 and March 2022. There were no new projects during that timeframe. Seven projects have been placed in service (two as part of Eastern CT 2029 and five in MA - Boston 2028, Boston Area

Optimized Solution, and three as part of SEMA/RI). There have been no cancelled projects since the October 2021 update.

There were no questions from the committee on this topic.

**Item 11.0 – Closing Remarks**

Ms. Truswell reminded the stakeholders to dial into the PAC meetings early in order to process individuals through the CEII waiting room. The next regularly scheduled PAC meeting will be Thursday, April 28, 2022.

**Meeting Adjourned at 3:40 PM**

Respectively submitted,

Marc Lyons  
Secretary, Planning Advisory Committee