ADVANCED ENERGY UNITED™

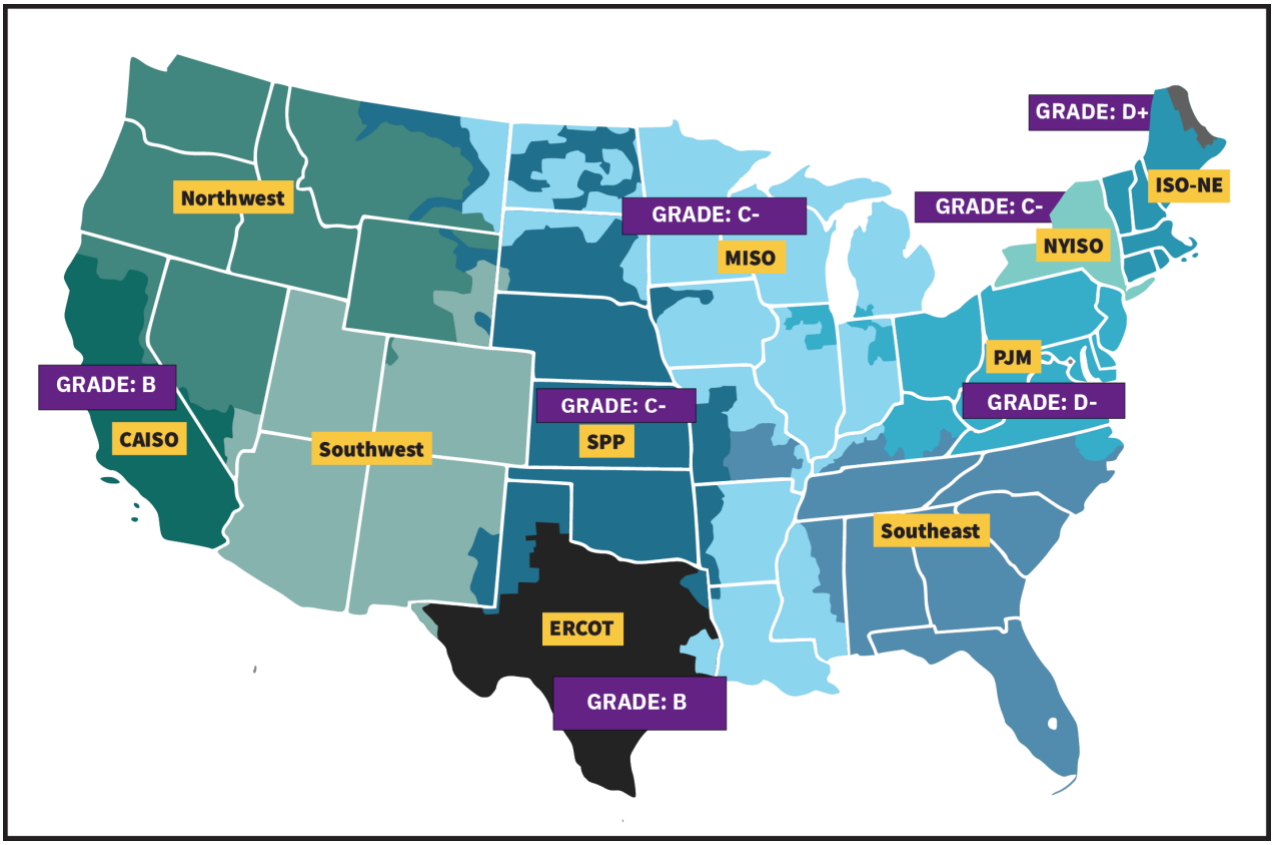
# PJM's Interconnection Process Evaluation

In a recent scorecard released by Advanced Energy United with analysis by Grid Strategies and The Brattle Group, PJM received an overall "D-" grade for its interconnection procedures and outcomes, ranking worst among the seven U.S. wholesale markets. The report offers a look-back analysis, providing a baseline against which to evaluate ongoing reforms, including in response to FERC Order 2023. Full analysis available at: AdvancedEnergyUnited.org/Scorecard.

| Category | Description | Score |
|---|---|---|
| Interconnection process results | Success rate and speed, cost reasonableness and uncertainty | D |
| Pre-queue information | Availability and quality of useful information and access to transmission provider to answer questions prior to queue entry | C |
| Interconnection study process design | Interconnection process structure, transparency, staffing, and modeling resources, and timeliness and management of construction of network upgrades | F |
| Study assumptions, criteria, replicability | Transparency and reasonableness of criteria and assumptions, consistency of modeling, consideration of grid-enhancing technologies, and coordination with neighboring systems and distribution studies | F |
| Usefulness of interconnection alternatives | Attractiveness and availability of alternatives to the traditional interconnection process | D |
| Using regional transmission planning | Regional transmission planning leverages findings and incorporates upgrades from interconnection studies, and vice-versa | D+ |
| **Overall Grade** | **Weighted evaluation giving highest weight to process results** | D- |

## Projects currently in the PJM interconnection queue:

Nearly 300 GW, including 210 GW of clean generation resources (solar, land-based, and offshore wind generation) and more than 73 GW of storage.[1]




[1] Lawrence Berkeley National Laboratory, *Queued Up,* available at https://emp.lbl.gov/maps-projects-region-state-and-county (accessed February 22, 2024).

**What is generator interconnection?**

The interconnection process is an evaluation of reliability impacts and transmission system upgrades and costs that must be undertaken before a new generation project can start to deliver electricity to the grid. While necessary, it is a complex, multi-step, multi-year journey that many projects don't make it through.

For projects seeking to connect to the transmission (high voltage) grid, the interconnection process is overseen by the relevant transmission provider; in much of the mid-Atlantic and part of the Midwest, that role is filled by PJM Interconnection or PJM. The PJM interconnection process is overseen by the Federal Energy Regulatory Commission (FERC), which recently finalized a major rulemaking, Order No. 2023, requiring all transmission providers to enact a series of reforms. Projects seeking to connect to the distribution grid undergo a separate state process, not evaluated by this report.

More information about the interconnection process is available from this guide by Advanced Energy United: https://blog.advancedenergyunited.org/reports/interconnection_process_guide_2023.

# About the Interconnection Process Scorecard

The scorecard evaluated a series of quantitative and qualitative metrics (listed above) and relied on a mix of publicly available queue data, interviews with interconnection customers (project developers with experience navigating interconnection processes), the expertise of the research team, and other publicly available research and analysis to evaluate each RTO/ISO. The scorecard is a look-back assessment, serving as a benchmark against which reform efforts (including compliance with FERC Order No. 2023) can be evaluated.

# PJM Findings

The report found "few bright spots" with respect to generator interconnection in PJM. Overall, the report concluded that PJM left its outdated serial process in place too long and that the new cluster process has yet to bring relief. Additionally, lack of proactive transmission buildout means the system has little headroom to accommodate new resources. Findings to individual categories are described below.

### Interconnection Process Results: D

Interconnection process results scores reflect the time, cost, and cost certainty that projects moving through the interconnection process experience. PJM's interconnection capacity execution rate began to decline in 2017 and has now come to a complete stop; projects from 2019 hope to complete the process six years later in 2025. Projects undergoing the transition to a cluster process have also experienced significant delays. PJM also received criticism for cost and cost certainty, with interconnection customers reporting "astronomical" cost estimates and significant differences between initial studies and final upgrade costs.

### Pre-queue Information: C

Availability of pre-queue information is important to improve interconnection applications and reduce the number of unviable projects entering interconnection queues, and it is an area where all the RTOs/ISOs scored poorly (MISO was highest with a C+). While FERC Order No. 2023 will require some additional pre-queue information, there is skepticism about how useful this will be in reality.

### Interconnection Study Process Design: F

The report's evaluation of the interconnection study process included an assessment of the process structure, transparency, and adequacy of staffing and modeling resources—in other words, how the process is structured as well as how it plays out in practice. PJM's now-replaced serial interconnection process came under particular criticism, and there is some hope that the newly adopted phased approach approved by FERC in 2022 will address some of the most acute deficiencies of PJM's process. However, that process has not yet been fully implemented, so it is too soon to evaluate its efficacy. Other challenges in PJM include lack of reliable schedule updates, strict adherence to standards even when they do not make sense, lack of flexibility to make even minor modifications to a project, and poor project management of construction leading to delays in some regions.

### Study Assumptions, Criteria, Replicability: F

This category evaluated the transparency and reasonableness of study criteria and assumptions, as well as consideration of grid-enhancing technologies and alignment and coordination of studies of distribution interconnection, neighboring systems, and transmission providers. Prior to the 2022 queue reform, PJM's models were difficult to use. Predictability and replicability of PJM's studies remain poor for several reasons, including posting of study models used in the 2022 reformed queue process has been delayed; in clusters with multiple projects, PJM does not disclose the modeling assumptions for other projects; and PJM's criteria for voltage recovery has caused issues. These shortcomings make it difficult for interconnection customers to understand upgrade exposures and cost risks.

### Usefulness of Interconnection Alternatives: D

In addition to the standard interconnection process, the report also evaluated the availability and usefulness of other approaches to bring projects online, including the use of Energy Resource Interconnection Service (ERIS, which requires more limited network upgrades because it only provides for use of the transmission system on an as-available basis), opportunities to use operational approaches to avoid network upgrades, and opportunities to share and transfer existing points of interconnection. The report found that outside of CAISO, ERCOT, and MISO, such alternatives were not meaningfully available. While ERIS is available in PJM, it is not frequently used; when it is, project costs are significantly lower.

### Using Regional Transmission Planning: D+

Finally, the scorecard evaluated the extent to which the regional transmission planning process is effective at supporting the interconnection of new generation. In most regions, the report found that transmission planning practices fail to adequately consider constraints or major network upgrades identified by interconnection studies, while interconnection study models fail to reflect planned transmission upgrades. While congestion is not currently an acute concern in PJM compared to other markets, the lack of a forward-looking transmission planning process indicates that this may not be the case for long. The report points to nascent efforts that may lead to future improvements, including incorporation of a forecast of resource expansion and deactivation in the regional transmission expansion plan and initiation of a Long-Term Regional Transmission Planning process. Whether these processes will result in proactive development of transmission capacity to enable future generator interconnection remains to be seen.

## Reform Needs

PJM is still in the process of implementing its interconnection reform approved by FERC in 2022; how far that process brings the region toward addressing the deficiencies identified in the report remains to be seen. At the same time, efforts to comply with FERC Order No. 2023 are underway across all the RTOs, and these further reforms will help to address some of the shortcomings identified in the report – but only if PJM submits an ambitious compliance proposal and the Commission holds the ISO accountable for addressing all compliance requirements. Further reforms beyond Order No. 2023 will also be needed to make the interconnection process in PJM more predictable, affordable, and efficient. Stakeholders in PJM—including developers, transmission owners, states, and the RTO—will need to continue to work together to improve the process and its implementation.