



Understanding the linkage between transmission deliverability and resource adequacy

FACT SHEET

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What was the motivation for this study?

In order to participate in capacity markets or resource adequacy programs, generating resources must first be studied for and qualify for full transmission deliverability. Energy-only resources, without firm interconnection rights, are excluded entirely from capacity markets and resource adequacy programs, and from the resource adequacy analysis that underpins resource accreditation. As a result, interconnection studies produce deliverability assumptions that directly influence resource adequacy analyses and capacity market outcomes. Despite this central role, there has been limited research into whether these assumptions accurately reflect resource performance during periods of elevated reliability risk. This study was motivated by the need to understand, test, and quantify the effect of deliverability assumptions on system capacity needs and individual resource accreditation.

What is the difference between ERIS and NRIS, and why does it matter for resource adequacy?

FERC Order 2003 established two interconnection service types: Network Resource Interconnection Service (NRIS), which requires deliverability studies and enables capacity market participation, and Energy Resource Interconnection Service (ERIS), which provides “as available” transmission access but typically confers no capacity value. Both ERIS and NRIS resources are dispatched identically in energy markets, yet ERIS resources are often completely excluded from resource adequacy models — creating a disconnect between operational reality and reliability planning that grows as renewable and storage penetration increases.

What was investigated in the study?

The study proceeded along three tracks: 1) a review of how ISOs classify and model deliverability, 2) a historical analysis of nodal LMP data during PJM scarcity events to evaluate whether deliverability constraints actually bind during resource adequacy (RA) risk peri-

ods, and 3) the development of a replicated PJM ELCC model to test the sensitivity of capacity requirements to deliverability assumptions.

Were energy-only (ERIS) resources more likely to be curtailed during system stress events?

No. Across approximately 60 resource adequacy event-days in PJM (2020–2025), there was no systematic relationship between resource type and curtailment during stress events. Congestion, where it appeared, followed broad regional patterns rather than generator-specific or interconnection-type-specific patterns. While historical market outcomes may not be indicative of the future, it does highlight the conservative nature of today's deliverability requirements.

How are deliverability caps leveraged in PJM's resource adequacy (LOLP) modeling?

PJM applies seasonal deliverability caps for NRIS resources by directly adjusting the hourly input profiles used in its ELCC simulation. This is done by truncating wind and solar output whenever simulated generation exceeds Capacity Interconnection Rights during the summer season, and different caps applied during the winter season. These caps are applied across all 8,760 hours, not just during RA risk periods, and implicitly assume simultaneous curtailment of all resources within a class and zone across the entire footprint. ERIS resources are excluded altogether. Both of these assumptions create a disconnect between the resource adequacy model and actual operations.

What impact do deliverability caps have on PJM's firm capacity requirements?

Removing deliverability caps from wind and solar profiles reduced LOLE from 0.10 to 0.06 days per year and EUE by 44%. This is equivalent to 2,350 MW of firm capacity — meaning the current methodology increases PJM's capacity requirement by that amount with direct consequences for procurement costs in a market clearing at or near the price cap.



How do deliverability caps affect accreditation (ELCC) of wind, solar, and energy storage?

Thermal resource accreditation is unaffected. Wind and solar ELCC values change only modestly when caps are removed. The largest effect is on energy storage, whose ELCC increases materially because removing caps increases the surplus energy available for charging in the hours preceding risk periods – an indirect effect that cascades through the ELCC framework.

Does this mean deliverability constraints don't matter for resource adequacy?

No, not necessarily. Transmission constraints can and do limit generator deliverability during certain system conditions, and those constraints have real implications for reliability. The question is not whether deliverability matters, but whether the current implementation in resource adequacy models accurately reflects when and how those constraints bind.

How can ISOs incorporate deliverability into resource adequacy assessments going forward?

In order to better represent both NRIS and ERIS resources in RA assessments, practitioners can model all physically interconnected resources, use actual operating profiles with historical curtailment rather than static caps, simulate projected curtailment using security-constrained production cost models where forward estimates are needed, and apply any deliverability adjustments to ELCC outputs rather than input profiles.

What remains unanswered?

The modeling conducted for this study, like PJM's own, is a single-zone model without internal transmission. Subsequent analyses will replicate RA risk conditions in nodal production cost simulations and AC power flow analyses, including N-1 and N-1-1 contingencies, to determine whether transmission constraints actually bind during the conditions that drive loss-of-load risk.