



Analysis of Resource Adequacy across the Eastern Interconnection

An open-source case study using GridPath

FACT SHEET

JULY 2025

What was the motivation for this study?

Resource adequacy (RA) analysis is typically conducted on an individual utility, independent system operator, but rarely across entire interconnections. To date, few publicly available studies have been conducted across the Eastern Interconnection. Because of this siloed nature of RA analysis, disparate assumptions about load growth, generation resources, and in particular, transmission flows across regions contribute to an incomplete picture of resource adequacy from a “physical” lens. This study aims to fill that gap with an analysis of 2028. In addition, few publicly available calibrated open-source models for the Eastern Interconnection exist, and this study sought to fill that gap.

What was investigated in the study?

This study assessed the resource adequacy of regions across the Eastern Interconnection by explicitly modeling the interconnected nature of the grid, rather than evaluating each region in isolation. To do this, three scenarios were developed to reflect different assumptions about the availability of interregional transfers. The first scenario assumed no external support beyond internal transfers within each organized market, effectively isolating each region. The second scenario reflected current planning practices by allowing each region to import power based on its assumed level of market assistance or firm transfers—typically much lower than the full technical capability. The third scenario assumed regions could access their full technical import capability, provided neighboring regions had surplus capacity. This wide-area resource adequacy assessment approach is essential for understanding system risk during widespread weather events and for identifying opportunities to strengthen reliability through interregional transmission and coordinated planning.

Did you consider data center load growth and how much?

Yes. The study incorporated recent data center load growth, which is accelerating across the Eastern Interconnection, particularly in regions such as PJM-South, SERC-Southeast, and MISO-Central. Load forecasts used in this analysis were sourced directly from the most recent ISO outlooks and utility-submitted forecasts reported through the NERC’s Long-Term Reliability Assessment. These forecasts already account for significant expected increases in electricity demand over the next several years, including substantial contributions from new data center developments. It did not consider opportunities for data center flexibility, although this is being considered in subsequent work.

This fact sheet is adapted from the report *Analysis of Resource Adequacy across the Eastern Interconnection: An open-source case study using GridPath*

What are the key findings of the study?

1. Most regions exhibit some level of loss of load risk in 2028 assuming significant load growth, generator retirements, and limited generator additions under a case where we exclude any interregional transmission—however, as allowance for interregional transfers increases, loss of load diminishes and most regions resolve any deficiency, relative to a 1-day-in-10-year LOLE standard.
2. Loss of load risk is substantially reduced across the system when the analysis mirrors transfer capabilities typically assumed by ISOs or when firm contracts are considered. Only a few areas, including SPP, MISO Central, and PJM South, continue to experience “elevated” LOLE, which means that LOLE exceeds 1 day in 10 years under assumptions of typical ISO market assistance and firm contracts.
3. As the analysis considers increasing levels of interregional transfer capability, the frequency and duration of events decline significantly. Under the “Full transmission” scenario, which assumes interregional transmission up to the technical limit, the remaining loss of load events are not only less frequent but shorter in duration, conditions that are well-suited for mitigation through short-duration energy storage or demand-side flexibility.
4. While near-term reliability concerns were found in some scenarios, many remaining shortages could be alleviated with efficient solutions such as additional demand response (given many of the events were within 2–4 hours of duration), accelerated deployment of new resources, and improved utilization of existing transmission networks rather than out-of-market interventions to retain aging or uneconomic generation. For context, at the end of 2023 there were 1,100 gigawatts (GW) of generation in the interconnection queues across the Eastern Interconnection. The vast majority of these resources were not included in this study (we only included resources already under construction).

Can unclogging the interconnection queue solve the resource adequacy challenges in 2028?

Yes. While this study identified elevated loss of load risk in certain regions by 2028, that risk exists under a scenario where few new resources are added beyond those already under construction. In reality, there are hundreds of gigawatts of projects in the interconnection queues across the Eastern Interconnection. In PJM-South for example, if even a modest package of those queued resources, exclusively wind, solar, and storage, can come online through reforms to the interconnection process and accelerated permitting, they would be sufficient to close the identified reliability gaps. This underscores the importance of prioritizing resource development and grid access over out-of-market interventions to retain aging and retiring power plants. Proactive infrastructure deployment, rather than delay tactics, is the most efficient and effective strategy to meet future reliability needs.

Is new interregional transmission needed to solve the resource adequacy gap or is this a matter of contracting?

Yes and no. In this study, no new interregional transmission was added in any scenario. Instead, we varied how much of the existing technical transfer capability between regions was assumed to be available for use. Simply adjusting that assumption—without building any new lines—resulted in significant reductions in loss of load risk across the system. This illustrates the large impact that transfer assumptions and coordination can have on reliability outcomes. In one sensitivity we added new resources, transmission, and a combination of the two to resolve remaining resource adequacy risks and showed how generation and transmission can be complimentary resources to mitigate loss of load risk.

However, relying on neighboring regions for reliability support introduces important policy and regulatory considerations. Striking the right balance between self-sufficiency and the benefits of geographic diversity is ultimately a question of risk tolerance and planning philosophy. While contracting for firm transfers is one approach, this study also highlights how new interregional transmission could unlock even greater reliability benefits by formalizing and expanding access to diverse capacity across regions. These findings



have direct implications for how we structure resource adequacy frameworks, transmission planning, and market design going forward.

What other insights does the study offer?

The study demonstrates that wide-area resource adequacy assessments are not only feasible, but also essential for uncovering system-level insights that local or regional planning alone cannot provide. By modeling the Eastern Interconnection as an integrated system, the analysis reveals interdependencies and shared risks that would otherwise remain hidden in siloed evaluations. This does not diminish the importance of local planning. Instead, it reinforces the need for both approaches to work in tandem.

The study highlights the critical importance of consistent, high-quality data across jurisdictions. Improved collection and harmonization of load profiles, generator characteristics, weather-dependent outage data, and renewable energy profiles across both the United States and Canada will significantly enhance the accuracy and usefulness of future assessments. Ongoing efforts by ESIG, NERC, DOE, and other regional entities are helping to build this foundation, which will support better-aligned national and regional planning in the years ahead.

What are the priorities for follow-on efforts?

Follow-on efforts fall into two key categories: improving inputs and expanding applications. First, future analyses should focus on refining data and modeling assumptions. This includes incorporating a broader range of load and weather years, fully integrating Canadian regions, and modeling weather-dependent outage risks for thermal generation and gas supply constraints. These enhancements will provide a more comprehensive and realistic picture of system reliability under evolving grid conditions.

Second, there are important opportunities to expand how this type of modeling is applied. Future studies can evaluate the resource adequacy of different clean energy portfolios and how they affect loss of load risk and transfers between regions at higher levels of renewable penetration. Additionally, the framework can be used to analyze new transmission additions and support efforts to harmonize capacity accreditation methods across regions and resource types.

Importantly, this work is being made open-source, enabling other researchers, planners, and policy makers to build on the tools and datasets developed in this study. This collaborative foundation will support more consistent, transparent, and effective resource adequacy planning across the interconnected grid.

More information can be found at
[**gridlab.org/GridPath_EI**](https://gridlab.org/GridPath_EI)