

# Regional Planning Needs and Solutions

---



**Brent Oberlin**

DIRECTOR, TRANSMISSION PLANNING



# Purpose:

## *This presentation provides an update on ISO New England's (ISO-NE) regional system planning evaluations of the New England system*

- Access to Planning Advisory Committee (PAC) materials containing Critical Energy Infrastructure Information (CEII) is required to access some of the ISO's materials on transmission planning. Those stakeholders with CEII access do not require any further action. If you do not have access to ISO-NE's PAC CEII information, please complete the CEII Request Process found at: <https://www.iso-ne.com/participate/support/request-ceii-access>
- Download and complete the CEII Access Request Form and then submit the completed Form into Ask ISO at: <https://askiso.force.com/s/>
- ***Note: If you have Reliability Committee (RC) CEII access, you still need to apply for PAC CEII access***
- Should you have further questions, kindly contact Participant Support and Solutions by email: [AskISO@iso-ne.com](mailto:AskISO@iso-ne.com) or by phone: (413) 540-4220 or (833) 248-4220
- The ISO-NE planning process was previously discussed with the IPSAC and a summary appears in [Appendix B](#) for stakeholder reference
- The information provided in this presentation is as of November 13, 2023

# Three Ongoing Tariff Efforts

- Three separate efforts involving changes to the ISO's [Tariff](#) are underway
  - Storage as a Transmission-Only Asset
    - The ISO held stakeholder discussions regarding proposed Tariff changes to allow storage to be considered as a transmission asset for the purposes of implementing solutions to Needs Assessments, Market Efficiency Transmission Upgrades, or Public Policy Transmission Studies
    - [FERC filing](#) was made on December 29, 2022; [FERC accepted](#) the Tariff changes on October 19, 2023
      - The ISO must make an additional FERC filing at least 30 days before the effective date
      - The ISO has not determined a target effective date at this time

# Three Ongoing Tariff Efforts, cont.

- Economic Study Process Improvements, Phase 2
  - The second phase of the effort is focused on further detailing Market Efficiency Needs Scenario that can potentially trigger an RFP for transmission construction
  - The ISO will begin discussions with stakeholders in Q2 2024
  - FERC filing is targeted for the second-half of 2024
- Extended-Term Transmission Planning\*, Phase 2
  - The second phase of the effort will address the rules to enable a state or states to consider potential options for addressing the identified issues and cost allocation for associated transmission improvements
  - The ISO began discussions with stakeholders in October 2023
  - FERC filing is targeted for late Q2 2024

\*In some documents, this may be referred to as “Longer-Term Transmission Planning”

# Interregional Study Request

- On [March 27, 2023](#), ISO-NE sent a request for an interregional study to IPSAC
- Today, New England must respect a 1,200 MW loss of source limit to ensure reliability in both PJM and NYISO's areas
- This 1,200 MW limit has the potential to constrain system design in New England, especially in the context of offshore wind resources
- ISO-NE requested:
  - Evaluation of the loss of source limit in today's system to see if the limit can be raised above 1,200
  - If the limit on today's system remains below 2,000 MW, identification of upgrades necessary to support a 2,000 MW loss of source limit
- On [August 23, 2023](#) the JIPC agreed to participate in the study
- Currently, ISO New England is working to select a consultant to perform the analysis



# 2050 Transmission Study

- The ISO finalized the [scope for the 2050 Transmission Study](#) on December 22, 2021
  - Study objective: Given the future load and resource scenarios described in the “New England States’ Vision for a Clean, Affordable, and Reliable 21st Century Regional Electric Grid,” determine the following for the years 2035, 2040 and 2050:
    - Transmission needs in order to serve load while satisfying NERC, NPCC, and ISO-NE reliability criteria
    - Transmission upgrade “roadmaps” to satisfy those needs considering both constructability and cost
- The study is restricted to thermal steady-state analysis
  - DC contingency analysis will be used to identify thermal constraints and develop transmission upgrades
  - This analysis is expected to identify potential major transmission line additions



# 2050 Transmission Study, cont.

- The ISO discussed the [preliminary N-1 and N-1-1 thermal results](#) at the March 16, 2022 PAC meeting
  - Some of the key takeaways:
    - The Winter Peak in 2050 is the most challenging snapshot
    - The overloads are driven primarily by high heating load
    - Heavy North-South transfers may require additional transmission between generation-rich Northern New England and generation-deficient Southern New England
- The results of additional [sensitivity analysis](#) were discussed at the April 28, 2022 PAC meeting
  - Sensitivities on 2050 Winter Peak to establish the relationship between load level and overloads
  - Analysis to determine if summer-only overloads can be solved via different solar resource distributions

# 2050 Transmission Study, cont.

- At the [July 20, 2022](#) PAC meeting, the ISO discussed:
  - Results reflecting modeling corrections
    - The updated results showed a relatively small decrease in the number of overloaded facilities, but there remain a significant number of system concerns
  - Approximate duration of overloads in response to stakeholder requests
    - Approximately 13 hours of exposure to loads above 51 GW, which is the load level selected to develop the base set of system upgrades
    - Results show that “capping” system load at lower load levels than those contemplated in the study can lead to a significant reduction in the miles of transmission overloads

# 2050 Transmission Study, cont.

- The ISO provided a further update at the [December 13, 2022](#) PAC meeting:
  - Discussed the following lessons learned
    - Increasing the capacity of existing lines is effective
    - 345/115 kV transformers are critical
    - Generator sizes and locations can affect overloads
    - Solutions are sensitive to load duration
  - Discussed preliminary solutions for Southwest CT and Boston
  - Summarized the approach to solution development



# 2050 Transmission Study, cont.

- At the [April 20, 2023](#) PAC meeting:
  - Presented possible solutions for:
    - Vermont
    - North-South transfer
    - Boston Import
  - Developed an approach for dealing with cost estimates
  - Summarized the approach to solution development
  - Proposed approach for identifying “high-likelihood” concerns, which are those that occur under a wide range of studied conditions

# 2050 Transmission Study, cont.

- On [July 25, 2023](#), the ISO discussed the following with the PAC:
  - Summarized key takeaways
  - Provided possible roadmaps to address North-South transfers and Boston Import
    - Included consideration of an off-shore grid
- The final presentation to the PAC occurred on [October 18, 2023](#)
  - Summarized all presentations to date
  - Presented cost estimates to address steady-state, thermal overloads
  - The estimated cost to serve the 57 GW load is approximately \$22-26 billion
    - The following costs were not considered:
      - Costs associated with resolving non-PTF overloads that were not associated with PTF overloads
      - Costs for equipment required to solve voltage, short-circuit, transient stability, or electromagnetic transient (EMT) concerns
      - Costs to interconnect any of the new resources assumed in this study
      - Future inflation was not applied to the cost estimates provided in this study; these cost estimates represent U.S. dollars in 2023
    - Therefore, the total cost to serve the 57 GW load will be significantly higher

# Transmission Planning Guide Updates

- ISO-NE issued an update to the [Transmission Planning Technical Guide](#) (TPTG), dated September 12, 2023
  - Added language throughout the guide to account for having a winter peak study condition
  - Updated to reflect long-duration energy storage
  - Update to reflect that DER power factor
  - Update voltage criteria
  - Updated to clarify the 50-year generator outage retirement risk rule
- There have been two recent updates to the [Transmission Planning Process Guide](#) (TPPG), with the most recent being September 8, 2023
  - Clarified requirements for modeling resources with contracts in Needs Assessments and solution development and corrected a reference

# Updating Area Study Plans\*

- New England-wide
  - In July, the ISO began a New England-wide short circuit assessment
  - On [July 25, 2023](#) the ISO presented the results of the Needs Assessment, which were later revised
    - 13 circuit breakers were found to be over their interrupting capability
    - 3 additional circuit breakers were found to be above 97.5% of their interrupting capability, but are not being addressed
  - Revision 1 of the Needs Assessment was published on [October 6, 2023](#)
  - Four Solutions Studies were initiated to address the overdutied circuit breakers
    - Western and Central Massachusetts (WCMA), Rhode Island, Maine, and Southeastern MA (SEMA)
  - [WCMA](#) and [Rhode Island](#) solutions presentations were posted on November 8, 2023 for discussion at the November PAC meeting

\*Links to each of the Key Study Areas can be found in [Appendix A](#)

# Updating Area Study Plans\*

- Vermont
  - 2032\*\* Needs Assessment scope of work presentation was discussed with the PAC on [December 13, 2022](#)
    - Considers new methodology for dispatch creation
    - Includes additional peak and minimum load scenarios to capture renewable resource and storage assumptions
    - Includes steady state, stability, and short circuit analysis
  - Based on stakeholder feedback, the ISO has added a winter evening peak condition to the scope
    - Discussed at the [February 15, 2023 PAC](#) meeting
  - The written scope was finalized on [July 13, 2023](#)

\*Links to each of the Key Study Areas can be found in [Appendix A](#)

\*\*Since the December discussion, the study year is being changed to 2033

# Updating Area Study Plans, cont.\*

- Boston
  - 2032\*\* Needs Assessment scope of work presentation was discussed with the PAC on [December 13, 2022](#)
    - Considers new methodology for dispatch creation
    - Includes additional peak and minimum load scenarios to capture renewable resource and storage assumptions
    - Includes steady state, stability, and short circuit analysis
  - The need for a winter evening peak condition was reviewed and found to be less severe than the summer peak conditions already considered
  - The final written scope was published on [August 23, 2023](#)

\*Links to each of the Key Study Areas can be found in [Appendix A](#)

\*\*Since the December discussion, the study year is being changed to 2033

# Economic Planning for the Clean Energy Transition

- To achieve a better understanding of the effect of industry trends on our economic planning analyses, the ISO is currently performing the Economic Planning for the Clean Energy Transition (EPCET) ‘pilot’ study, similar to our TPCET [pilot study](#) for transmission planning
- The EPCET pilot study has three main objectives
  - Perform a dry-run of the study framework proposed in the upcoming Tariff changes
  - Take a deep dive into all input assumptions in economic planning analyses, propose updates to any assumptions based on our current experience, and test the effect of those modeling changes
  - Gain experience in the features and capabilities of our new economic planning software
- The scope includes a set of three reference scenarios and also models stakeholder sensitivity requests
  - **Benchmark Scenario:** Model previous year (2021) to test fidelity of models against historical performance
  - **Market Efficiency Needs Scenario:** Model future year (i.e., 10-year planning horizon) based on our existing planning criteria (CELT forecasts [EE, PV, EV, HP], FCM new/retired resources, state contracted resources, etc.)
  - **Policy Scenario:** Model future year (i.e., year of last policy target, 2050) based on full effect of all New England state climate policies (i.e., electric sector and economy-wide de-carbonization).
    - These scenarios use a capacity expansion tool that models the buildout of the system from today to 2050 under different assumptions
- The ISO initiated the study in April 2022 and expects to finish the work by Q2 2024

# Market Efficiency Transmission Upgrades

- There have been no changes since the May 2023 IPSAC meeting



# Public Policy Based Transmission

- Public Policy Transmission Upgrades (PPTUs) are upgrades designed primarily to meet local (e.g., municipal and county), state, and federal Public Policy Requirements identified as driving transmission needs relating to the New England Transmission System
- The Public Policy process was initiated on [January 13, 2023](#)
- The ISO discussed the process with the PAC on [January 19, 2023](#)
- Two submittals were made
  - [Combined document containing both submittals](#)
  - [Combined templates for both submittals](#)
- New England States Committee on Electricity (NESCOE) has the option to provide a communication regarding those submittals by May 1, 2020
  - On April 28, NESCOE provided their [Submission Regarding Transmission Needs Driven by State and Federal Public Policy Requirements](#)
  - No Public Policy Requirements were identified
- Stakeholders had until May 16, 2023, to request that ISO-NE reconsider NESCOE's position regarding federal public policy requirements
- At the [June 15, 2023](#) PAC meeting, the ISO presented its finding that a Public Policy Transmission Study would not be initiated for this cycle

# Regional System Plan Project List and Asset Condition List Update

- June 2023
  - Updates to the Regional System Plan (RSP) Project List
    - Six cost increases greater than \$5M
      - \$84.3M for the 2nd Mystic-Woburn 115 kV cable
      - \$30.8M for the new Woburn-Wakefield 345 kV cable
      - \$23.1M for the new Sudbury-Hudson 115 kV line
      - \$14.0M for the two Browns River 50 MVAR capacitor banks
      - \$21.1M for the N12/M13 DCT separation & reconductoring between Somerset and Bell Rock
      - \$32.1M for the new East Eagle 115 kV station between Mystic and Chelsea
    - No new projects
    - Five projects were placed in service – all are in Eastern CT
    - No projects were canceled
  - Updates to the Asset Condition List
    - 30 new projects added
    - 12 projects placed in service
  - Final RSP Project List and Asset Condition List update
    - [Final PAC presentation](#)
    - [Final RSP Project List](#)
    - [Final Asset Condition List](#)

# Regional System Plan Project List and Asset Condition List Update, cont.

- October 2023
  - Updates to the Regional System Plan (RSP) Project List
    - Cost increases greater than \$5M
      - None
    - No new projects
    - Six projects were placed in service
      - (MA) Total of four projects
        - » SEMA/RI – three projects
        - » Boston Area Optimized Solution – one project
      - (CT) Total of two projects
        - » Eastern CT 2029 – two projects
    - No projects were canceled
  - Updates to the Asset Condition List
    - 23 new projects added
    - 14 projects placed in service
  - Final RSP Project List and Asset Condition List update
    - [Final PAC presentation](#)
    - [Final RSP Project List](#)
    - [Final Asset Condition List](#)



# APPENDIX A

# Links to Key Study Areas

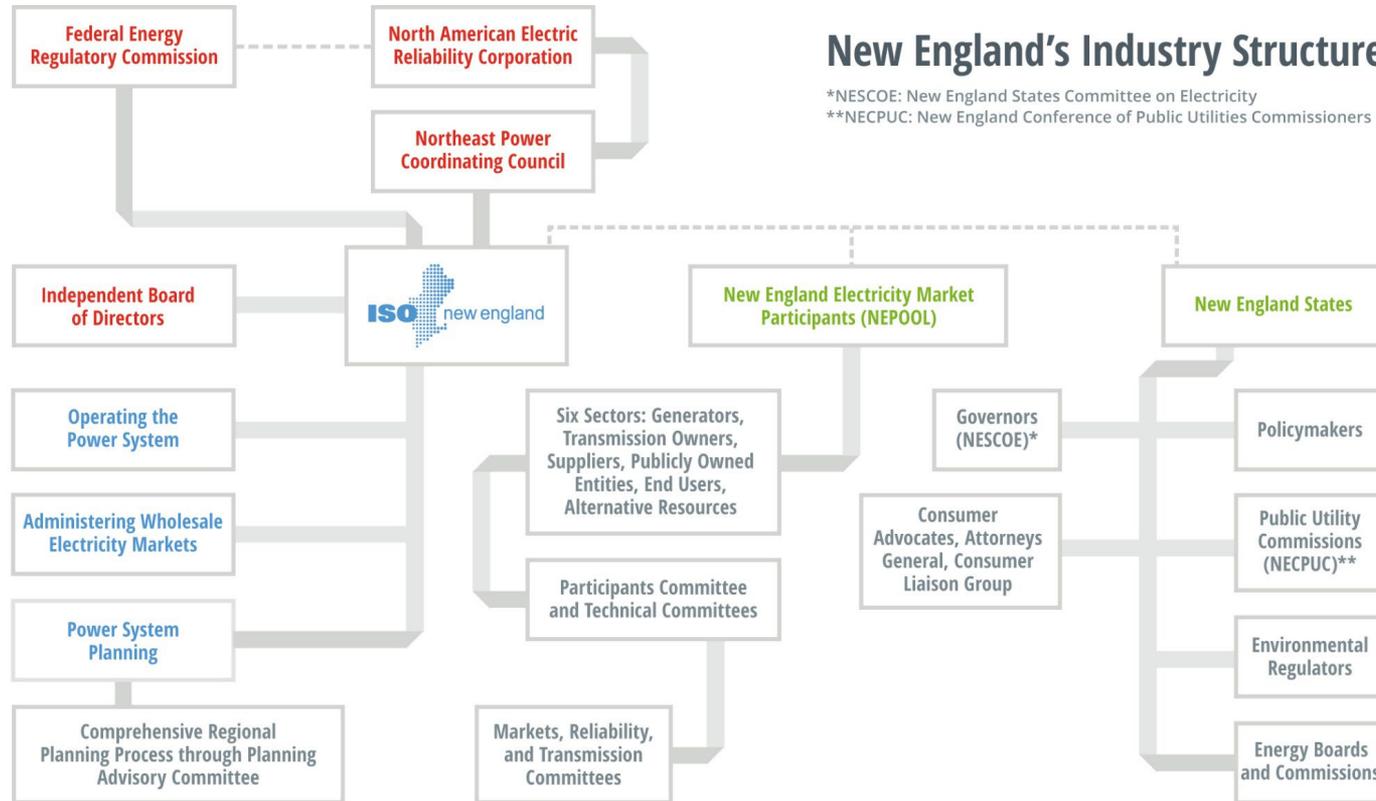
- [Eastern Connecticut](#)
- [Greater Boston](#)
- [Greater Hartford](#)
- [Maine](#)
- [New England East-West Solution](#)
- [New England-Wide Geomagnetic Disturbance](#)
- [New Hampshire and Vermont](#)
- [Southeastern Massachusetts and Rhode Island](#)
- [Southwest Connecticut](#)
- [Western and Central Massachusetts](#)

# Links to Other Areas of Focus

- [Longer-Term Transmission Studies](#)
  - This where materials related to the 2050 Transmission Study can be found

# APPENDIX B

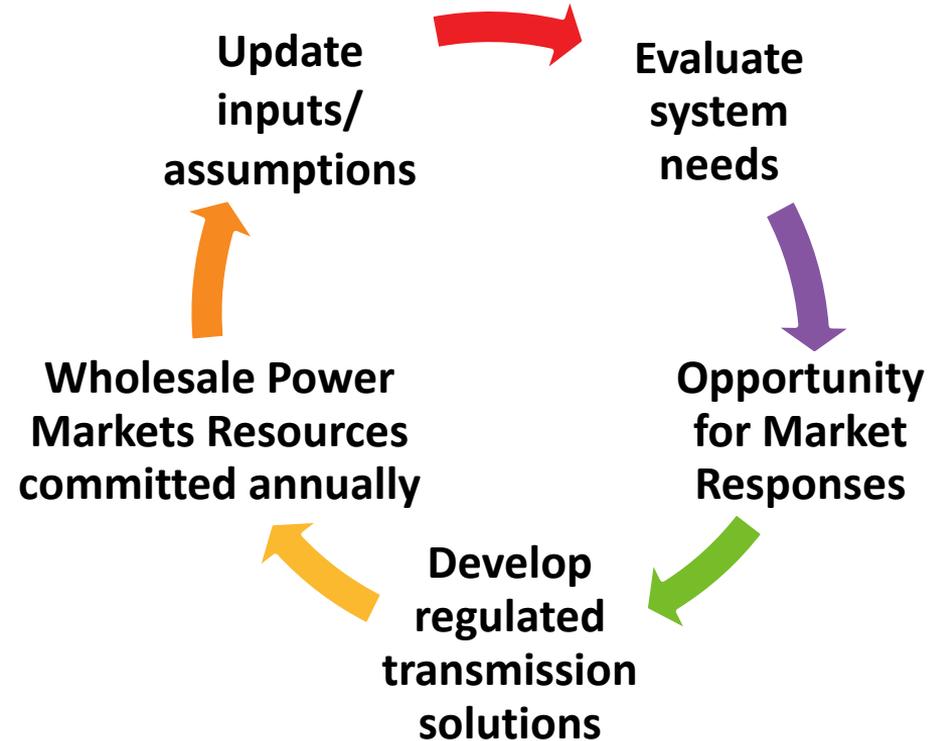
# Numerous Entities Including an Independent Board Provide Oversight of and Input on ISO's Responsibilities



# New England's System Planning Process

## Continuous, Adaptive and Successful

- Open and transparent 10-year planning horizon reflects:
  - Update inputs/assumptions
  - Evaluate system needs
  - Market responses
  - Timing of future resource needs
- Provide information to marketplace and stakeholders
- Coordinate with neighboring areas



# Reliability Planning Process

- Needs Assessments evaluate the adequacy of the transmission system over a 10-year planning horizon
  - Incorporate resources (generation and demand response) that have a firm commitment to perform, typically receiving an obligation through the Forward Capacity Market
  - Incorporate energy efficiency and photovoltaic forecasts
- ISO New England utilizes a continuous planning process
  - No fixed schedule
  - Allows for the incorporation of assumption changes “on-the-fly” rather than waiting for the next cycle
  - Ensures that solutions are not under or over-built
- Solutions Development
  - Identification of needs to be addressed through the Solutions Study process or the Open Competitive Process (as per Attachment K)
    - If the requirements of Attachment K Section 4.1(j), including a year of need 3 years or less from the completion of the needs assessment, have been met then the Solutions Study process is used for solution development
    - If the year of need is greater than 3 years from the completion of the Needs Assessment, the competitive process is used for solution development

# Public Policy Process

- At least every 3 years, the ISO issues a Public Notice indicating input on state and federal Public Policy Requirements (PPR) can be submitted to the New England States Committee on Electricity (NESCOE) and local (e.g. municipal and county) PPRs can be submitted to the ISO
- NESCOE may provide a communication to the ISO regarding Public Policy Requirements
- Specification of the federal, state and local PPRs, if any, that will be addressed in a Public Policy Transmission Study (PPTS). Federal and state PPRs will be specified by NESCOE and, if required, by ISO. Local PPRs will be specified by ISO
- ISO performance of an initial phase of the PPTS and, if determined by ISO, a follow-on phase of the PPTS with opportunity for PAC to comment
- If a Public Policy Transmission Upgrade will be pursued, the solution will be developed through the Open Competitive Process

# Helpful References

- The Transmission Planning Process Guide outlines the steps in the regional transmission planning process (<https://www.iso-ne.com/system-planning/transmission-planning/transmission-planning-guides/>)
- The Transmission Planning Technical Guide documents several of the assumptions used in transmission planning studies (<https://www.iso-ne.com/system-planning/transmission-planning/transmission-planning-guides/>)
- Attachment K to the ISO New England Open Access Transmission Tariff (OATT) describes the Regional System Planning Process ([www.iso-ne.com/oatt](http://www.iso-ne.com/oatt))