ISO-NE Generator Interconnection Process & Order 2023 Compliance

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Introduction & Outline

New Leaf Energy is a national developer of distribution and transmission interconnected solar and storage resources, headquartered in Lowell, MA.

Outline of Today's Presentation

- **Current ISO New England Interconnection Process Overview**
- **Symptoms of Problems with the Interconnection Process**
- **The Primary and Secondary Causes of these Problems**
- **Relevant Federal Energy Regulatory Commission Rulemakings**
- **Order 2023 Reforms & Beyond**
- **Initial Recommendations for Consideration**

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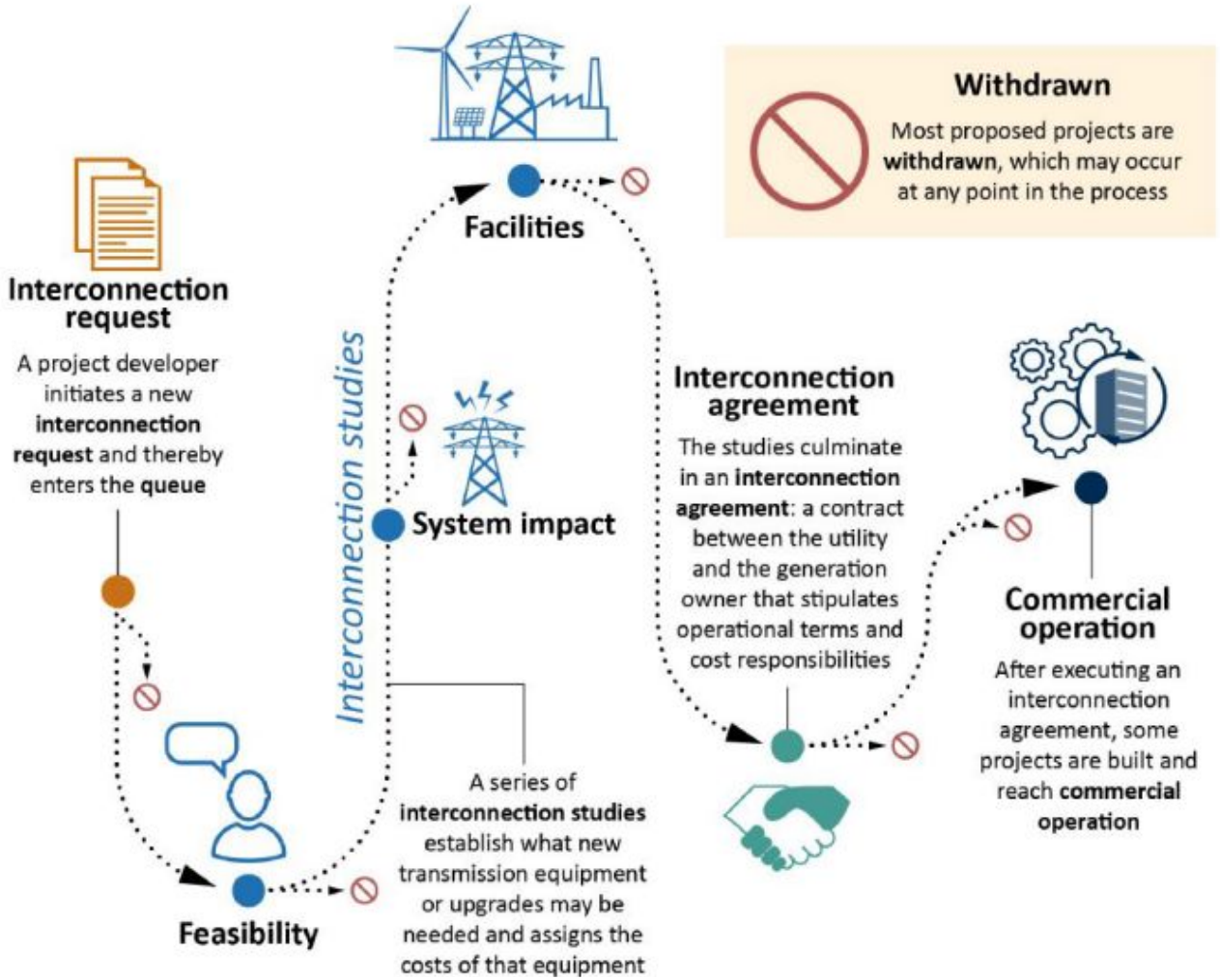
Current ISO New England Interconnection Process Overview



ITEMS OF NOTE:

- Projects that enter the ISO- NE queue are **studied serially,** meaning one after another, in the order in which they entered.
- There are **three major stakeholders** in the study process: ISO New England is in charge of conducting the studies (often via consultants), the Transmission Owner (TO) provides cost estimates as well as information about the feasibility of the specific site, and the developer submits models, designs, information and payments for the studies.
- **Developers pay** for the costs of the upgrades at the point of interconnection, as well as network upgrades elsewhere on the system, if they are triggered. Costs aren't known until the project enters the queue and study results are posted, which is often years after queue entry.

Source: DOE- https://www.energy.gov/sites/default/files/2023-07/Rand_Queued%20Up_2022_Tx%26Ix_Summit_061223.pdf

Symptoms of Problems with the Interconnection Process

- High rates of queue withdrawals, triggering frequent restudies.
- Slow, multi-year study timelines.
- High volumes of projects waiting to be studied.
- Slowed deployment of renewable deployment.
- Higher PPA costs due to growing network upgrade costs.
- Overworked and stressed ISO and utility staff.
- Reliability concerns when retirements outpace additions.
- Frustrated developers.
- Cancelled projects, wasted money, wasted time.

"Ultimately, the dysfunction of the interconnection process harms consumers. It prevents low-cost generation from coming online that could have reduced the cost of electricity, and it harms reliability. Several of the nation's largest grid operators have stated that they could face resource adequacy problems if new resource entry does not occur rapidly enough to match the pace of resource retirements."

- FERC Commissioner Allison Clements

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Primary and Secondary Causes of these Problems

PRIMARY:

- Limited or no headroom available on the system in places where clean energy resources can be built.
- Transmission planning processes & cost allocation rules not configured to systematically, efficiently, cost-effectively and strategically site new projects.
- Lack of visibility and certainty on interconnection costs until late in the development cycle.

SECONDARY:

- Staffing shortages and labor intensive models.
- Lack of incentives or penalties for ISOs and TOs to make them meet timelines.
- Unreasonable study assumptions trigger upgrades that aren't needed.
- Too many speculative projects in the queue that have low probability of being built.
- Cost allocation rules (first to trigger pays for all) increases probability of dropouts.
- Limited publicly available data & study methodology drives high volumes of projects into the queue.

ORDER 2023 seeks to resolve some of the secondary causes of queue delays. The Transmission Planning and Cost Allocation final rule (still pending) may be able to address some of the primary causes. See next slide for details.

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Relevant Federal Energy Regulatory Commission (FERC) Rulemakings

July 15, 2021: FERC issues an Advanced Notice of Proposed Rulemaking (ANOPR) [RM21-17-000] in order to begin Transmission and Interconnection Reforms.

- Technical Conference
- Hundreds of Industry Comments
- Joint Federal-State Task Force (FERC + NARUC) established

April 21, 2022: FERC issues a Notice of Proposed Rulemaking (NOPR) [RM21-17-000]

- Targets Transmission Planning & Cost Allocation

No rule has been published

June 16, 2022: FERC issues Notice of Proposed Rulemaking (NOPR) [RM22-14-000]

- Targets Interconnection Processes

Sept 6, 2023 "Order 2023" published in the Federal Register

Simplified Process Overview*:

- FERC initiates rulemaking.
- Stakeholders submit comments.
- FERC publishes order with new rules.
- RTOs and utilities file compliance plans.**
- FERC reviews / accepts filings.
- Rules go into effect.

*Specific processes can vary. Legal challenges can create additional actions, not shown here.
** ISO New England is currently in the process of creating its Order 2023 Compliance rules.

FERC Order 2023 & Beyond

CORE ORDER 2023 CHANGES:

- Fixed, predictable and (hopefully) faster study timelines.
- Higher barriers to entry like site control and readiness deposits.
- Penalties for TOs and ISOs if they don't meet study deadlines.
- Projects will be studied and allocated costs in groups called clusters.
- Advanced technologies that avoid costly upgrades can be considered.
- Changes to projects won't automatically kick projects out of the queue
- Batteries do not need to be studied as if they charge during peak load (because in practice, they won't)

WHERE ISO-NE CAN DO MORE:

- *Minimize disruption to late stage projects during transition to new rules.*
- *Create more certainty by providing tools, information and enhanced transparency into study methodologies, cost allocation rules and network upgrade costs.*
- *Improve coordination with state interconnection queues.*
- *Standardize study reports and cost estimation tools (i.e. unit cost guides, templates).*
- *Create clear procedures and transparency into material modification and grid enhancing technology processes.*

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Initial Recommendations for Consideration

Near-term friction caused by process-related issues can be improved via the following recommendations:

- Promote the culture of continuous improvement at ISO New England via the establishment of an ongoing NEPOOL forum for interconnection process reform (at minimum, have a “Phase 2” following Order 2023 compliance).
- Consider an analogous effort at the Massachusetts state level to identify best practices for Affected System Operator (ASO) studies, and tie those into ISO-NE reform efforts.
- Explore process automation, Artificial Intelligence (AI), improved/streamlined models, workforce development and other innovations to improve timelines and study accuracy. Massachusetts is a leader in technology & innovation. Could its Clean Energy Center and universities could be tapped to help?
- Anticipate and get in front of looming construction delays. Bulk power system equipment needs to be procured years in advance. Projects could get through studies and be delayed by the TO’s network upgrade timelines.

Thank You

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Appendix

Key Concepts and Vocabulary

- Developers try and identify key locations on the grid to place their projects. One key factor is whether or not they can inject energy into the grid. This is called "**headroom**" or "**injection capacity**."

- Connecting to the grid isn't like plugging in a device. It is always necessary to build new interconnection infrastructure called **interconnection facilities** to connect a project via existing electrical substations, new electrical substations, or "tapping" into a transmission line. These costs can vary significantly, and generators located far away from substations or transmission lines need to build "**gen-ties**", or new, proprietary radial lines to connect to the system.

- The exact point on the system where the project meets the grid is called the **POI**, or **Point of Interconnection**. Where your POI is matters a lot. Power flows all over the system, and the system is not uniform. Injecting energy in certain locations can cause thermal, voltage and transient stability problems. Some problems are very expensive to resolve and require **network upgrades**, to the transmission system.

- In ISO New England, **interconnection customers** pay for any needed upgrades identified in their studies, whether they are related to their specific facility or are on the broader network.

- ISO New England has study procedures to simulate grid conditions and identify needed upgrades to connect and **sell energy**. If a project wants to **sell capacity**, they need to meet a higher level of reliability and are tested under a simulation of very stressed conditions. These are bespoke studies with labor intensive models that can only be run by the ISO and take a lot of time.

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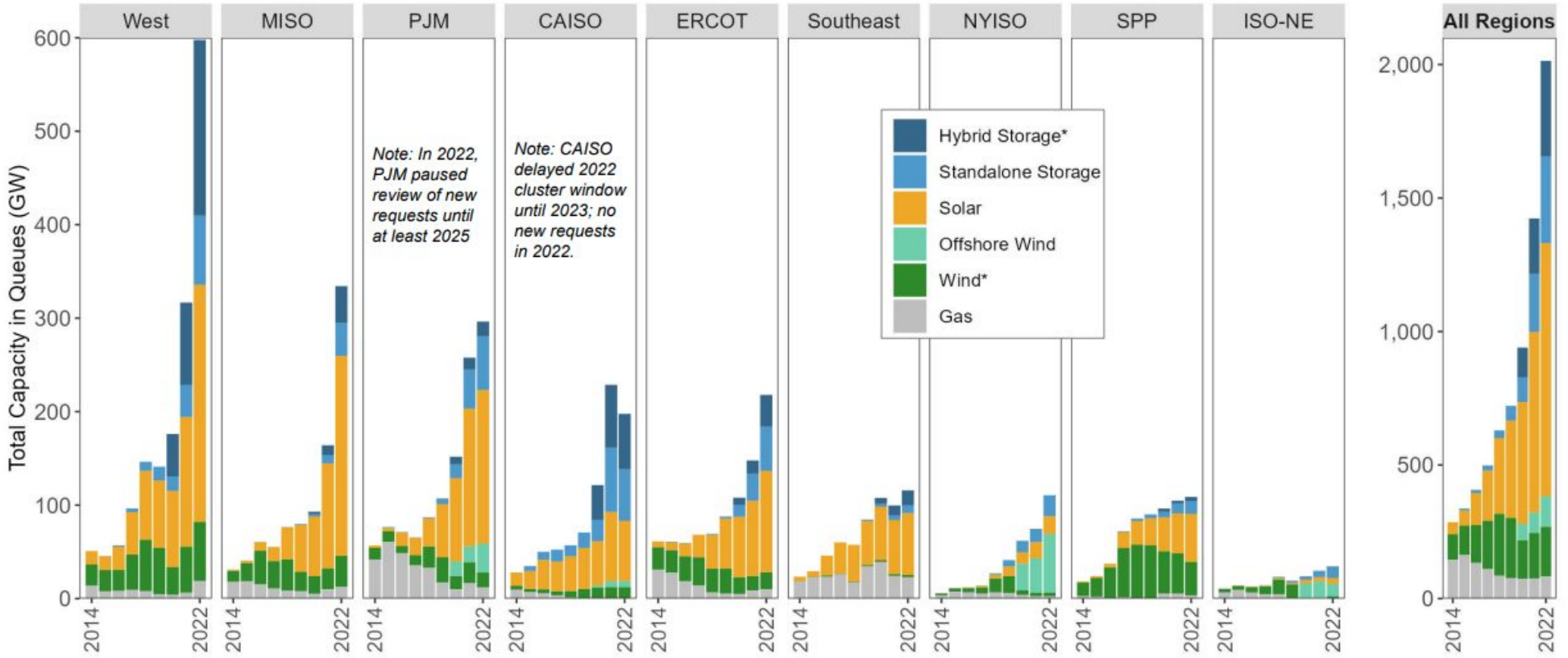
ISO-NE Queue Volumes Are Significant, But Not As Extreme As In Other Locations

Active queue capacity highest in the non-ISO West (598 GW), followed by MISO (339 GW) and PJM (298 GW). Solar and storage requests are booming in most regions.



*Notes: (1) *Hybrid storage capacity is estimated for some projects using storage:generator ratios from projects that provide separate capacity data, and that value is only included starting in 2020. Storage duration is not provided in interconnection queue data. (2) Wind capacity includes onshore and offshore for all years, but offshore is only broken out starting in 2020. (3) Hybrid generation capacity is included in all applicable generator categories. (4) Not all of this capacity will be built.*

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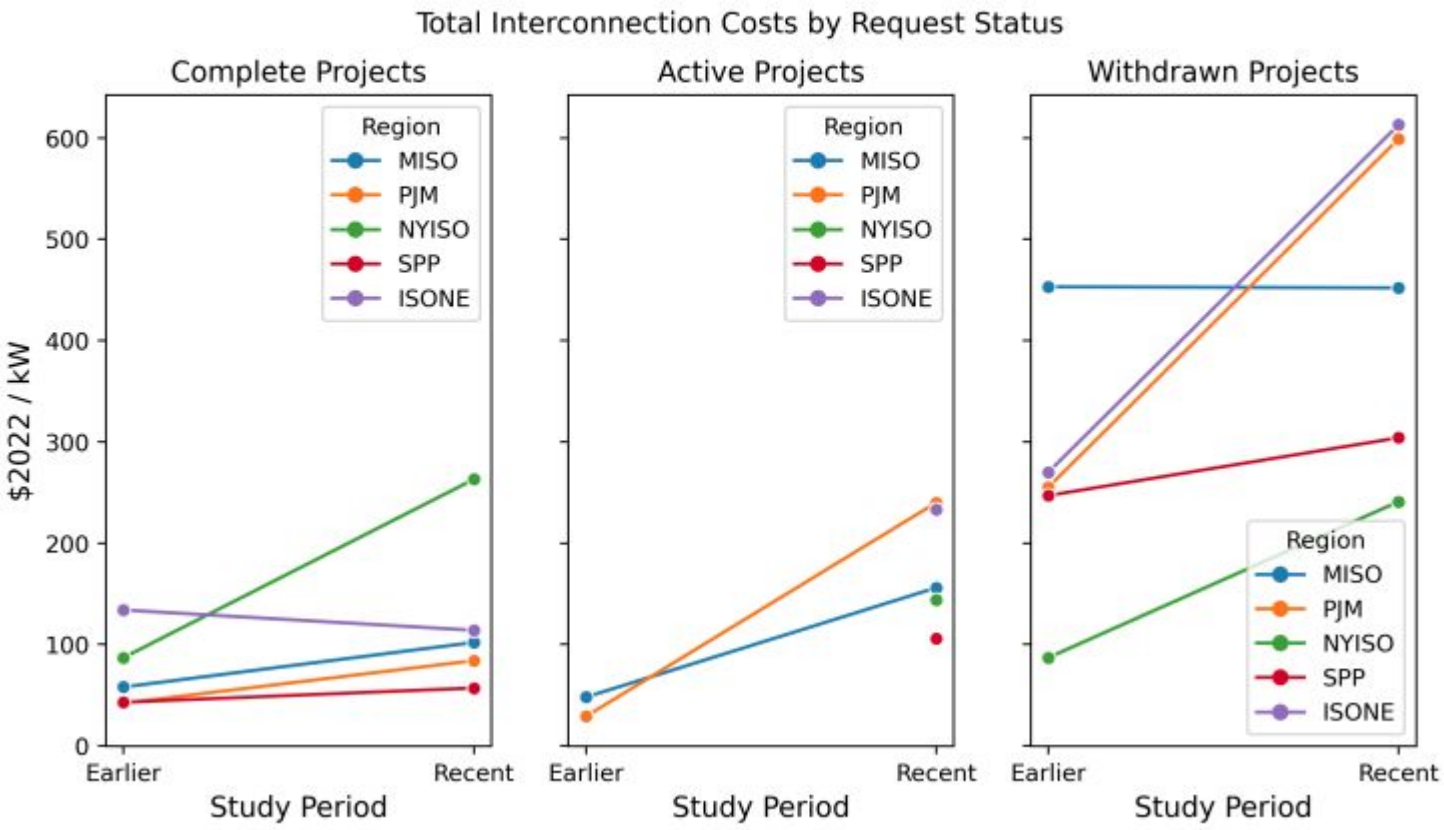
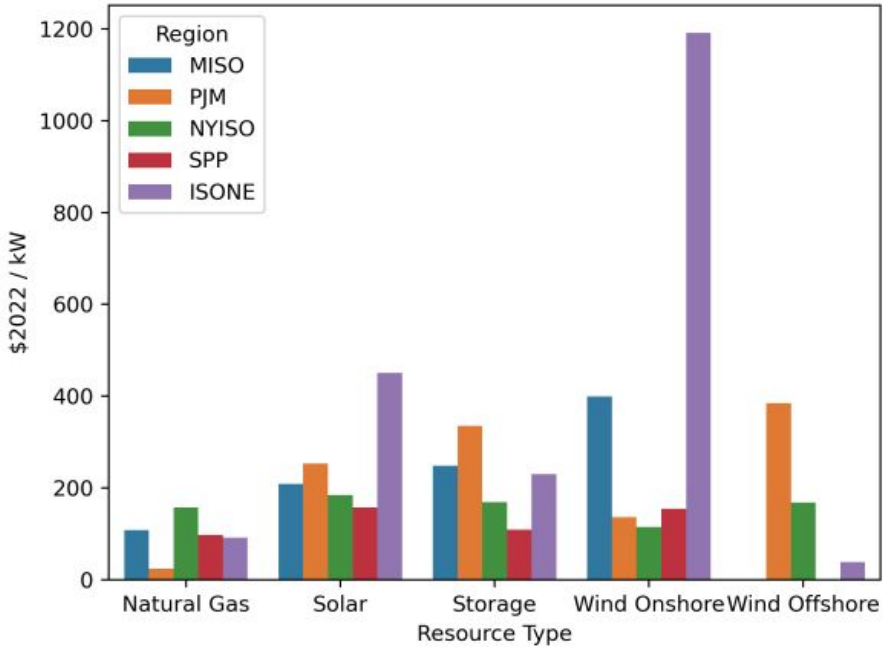
Source: https://www.energy.gov/sites/default/files/2023-07/Rand_Queued%20Up_2022_Tx%26Ix_Summit_061223.pdf

Increases in Network Upgrade Costs Lead to Queue Withdrawals

Average Interconnection Costs



Average Interconnection Costs in Recent Years (includes projects that withdraw application)



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