

Transitional Cluster Study Discussion

Massachusetts Executive Office of Energy & Environmental Affairs



July 23, 2026

Agenda

- I. Introductions (5 mins)
- II. Welcome by EEA Secretary Rebecca Tepper (5 mins)
- III. Remarks by Lieutenant Governor Kim Driscoll (5 mins)
- IV. ISO New England Presentation on Transitional Cluster Study (45 minutes)
- V. Transmission Owners Presentation on Upgrade Cost & Construction Timeline Estimates (30 minutes)
- VI. Final Q&A and Discussion (25 minutes)
- VII. Conclusion (5 minutes)



Transitional Cluster Study

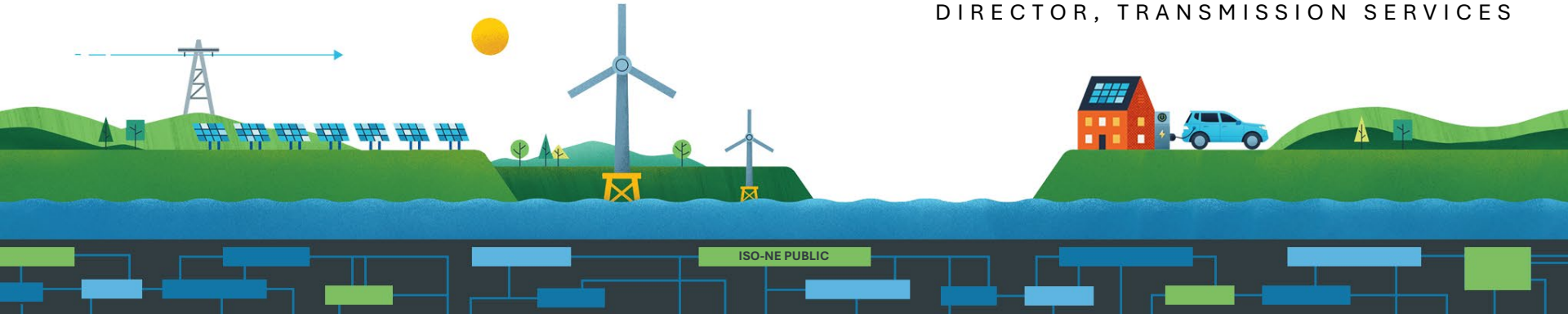
ISO New England

Transitional Cluster Study (TCS) Discussion



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ISO-NE Interconnection Reform

Order No. 2023 & TCS

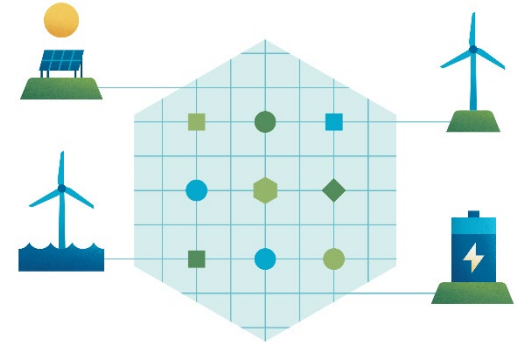
Background: FERC Order No. 2023 required a fundamental shift to a cluster-based interconnection process (“first-ready, first-served”)

Transitional Cluster Study (TCS)

- ISO-NE’s bridge from the current queue to the new framework
- Groups eligible projects into a single cluster study to:
 - Evaluate system impacts collectively, assign shared transmission upgrade costs, and incorporate stricter readiness requirements (site control, deposits, study milestones)

Today’s Focus

- Overview of, and notes on, the TCS
- Next steps



The ISO is Working to Facilitate the Interconnection of Storage (and Other) Resources to the Region's Transmission System

- Currently, ~2,200 MW of storage, mostly in MA, have completed Interconnection Studies and have commercial operation dates in or before 2030
- Storage projects make up the bulk of projects currently undergoing the expedited TCS
 - Through the TCS, the ISO will move more Interconnection Requests (IRs) through the study process in a shorter period than ever before
- Currently, there is ~590 MW of transmission connected storage in New England (of which 400 MW is in MA)

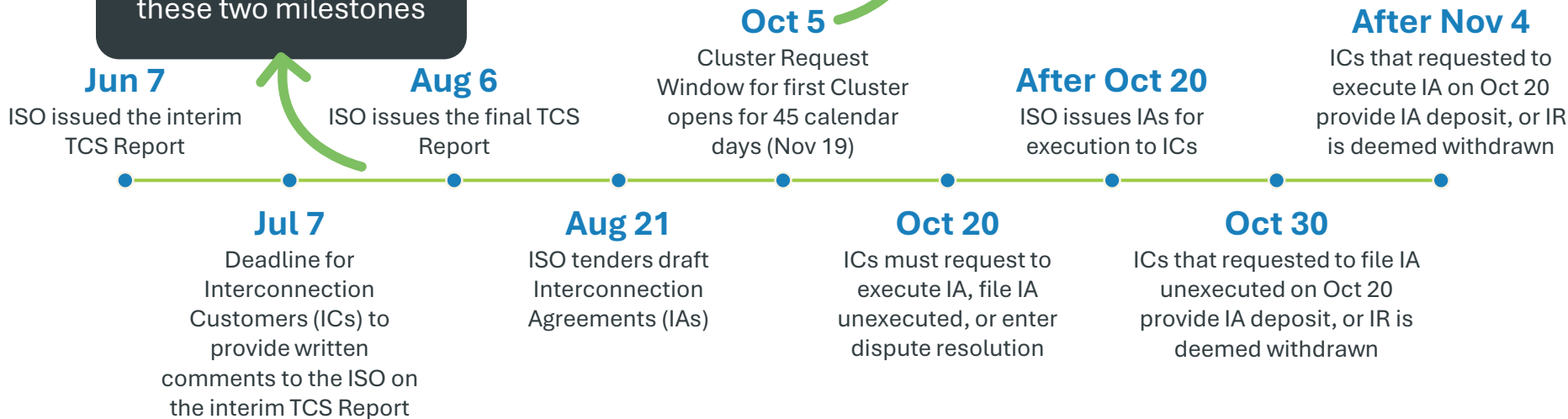


The TCS Is Ongoing

Timeline

The Cluster Request Window will be followed by a 60-day Customer Engagement Window, which will include a Scoping Meeting; following this window, the ISO will begin study work in early 2027

We are here, in between these two milestones



To date, the ISO has met all required milestones

Reminder: The TCS is Currently Ongoing

- To meet confidentiality requirements, the ISO cannot discuss TCS results and details related to specific projects
- The ISO can discuss general aspects of the TCS, including any information in the [public/non-CELL version of the interim TCS report](#)
 - The ISO developed a public/non-CELL version of the interim TCS report to inform regional stakeholders not participating in the TCS and that do not have CELL access

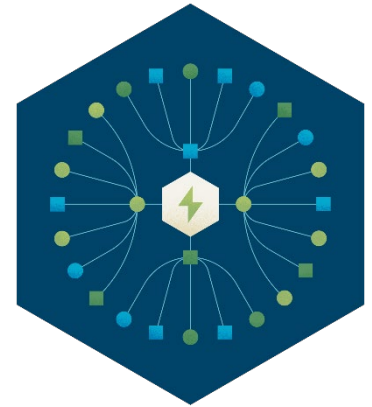


ORDER NO. 2023 TRANSITION



Order No. 2023 Overhaul of Interconnection Procedures

- Order No. 2023 introduced (and Order No. 2023-A affirmed), among other things:
 - A change from studying projects serially one-by-one to in-parallel clusters
 - Increased project entry requirements (e.g., commercial readiness deposits and site control) and withdrawal penalties
 - The sharing of upgrade costs among projects
 - Clear and enforceable deadlines for parties like the ISO to complete studies
- These reforms were meant to move interconnection from a “first-come, first-served” to a “first-ready, first-served” process



Order No. 2023 Transition

- Order No. 2023 required (and Order No. 2023-A affirmed) that the transition process balance “...*the need to move expeditiously to the new cluster study process with the need to respect the investments and expectations of interconnection customers at an advanced stage in the existing interconnection process.*” (Order No. 2023, P856)



Order No. 2023 Transition (cont'd)

- As explained in Order Nos. 2023 and 2023-A, the transition, which includes the TCS, was intended to:
 - Move quickly to the Cluster Study process (Order No. 2023, P856)
 - Deter speculation (Order No. 2023, P857)
 - Allow projects with eligible IRs with confidence in their commercial viability and intent to proceed to complete the interconnection studies/process swiftly (Order No. 2023, P859)
 - Lower the risk of restudies and delays resulting from late-stage withdrawals by requiring higher deposits and penalties (Order No. 2023, P860)
 - Otherwise encourage projects to wait for the first cluster, which has lower deposit requirements, if not ready to proceed (Id.)

NOTES ON THE TCS



TCS: Interim Report Results



TCS Interim Report (Issued June 7, 2026)

Meets final-report requirements but may be refined after IC comments (comments were due July 7, 2026)

23 participating projects, totaling ~4,800 MW

- Largest ever single study of generator capacity (Capacity Network Resource Interconnection Service, or CNRIS)
- ISO-NE's first interconnection cluster study under FERC Order No. 2023; completed in ~8 months; mostly battery storage, with some solar and wind

Per-project upgrade costs: \$0 to \$541M

- Driven by project size, location, and proximity to other projects, plus the violations and upgrades identified

Energy + Capacity projects average ~\$178M

- Projects newly studied for both energy (Network Resource Interconnection Service, or NRIS) and capacity (CNRIS) saw average upgrade costs ~\$178M; five had costs of ~\$65M or less

Capacity-only projects under \$1M

- None of the five capacity-only projects exceeded \$1M

The ISO Started the TCS in October 2025

- The ISO received orders from FERC on April 4, 2025, and June 20, 2025, which set the Order No. 2023 transition timeline
- The deadline for ICs to submit TCS Agreements to participate in the TCS was October 10, 2025, and the TCS study started the following day



The TCS Used Well Established Study Practices

- The interconnection standards applicable to energy and capacity (*i.e.*, the Network Capability and Capacity Capability Interconnection Standards) as well as the study practices and methodologies used under the serial study process were adapted for the Cluster Study approach, but otherwise remained fundamentally the same
 - These standards are defined in the Tariff and detailed in the ISO's Planning Procedures



Stakeholders Were Involved in the Update of Study Practice and Methodology Documentation

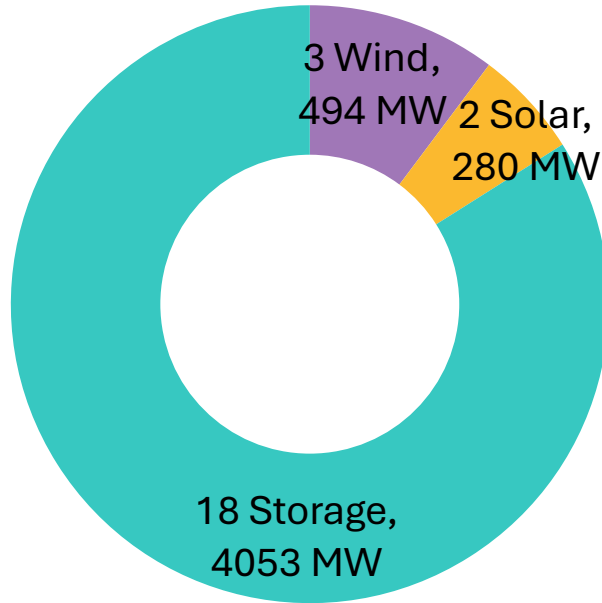
- Planning Procedure 5-6 (PP5-6), which details the Interconnection Study practices and methodology, was expanded to support Cluster Studies
 - The changes were reviewed and supported by stakeholders
 - Stakeholder discussions on these PP5-6 updates began in March 2024, and spanned 8 Reliability Committee meetings in 2024 and 2025
- Changes included incorporating, among other things:
 - The capacity analyses from another planning procedure
 - A section on Cluster Study process, and detailed examples of cost allocation calculations
 - A section on affected system operator study coordination

The Majority of TCS Projects Submitted IRs After Order No. 2023 was Issued

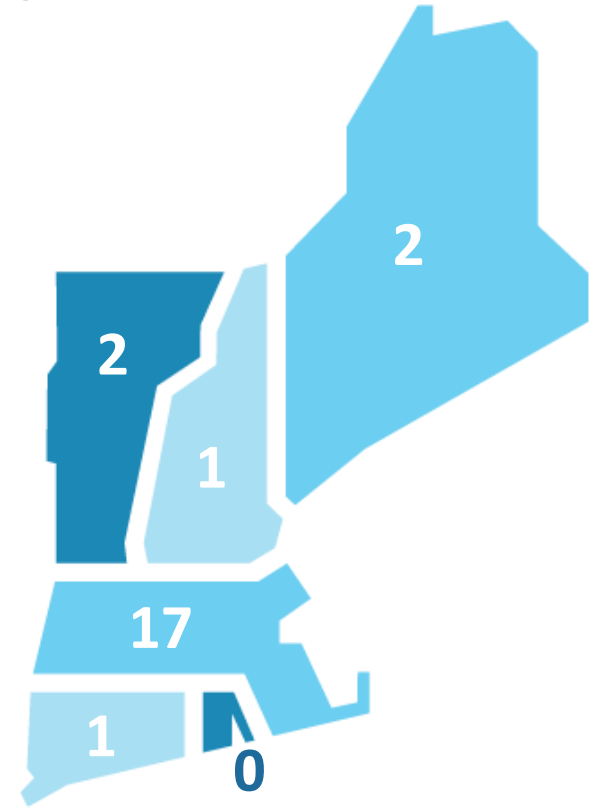
- The transition requirements in Order No. 2023 were intended to complete studies for projects that had been waiting in queue and were ready to make large commercial readiness demonstrations
- In addition to projects that had been waiting in the queue, the TCS also included 14 IRs that were submitted after Order No. 2023 was issued
 - 12 of these 14 IRs were submitted within 3 months of the June 13, 2024 eligibility deadline
 - Eight of these 14 IRs were submitted after the ISO's compliance proposal had been filed on May 14, 2024
- Projects were free to withdraw from the queue without penalty through October 10, 2026, and FERC encouraged those projects that may not be commercially ready to wait until the first full cluster study (Order No. 2023, P859)
- Those projects that remained in the TCS were studied in the manner described in the Tariff and Planning Procedures

Position	Requested
1090	01/13/2021
1116	04/13/2021
1123	04/21/2021
1148	07/13/2021
1171	10/25/2021
1238	03/22/2022
1252	04/21/2022
1365	03/09/2023
1412	06/20/2023
1427	07/21/2023
1428	07/25/2023
1460	10/12/2023
1495	02/22/2024
1502	03/28/2024
1513	04/08/2024
1515	04/09/2024
1518	04/09/2024
1542	05/28/2024
1543	05/28/2024
1546	05/30/2024
1551	05/31/2024
1553	06/04/2024
1555	06/06/2024
1557	06/06/2024
1567	06/11/2024

Most Projects in the TCS were for Storage Proposals in MA

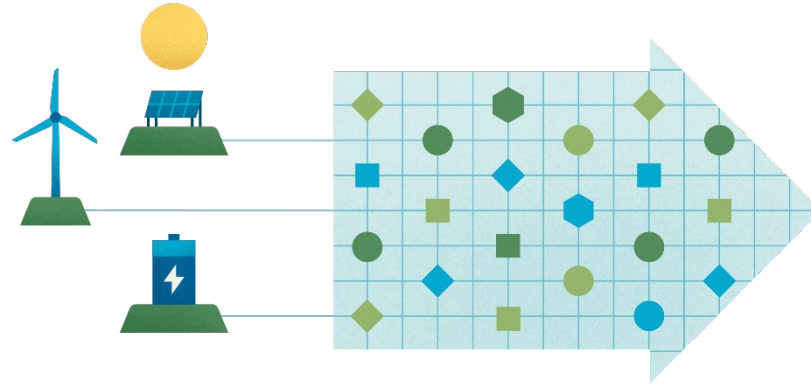


TCS as of June 7, 2026, MW values provided are requested capacity (CNRIS)



The TCS Studied More Capacity than Any Previous Single Study

- The TCS studied ~4,800 MW of capacity (CNRIS)
- Before the TCS, capacity (CNRIS) was studied as part of a Forward Capacity Auction (FCA) qualification process
- For resources sized 20 MW+, the highest amount of capacity studied in an FCM was ~2,900 MW in FCA 2 and FCA 10



The TCS is the “Fastest” Interconnection Study to Date

- The TCS studied 18 projects for energy (NRIS) and 23 projects for capacity (CNRIS) within ~8 months
 - Represents more than 25,000 hours of work to date
- Under the serial study process, one system impact study for energy (NRIS) could take 9 months or more
 - Studies for capacity (CNRIS) would be done separately as part of an FCA qualification process



TCS Study Cases and Information Access

- The ISO has taken multiple steps beyond the requirements of the Tariff to provide ICs and other stakeholders with as much timely information as practicable about the results of the study, including:
 - Publishing a public version of the interim TCS Report
 - Providing all ICs case files and information within five days of issuing the interim TCS Report that enable their review of critical violations identified in the report and replication of any referenced study case
 - Including a user guide for how to manipulate the information provided to replicate study results
 - Posting responses (both public and CEII) to ICs questions about the interim TCS Report
- During the TCS (and future Cluster Studies), the ISO must share information equally with all ICs
 - This ensures that no IC has access to information that others do not and protects IC confidentiality

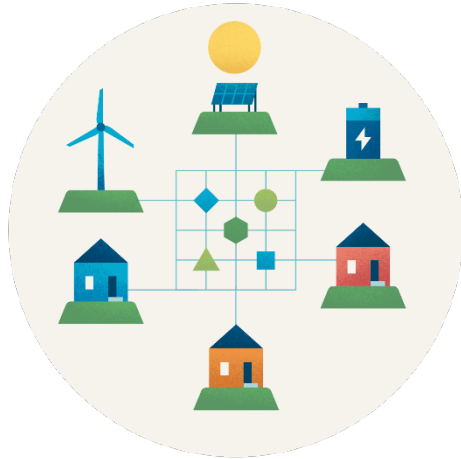
Cluster Study vs. Serial Study Process Considerations

	Serial Process	Clusters (Including TCS)
Ability for ICs to iterate on project parameters?	Yes, within some limits, but often would add significant time to a study	No, otherwise would cause delays for all projects in study, jeopardizing required study deadlines
Ability for ICs to meet and engage directly with the ISO to discuss study results?	Yes, where the ISO could provide in-depth discussion on energy (NRIS) study results, but would add time to the study process. Opportunities more limited for capacity (CNRIS) studies to meet FCA qualification deadlines and treat all projects equally.	No, because information needs to be shared equally with all ICs, and study deadlines must be met
Clear attrition opportunity for IRs without application of withdrawal penalty?	Yes, high upgrade costs can be shared with IC, and IC can end the study process with no withdrawal penalty for energy (NRIS) studies. Projects assigned upgrades for capacity (CNRIS) analyses could reduce requested MW and/or decide to not clear in the FCA	No,* ICs are provided with upgrade costs towards the end of the study process, and withdrawal penalties are applied if they withdraw their IRs

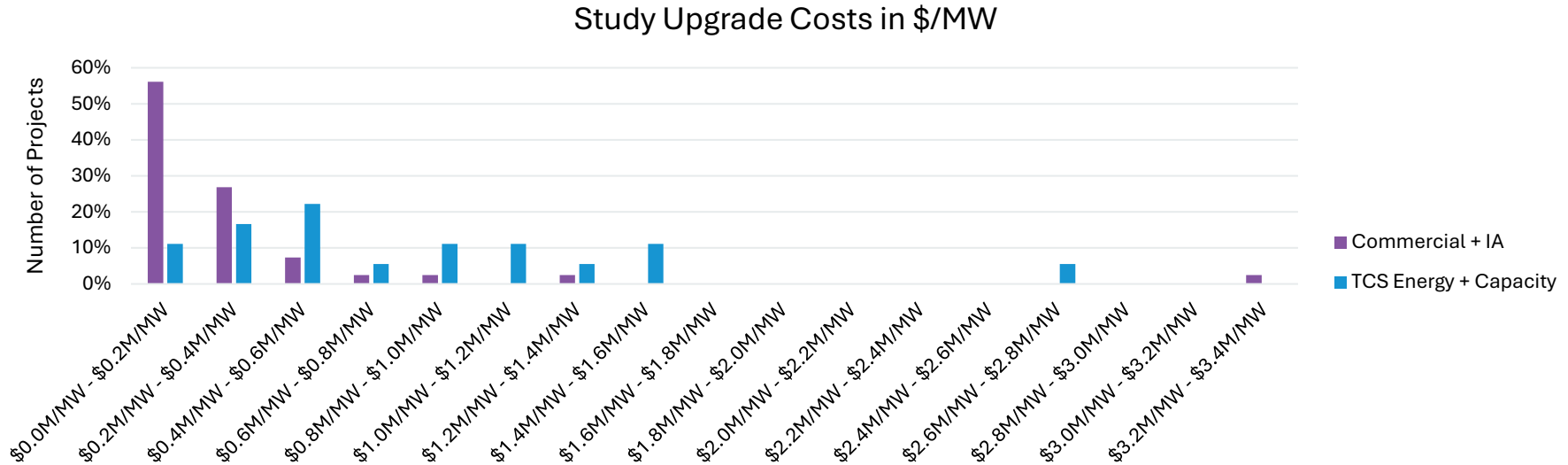
* When submitting the TCS Agreement, ICs could elect to automatically downgrade to study only energy (NRIS) if violations are exclusively seen for capacity (CNRIS) analyses. Two projects in the TCS elected this option.

There Are Multiple Factors that Influence Whether a Project Contributes to a Violation Requiring an Upgrade

- Factors that can influence a project contributing to a violation requiring an upgrade include:
 - Project MW size
 - Electrical location of project
 - Number, proximity and size of other projects included in the same study
 - Short Circuit, stability and electromagnetic transient performance of project



Comparison of Recently Commercial + IA vs. TCS Project Study Upgrade Costs



- The chart compares study upgrade costs for recently commercial (2024-2026) projects and projects with an IA that are not yet commercial **vs.** TCS projects studied for both energy (NRIS) and capacity (CNRIS)
 - This is not an “apples-to-apples” comparison, as explained on the next slide

Comparison of Recently Commercial + IA vs. TCS Project Study Upgrade Costs (cont'd)

- When comparing study upgrade costs for recently commercial (2024-2026) projects and projects with an IA that are not yet commercial to TCS costs, note:
 - The TCS includes costs for upgrades to address energy (NRIS) and capacity (CNRIS) violations, while commercial + IA costs are only for energy (NRIS)
 - Many of the commercial + IA study costs were identified in studies completed in the early 2020's
 - The industry has seen significant inflation during this period
 - The costs for 4 projects studied only for capacity (CNRIS) in the TCS were not included in the TCS figures, but were included in the commercial + IA figures
 - These projects had costs for energy (NRIS) related upgrades identified in previously conducted serial system impact studies, and had essentially \$0 upgrade costs for capacity (CNRIS) related upgrades in the TCS

Comparison of Recently Commercial + IA vs. TCS

Project Study Upgrade Costs (cont'd)

- There are 5 TCS energy (NRIS) + capacity (CNRIS) studied projects, totaling ~1010 MW (all storage, with ~970 MW in MA and ~40 MW in VT), with interconnection costs between \$0 - \$400k/MW
 - The majority of project commercial + IA study upgrade costs are within this range

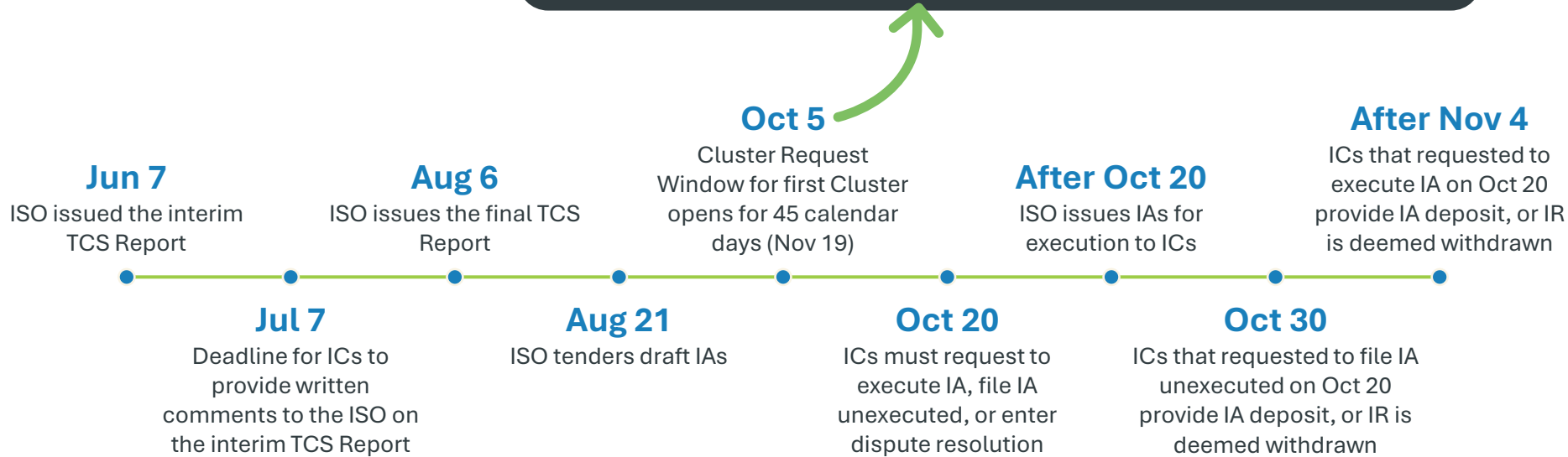


NEXT STEPS



Next Steps for the TCS

The Cluster Request Window will be followed by a 60-day Customer Engagement Window, which will include a Scoping Meeting; following this window, the ISO will begin study work in early 2027



Expected Q4 2026: ISO to hold a lessons-learned meeting to identify improvements for future Clusters

The ISO Must Meet All TCS-Related Tariff Requirements, Including Milestone Deadlines

- Meeting the Tariff-required TCS deadlines will allow
 - “first-ready” projects to move forward
 - The first full Cluster to start by its Tariff-required deadline (with the Customer Request Window scheduled to open on October 5, 2026)
 - This timeline will enable this Cluster to support outputs of the Longer-Term Transmission Planning RFP, 3rd ME Resource Integration Study and state process affected system operator studies that are coordinating with the TCS
 - The ISO is already preparing for this first Cluster, including preparing a heatmap for posting within 30 Calendar Days after it issues the final TCS Report
- Following the date when IA deposits are due, the ISO will determine whether the withdrawal of any TCS IRs, or other higher-queued IRs, result in a need for restudy of the TCS
 - As described in its [“Next Steps” memo](#), determining the need for any necessary restudy at this stage reduces the risk of prolonged multiple rounds of restudy, which reduces the risk of delays for starting the first Cluster

The ISO Has Committed to Discussing “Lessons-Learned” With Stakeholders

- The ISO anticipates holding a “lessons-learned” session in Q4 2026
 - The ISO committed to holding such a session in its [Order No. 2023 compliance filing](#) to:
 1. *“discuss lessons learned in the new interconnection process”*
 2. *“gather input from NEPOOL Participants on potential improvements, and”*
 3. *“discuss potential best practices on related interconnection issues and implementation, such as data and modeling improvements, automation, and non-material project size reductions for Interconnection Customers.”*
 - These discussions will be open to all stakeholders, and the ISO will adopt any lessons-learned as soon as practicable

Questions





Upgrade Cost & Construction Timeline Estimates

Transmission Owners – National Grid and Eversource



Federal and Regional Energy Affairs Office

Thank You!