Draft Conclusions and Recommendations

- ISO New England 2050 Transmission Study
- Transmission Planning
- Offshore Wind Transmission
- Generator Interconnection and Order 2023
- Siting and Permitting
- Grid Enhancing and Alternative Technologies

Draft Conclusions and Recommendations:

ISO New England 2050 Transmission Study

- The ISO-NE 2050 study provides several high-level observations on transmission-related challenges the future grid may face as a result of the clean energy transition
  - **Reducing peak load significantly reduces transmission cost.** Peak load growth from electrification will result in significantly higher regional transmission costs (e.g., the cost to serve 51 GW of load is $16-$17 billion, while the cost to serve 57 GW of load is $23-$26 billion). More aggressive demand response, energy efficiency, peak shaving programs, and using some stored fuel for heating on the coldest days can reduce peak demand growth and save costs across the region.
  - **Incremental upgrades can be made as opportunities arise.** Many transmission concerns can be addressed by rebuilding existing lines rather than building new lines in new locations. Taking advantage of line rebuilds could minimize costs and be less environmentally disruptive. Upgrading the capacity of lines as the opportunity arises, or "right-sizing" asset condition projects, could be a financially prudent way to reliably serve increased peak loads.
  - **Generator locations matter.** The specific location of generators can have a significant impact on the needed transmission upgrades. In general, locating generation close to large load centers, such as cities, can reduce the strain on the transmission system.
  - **Transformer capacity is crucial.** As load increases, higher voltage lines and power transformers to "step down" to lower distribution system voltages become more important. Many additional transformers will be needed, but they typically are expensive and require a long lead time. It may be prudent to start ordering transformers ahead of time and determining their exact locations later.
- The Clean Energy Transmission Working Group may wish to consider whether and how to incorporate these takeaways into its report to the legislature

Draft Conclusions and Recommendations:

Transmission Planning

- The Commonwealth should support regional and interregional efforts to create more holistic, proactive, and forward-looking transmission planning processes. Support the prioritization of multi-value transmission that address multiple needs, including those that enable future electrification and clean energy resources in a holistic manner.
- The Commonwealth should request Transmission Owners to prioritize upgrades to existing infrastructure as solutions to onshore transmission needs. Focus first on addressing anticipated onshore transmission needs by upgrading existing facilities, including those that are already slated for replacement due to asset condition needs. Select greenfield onshore transmission projects only when no other viable alternative exists.
- To the extent new onshore transmission is needed, the Commonwealth should encourage the co-location of transmission infrastructure within state-controlled properties and corridors (e.g., highway and railroad rights-of-way). The legislature should consult with relevant agencies (e.g., Mass DOT, MBTA) and consider allocating additional resources to these agencies or granting additional statutory authority to support the Commonwealth's clean energy transition.
- To expedite the interconnection of clean energy resources and the development of the necessary transmission, the Commonwealth should support workforce development efforts to increase the number of engineers and technical staff within relevant agencies to ensure review of siting and permitting applications in a prudent and expeditious manner.

Draft Conclusions and Recommendations:

Offshore Wind Transmission

- The Commonwealth should work with other New England states, ISO New England, and transmission-owning companies to initiate a regional analysis to determine the optimal locations for the interconnection of offshore wind. The analysis should include options to interconnect offshore wind resources that: (i) minimizes costs and needed upgrades to deliver power to load centers and meet future load growth, (ii) enables the ability to interconnect other new clean energy resources, and (iii) minimizes environmental and community impact.
- The Commonwealth should evaluate the offshore wind procurement process as part of a strategic offshore wind plan, considering the recent procurement experiences along the east coast. This should target lowering total customer costs and de-risking offshore wind procurement events by reducing the cost of entry for developers. This could include separating land-based transmission upgrades from offshore wind development, and setting clear standards for offshore transmission projects that enable a modular and expandable multi-terminal HVDC offshore grid.

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Generator Interconnection Process Conclusions

- Interconnection process reform has become a focus of FERC and RTOs due to the backlog of projects waiting to be studied and high volumes of projects dropping out at various stages of the study process.
- Interest in developing clean energy projects has also grown in recent years, creating the need for larger numbers (and more complex) interconnection studies. These studies are complicated and challenged by a shortage of qualified professionals to conduct them.
- Proactive transmission planning processes are necessary to cost-effectively integrate thousands of new projects on the grid and maintain reliability. Currently, these processes do not exist, relegating identification and funding of major network upgrades to the interconnection process, which it is not designed for. Entering the study process continues to be the only way for a project to determine its interconnection costs with certainty.
- Many network upgrade costs are too costly for any individual project to fund and inefficient, with one-by-one upgrades not as cost-effective as holistic expansion plans.

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Interconnection and Order 2023 Conclusions

- Order 2023 leaves certain challenges partially or completely unresolved. While the Order requires the use of heat maps and certain levels of data disclosure for interconnection customers, because of the opaque nature of the studies and the unpredictability of costs, high volumes of "speculative" projects will continue to enter the queue, creating more work for ISO-NE and the TOs. Improvements to data transparency and cost certainty for interconnection customers need additional attention.
- Even with improvements, ISO-NE estimates its queue entry and initial study phase (not including necessary re-studies) will take almost a year. Process automation, Artificial Intelligence (AI), improved and streamlined models, staff additions, and other innovations to improve timelines and accuracy are areas for additional improvement.
- Costly and delayed construction timelines will be a challenge. Even if the region can process many more studies, and interconnection customers accept the associated costs, network upgrades associated with those projects need to be built in a timely manner and multi-year backlogs for network upgrade construction projects and increasing costs are an issue.
- To ensure efficient processing of Distributed Generation and Utility scale interconnections, infrastructure upgrades at the distribution and transmission level will need to be aligned. ISO-NE is in the process of providing clarification on the interaction between DG ASO and ISO-NE interconnection queues.

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Transmission and Distribution Interconnection Recommendations

- **Encourage ISO-NE to establish a forum to continuously explore interconnection process improvements beyond initial Order 2023 compliance.** This forum could be housed within the existing New England Power Pool (NEPOOL) framework.
- Support focused workforce development initiatives. Power system engineers and related specialists are in high demand. **Massachusetts and the Clean Energy Center could work with universities to expand existing workforce education/training programs.**
- Transmission system network upgrade construction delays could impede the region's progress. One of the reasons will be procurement of long-lead time bulk power system equipment. **Massachusetts should direct Transmission Owners to identify and procure key pieces of equipment that will be used to enable this work, with input from ISO-NE and Massachusetts DPU oversight.**
- **Establish a working group, chaired by DOER and DPU, to facilitate stakeholder collaboration on regional best practices for Distributed Generation (DG) Affected System Operator (ASO) studies.** The results of this working group would inform the ISO-NE stakeholder engagement process on DG ASO studies following compliance with Order 2023.
- **Consider directing EDCs and TOs to work with ISO-NE to identify local transmission upgrades necessary to meet statewide climate goals and associated cost allocation mechanisms to formalize the treatment of rate recovery of proactive local transmission upgrades.** EDCs and TOs should complete this task by a specific date and submit a progress report to ISO-NE, EEA, DOER and DPU, and upgrades should include those needed to implement the electric sector modernization plans.

Draft Conclusions and Recommendations:

Siting and Permitting

- The Commission on Energy Infrastructure Siting and Permitting (CEISP) is charged with developing recommendations for reform of electric transmission facilities siting and permitting.
- The CETWG recommends the CEISP consider transmission siting and permitting challenges identified in the CETWG's report to the legislature.

Draft Conclusions and Recommendations:

Grid Enhancing and Alternative Technologies

- The Commonwealth can push for a regional study or cost-benefit analysis of GETs and encourage the use of GETs where they offer a cost-effective strategy to achieving state transmission goals.
- Order 2023 requires GETs evaluation, but the transmission planner ultimately determines the final solution. ISO-NE can go beyond Order 2023 requirements and formally evaluate dynamic line ratings in all contexts where DLR technology may be reasonably applied.
- The Commonwealth can encourage the utilization of developer identified GETs solutions to interconnection and curtailment challenges.