Planning Advisory Committee
Meeting Minutes
November 15, 2022

Attendee	Organization
J. Truswell - Chair	ISO New England Inc.
S. Adams	ISO New England Inc.
S. Ali	PPL Energy Plus
B. Andrew	Eversource Energy
P. Asarese	ISO New England Inc.
D. Bergeron	Maine Public Utilities Commission
T. Blanco	National Grid
J. Brodbeck	ISO New England Inc.
J. Burlew	ISO New England Inc.
D. Capra	NESCOE
D. Conroy	RLC Engineering
J. Dannels	Shell
J. Donovan	Mass
M. Drzewianowski	ISO New England Inc.
F. Ettori	VELCO
J. Fenn	Versant Power
B. Forshaw	Connecticut Municipal Electric Energy Cooperative
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
B. Frimpong-Duah	Daymark Energy Advisors

G. Germain	CHA Consulting
D. Green	RLC Engineering
R. Guay	Maine Public Utilities Commission
N. Hutchings	ISO New England Inc.
J. Iafrati	Customized Energy Solutions
S. Kaminski	New Hampshire Electric CoOp
A. Krich	Boreas Renewables
F. Kugell	Avangrid
R. Lafayette	Eversource Energy
S. Lamotte	ISO New England Inc.
Z. Logan	CMPCO
P. Lopez	Massachusetts Department of Energy Resources
J. Macura	ISO New England Inc.
B. Marszalkowski	ISO New England Inc.
J. Martin	New England Power Company
T. Martin	New England Power Company
A. McBride	ISO New England Inc.
A. Mitchell	National Grid
J. Montefusco	The United Illuminating Company
A. Newcomb	Daymark Energy Advisors
B. Oberlin	ISO New England Inc.
H. Pathan	Eversource Energy
D. Patnaude	Eversource Energy
H. Presume	VELCO
C. Richards	PPL Energy Plus

E. Roedel	The United Illuminating Company
J. Rotger	Galt Power, Cross Sound Cable, BP Energy, Mercuria Energy and DTE Energy
E. Runge	Day Pitney
D. Schwarting	ISO New England Inc.
M. Scott	New England Power Company
P. Shattuck	Anbaric
P. Silva	Synapse Energy
R. Snook	Connecticut Department Energy and Environmental Protection
E. Snyder	Eversource Energy
C. Soderman	Eversource Energy
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	PPL
R. Vega	ISO New England Inc.
P. Vijayan	ISO New England Inc.
A. Weinstein	Vistra Energy
A. Worsley	Boreas Renewables
J. Zhang	ISO New England Inc.

Item 1.0 – Chairs Remarks

Ms. Jody Truswell welcomed the committee and reviewed the day's agenda. She reminded the committee of the EAG meeting scheduled for November 17th and the ISPAC meeting scheduled for December 5th.

Item 2.0 – National Grid 326 345 kV Line – Structure Replacements

Mr. Tony Blanco discussed the asset condition needs on the 326 Line and the preferred solution. This line was built in 1971 connecting the Sandy Pond and Scobie Pond 345 kV substations.

This project is for the National Grid portion of the line, which has a total length of approximately 12.4 miles.

The asset condition project is being proposed due to damage to the wood structures from carpenter ants and woodpeckers as well as grounding concerns. The preferred alternative solution is to

- Replace 19 structures with steel poles and make minor repairs
- Correct grounding at 10 structures

The project has an estimated cost of $8.9M (100% PTF). Construction began on October 24, 2022. It is expected to be completed in 7 months.

In response to stakeholder questions, National Grid provided the following statements:

- The work is expected to be done live and will not require any outages of the 326 Line.
- At this time, it is not known whether the 19 structures that will be replaced with steel poles would be sufficient to carry a larger conductor as part of a future project. That would depend on the size of the new conductor and the specifics of the project.
- This presentation described the needs for the National Grid portion of the line only. The Eversource portion was presented at the June 2022 PAC meeting (includes replacement of 22 structures).

<u>Item 3.0 – VELCO Middlebury Condition Assessment & Solution</u>

Mr. Hantz Presume presented the background and scope of work for the Middlebury substation. Constructed in 1970, this substation connects the K30 and K63 115 kV Lines and has a 115/46 kV transformer and 22.9 MVAR capacitor bank.

There have been several modifications to this substation since its construction including the addition of the cap bank, replacement of control house and second 115 kV breaker. A comprehensive review of all equipment found

- Two breakers deficient (K30, K63). The K30 breaker is beyond its 40-year useful life and the K63 breaker has a hydraulic-pneumatic mechanism, the last of this type remaining on the VELCO system
- Obsolete disconnects and insulators
- Space constraints in the control house, which makes it difficult for technicians to work

Two proposed solution alternatives were presented, with Alternative 1 being the preferred alternative:

<u>Alternative 1</u>: replace and repair equipment in place, rebuild the control house on the current site ($16.3M, PTF: $7.5M), expected to be completed by June 2024

<u>Alternative 2</u>: rebuild the substation on a nearby site and transfer operation once completed ($19M, PTF: $8.6M)

In response to stakeholder questions, VELCO provided the following statements:

- We have considered alternatives to the SF6 breakers and are actively considering them. The concern is there may not be enough space to insert larger breakers.

Item 4.0 – Avangrid Railroad Corridor Transmission Line Asset Condition Assessment Update

Mr. Zach Logan provide an update on the asset condition project for the Milvon to West River segment (88005A/B, 8804A/B, 88003A/B sections) of the New Haven to Fairfield railroad lines. This project was originally presented in June 2018 and an asset condition assessment was done at that time.

The estimated cost in 2018 for the preferred alternative was $196.6M. The cost increased today to $345.4M for the 19 mile rebuild of the lines. A detailed breakdown of the cost increase was provided in the presentation. The biggest drivers for the cost increase were

- Labor and Equipment
- Engineering/Permitting/Indirect

The increase in project cost is $148.8M, all PTF.

In response to stakeholder questions, Avangrid provided the following statements:

- Asset condition projects on other sections of this corridor have not been presented to the committee since they are not as far along in the process. Avangrid will be coming to the committee with those sections.
- A rough estimate of the in-service date for this project places it in 2027.
- The estimated range on the cost estimate is +50/-25%. Avangrid is finalizing the contracting process, but is not predicting large cost swings from this updated estimate. Avangrid will provide an update if the estimate changes.

Item 5.0 – Eversource Trumbull – Norwalk Corridor Partial 115 kV Line Rebuilds

Mr. Christopher Soderman presented the partial rebuild project of 115 kV line sections of the Trumbull to Norwalk corridor. This project is driven by asset condition and overall reliability. Portions of these lines upgraded by previous projects are not subject to this project. The project includes the following lines:

- Line 1637 from Norwalk 345/115 kV substation to Weston 115 kV substation
- Line 1720 from Hawthorne 115 kV substation to Norwalk 345/115 kV substation – Majority of line structures shared with lines 1637 and 1714 within scope of this presentation
- Line 1714 from Trumbull 115 kV substation to Weston 115 kV substation
- Line 1222 from Hawthorne 115 kV substation to Old Town 115kV substation – Majority of line structures shared with line 1714 within scope of this presentation

The sections described above have steel lattice towers that date back 69 years and were not designed to NESC standards for loading and clearances. There is general deterioration of the lattice structures and their foundations including lack of redundant bracing, corrosion, rust, and overstress. The Norwalk to Trumbull corridor has also experienced frequent storm damage in recent years.

The proposed solution was determined after inspections and grading of all structure conditions in accordance with Electric Power Research Institute (EPRI) guidelines. All structures identified for replacement were rated as priority B: Minimal Defect, C: Moderate Defect, or D: Severe Defect. The project scope can be summarized as follows:

- Structure replacement
    - Line 1637: replace 35 of 56 structures, add 9 new structures (7 for dual circuit separation)
    - Line 1720: replace 4 of 8 structures, add 22 new structures (19 for dual circuit separation)
    - Line 1714: replace 70 of 94 structures, add 41 new structures (25 for dual circuit separation)
    - Line 1222: replace 1 of 1 structures, add 6 new structures for dual circuit separation
- Reconductoring - replace existing 556 ACSR conductor with Eversource standard 1590 ACSS
    - Line 1637: 4.0 of 6.26 miles
    - Line 1720: 11.43 of 13.87 miles
    - Line 1714: 9.4 of 12.53 miles
    - Line 1222: 1.97 of 1.97 miles
- Shield Wire
    - Line 1637/1720: replace 1.3 mi of existing 3/8"alumoweld overhead shield wires with OPGW from Norwalk Junction to structure 962. Transfer of 6.7 miles of existing OPGW between Weston and structure 965 to new structures.
    - Line 1714/1720/1222: Replace 9.4 mi of 11/32"copperweld overhead shield wires with OPGW between Weston and Old Town. Transfer of 9.4 miles of existing OPGW between Weston and Old Town to new structures

Total estimated PTF costs are $159.59M (-25% / +50%) with a projected in-service date of Q2 2025.

<u>Item 6.0 – Eversource 3041/362 Line Structure Replacements & OPGW Installation Rev. 1</u>
Mr. Christopher Soderman provided a revision to the 3041 and 362 lines project presented at the October 19, 2022 PAC meeting. This project includes structure replacements and OPGW installation.

The revisions presented were as follows:

- Line 3041: Installation of 6 strut insulators (previously 4) on existing structures to mitigate conductor swing
- Line 362:

- Replacement of 20 lattice structures (previously 11) with a combination of steel monopole structures and light duty steel H frame structures. The additional 9 structures were identified and prioritized for replacement to take advantage of siting and permitting efficiencies on the affected right-of-way.
- Estimated project cost updated from $13M to $19.163M

Item 7.0 – Aligning Generator Outputs in Planning Studies

Mr. Pradip Vijayan presented the proposal to align generator MW outputs used for stability and steady-state analyses in transmission planning studies. Currently, all transient stability analyses dispatch generators to their Winter NRC rating and steady-state analyses at off peak load conditions dispatch generators to their Summer NRC rating. The proposal is to use the same generator MW output value in steady-state and stability analyses performed at a given load level.

Rationale for using potentially lower generator MW output in stability analyses at summer peak load conditions (same values used for steady-state analyses):

- Transient stability limits are observed during off-peak load conditions when system inertia is lower and are typically not established using summer peak load cases. Using higher generator MW outputs in the summer peak load cases is not critical for identifying the limiting transient stability conditions.
- Significant amounts of DER tripping in an importing area will increase loadings on transmission facilities. The extent of DER tripping can only be calculated by transient stability simulations and the thermal impact can be best represented by studying summer peak load levels.

Rationale for using Winter NRC in steady-state analyses at off-peak load conditions (same value used in stability analyses):

- Off-peak load level studies are typically performed to assess transient stability performance and/or voltage performance and the use of Winter NRC ratings would result in more stressed conditions for off-peak load levels in terms of reduced voltage support and lower system inertia having fewer generators online to meet the load
- Off-peak load conditions could occur at temperatures below 50°F, which makes the use of Winter NRC ratings under off-peak load conditions more applicable

The proposal can be summarized as follows:

- All summer peak load Attachment K Studies: Stability analyses at summer peak load conditions will use the same generator MW output as in the steady state analyses (Summer QC for conventional resources and de-rated percentage of nameplate for renewable and energy storage resources).
- All Other summer peak load Transmission Planning Stability Studies: Stability analyses at summer peak load conditions will use the same generator MW output as in the steady state analyses: (Summer NRC).
- All off-peak load Transmission Planning Studies: Steady-state analyses at off-peak load conditions will use the same generator MW output as in the stability analyses (Winter NRC). The proposal allows for exceptions, where a specific off-peak load study may

model resources at a different generator MW output value than the Winter NRC rating. In such cases, a rationale will be provided.

These changes will be documented in the Transmission Planning Technical Guide (TPTG), Planning Procedures 3, and 5-6. A verbal correction to the presentation was made that comments on this proposal should be submitted as part of the comments on the draft TPTG revisions to pacmatters@iso-ne.com 15 days after the draft revisions are posted.

The updated methodology will begin to be used in the upcoming Needs Assessments for the Boston and Vermont study areas. PPA studies and SISs that start after the planning procedure changes are finalized will also utilize the updated methodology.

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

- The implementation of the updated methodology in Needs Assessments is expected to begin in the January timeframe. The ISO can take back and think about the need for a central location or "dashboard" that provides the status of all area studies being conducted. The ISO provided an outline of project updates in the spring.
- The proposal only includes changes to generator ratings and there is no proposal to change transmission equipment ratings that are used in the base cases. ISO-NE clarified that the summer peak load stability cases use summer ratings for transmission facilities.
- Summer QC is generally lower than summer NRC. Modeling generator output using Summer QC in Needs Assessments vs Summer NRC in Solutions Studies achieves two different objectives: one is to ensure service to load while the other is ensuring that there is no adverse impact. From a load serving perspective, the use of lower Summer QC ratings is more representative of a hot summer day and would identify the worst case conditions. In a Needs Assessment, reducing generation to resolve any criteria violation would be an option as long as load can be reliably served.

Item 8.0 – Transmission Planning Technical Guide Update

Ms. Sarah Lamotte presented proposed updates to the Transmission Planning Technical Guide. The updates are primarily related to transmission planning study assumptions.

The drivers for the proposed updates include new and updated study assumptions identified during and after the Transmission Planning for the Clean Energy Transition (TPCET) Pilot Study, new steady-state voltage criteria for Geomagnetic Disturbance (GMD) studies, and other steady state voltage criteria items.

Proposed updates:

1. Maximum Real Power Ratings
    a. Section 2.3.3 - Generator rating updates discussed in the June 15, 2022 PAC meeting and in agenda item 7 today
    b. Section 2.3 subsections on Wind, Conventional Hydro, and Solar - replaced instances of the word "nameplate" with "maximum real power output" and other minor editorial changes throughout

2. Generation Dispatch: *New and updated assumptions to replace the previous probabilistic methodology based on a Megawatt Unavailable Threshold with number of units out of service, applicable to both steady state and stability analyses*
    a. Delete former section 2.3.5: Generator Unavailability Probability
    b. Delete former section 3.1.3: Probabilistic Threshold Guideline
    c. Update criteria to consider economic dispatch of generation in the development of study conditions
    d. Add Table 4 1: Peak Load Generator Outage Thresholds
    e. Add Table 4 2: Peak Load Generator Outage Criteria (7% EFORd)
    f. Add assumptions for generator dispatches at minimum load
    g. Add assumptions for intra area interface transfers under various study conditions
3. Energy Storage Systems
    a. Align assumptions for pumped storage hydroelectric resources with the existing assumptions for Battery Energy Storage Systems (BESS). BESS assumptions previously presented to PAC.
    b. New Section 2.3.8: Energy Storage Systems (ESS) modified to reflect new assumptions for pumped storage hydroelectric resources
    c. New assumptions for pumped storage hydroelectric resources added to Table 2-8 (Former Table 2-11): Energy Storage Systems Assumptions
    d. Deleted former Table 2 10: Pumped Storage Hydro Generation Levels
    e. Deleted former section 2.3.9: Pumped Storage Hydro Generation
4. Voltage Criteria
    a. Update Table 3 2 steady state voltage criteria by facility owner consistent with how it has been presented in Transmission Planning studies
    b. Update the high voltage criteria for post contingency, pre switching conditions in section 3.1.2.3 which was previously under development
    c. Add new Section 3.1.2.6 to reflect voltage criteria for a Geomagnetic Disturbance (GMD) event
5. Load Distribution at Minimum Load
    a. Add new section 4.6, Minimum Load Distribution, in TPTG Appendix J: Load Modeling Guide
    b. Assumptions updated for the Day Time and Night Time Minimum load distributions (Tables 4-3 and 4-4)
6. DER Modeling
    a. Add a new Appendix K: Distributed Energy Resource (DER) Modeling Guide, which included modeling methodology, protection assumptions, and replacement lifecycle
    b. Remove previous methodology in Appendix J Section 6.3 for modeling Distributed Solar PV in proportion to the load at each substation
    c. Removed previous methodology in Appendix J Section 6.5 for modeling PV as negative load
    d. Add a new Section 3.3.5: Treatment for Transmission Element Loadings in Stability Simulations Following Tripping of Distributed Energy Resources (DER)
        i. Transmission element loadings limited to 95% of their STE limit following DER tripping in stability simulation
7. Miscellaneous

a. Minor editorial changes throughout the document to correct grammar and formatting, and improve reading ease

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

1. The probabilistic calculation for generator outages would be based on number of units rather than number of MW. The new method of handling generator outages keeps consistency from a reliability perspective regardless of the size of the study area. The proposed updates remove the probability curves and MW unavailable calculation used today.
2. The assumptions for Battery Energy Storage Systems (BESS) were presented at PAC in 2021 and did not include stand-alone storage charging at peak load conditions. There are certain resources, namely co-located resources, which are assumed to be charging at summer mid-day peak.
3. Limiting transmission element loadings to 95% of their STE following DER tripping in stability analyses provides operating margin before immediate operator action needs to be taken.
4. We expect to have redlines available for comments in the next few weeks.
5. The new methodology for Generation Dispatch will be described in the TPTG with sufficient detail so that other planners have access to the same inputs and can replicate the process.

<u>Item 9.0 – Closing Remarks</u>

The next scheduled PAC meeting will be conducted virtually on Tuesday, December 13, 2022.

Meeting Adjourned at 10:47 AM

Respectfully submitted,
Abimael Santana
Lead Engineer, Resource Qualification