Options to Address PJM's Near-term Resource Adequacy Challenges

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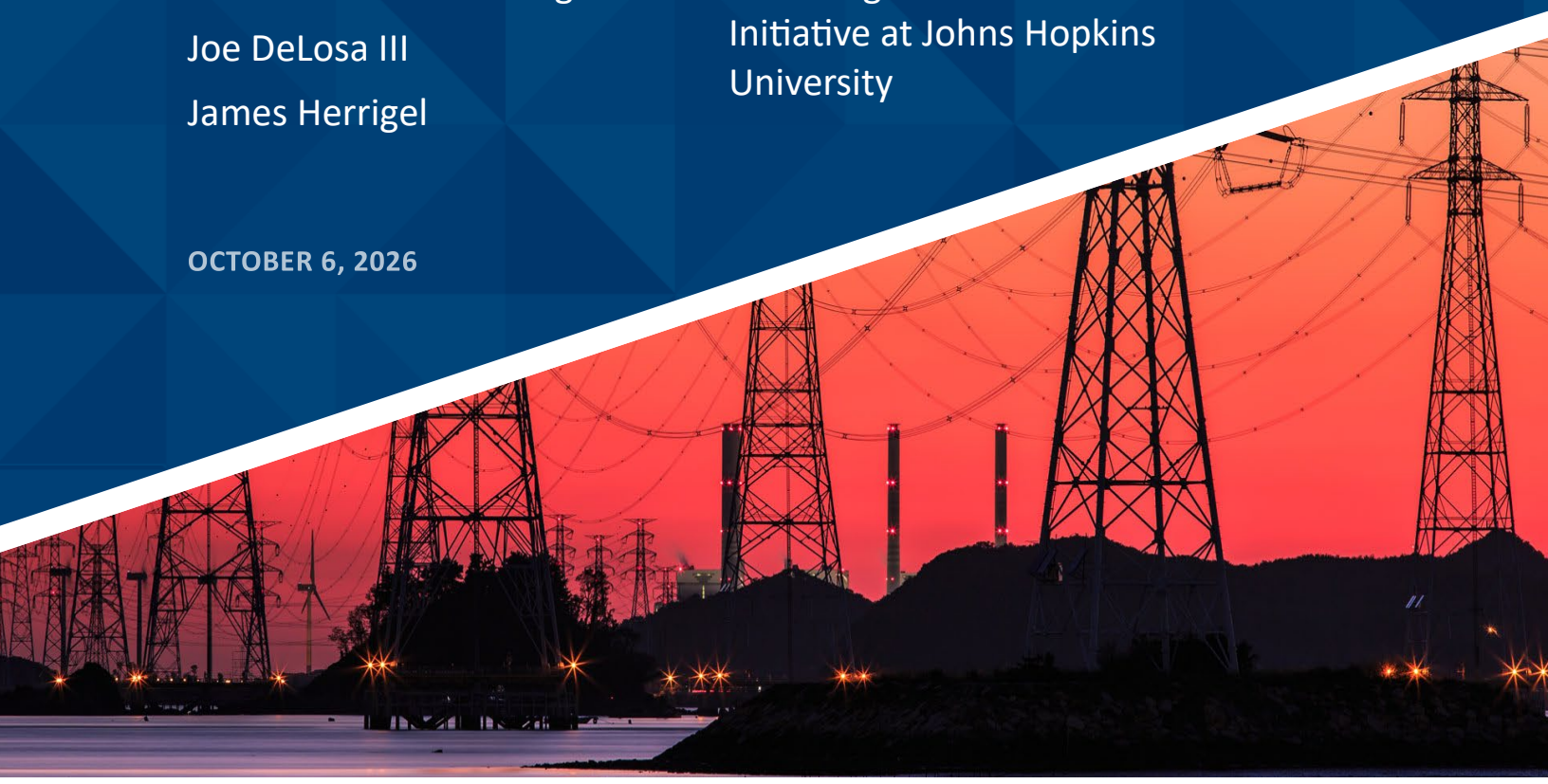

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ABSTRACT

This report discusses five groups of options through which PJM (upon validating their near-term feasibility) likely will be able to mobilize 10–20 GW of capacity over the next few years. By enabling latent capacity, improving price signals and investment incentives, and fast-tracking of interconnection options, the added resources can mitigate the current capacity deficiencies and yield customer value in PJM's upcoming capacity auctions. This will create the time and space necessary to allow a more holistic and less rushed redesign of PJM's market and state procurements to address the footprint's significant longer-term generation investment needs.

NOTICE

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This report is intended to be read and used as a whole and not in parts. It reflects the perspectives and opinions of the authors and does not necessarily reflect those of The Brattle Group's clients or other consultants. The authors would like to thank PJM staff, Abe Silverman, Katya Evans, Ric O'Connell, Sam Newell, Kathleen Spees, Andrew Levitt, and Aniruddh Mohan for their comments and input on a draft of the report.

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Executive Summary

PJM faces high load growth and a scarcity of supply, which has created significant resource adequacy (RA) challenges and increased prices in its capacity market, the Reliability Pricing Model (RPM). Despite much higher capacity prices – even with the temporarily lowered administrative cap—recent auctions have cleared short of PJM's reliability requirement. Limited entry from new resources makes it difficult to address increasing RA needs. PJM and its stakeholders have recognized the need for market reforms. However, any fundamental redesign of the PJM market will take time and is unlikely to yield results before the early 2030s.

This report summarizes steps PJM can take over the next 6–18 months to mobilize a broader range of resources for the delivery years for which recent auctions cleared insufficient capacity, as well as the upcoming base and incremental capacity auctions for the 2028/29 through 2031/32 delivery periods. These recommendations, many of which have already been evaluated by PJM stakeholders, will help alleviate the current RA shortfalls. These reforms will improve market incentives for attracting new resources by ensuring that PJM's reliability modeling and capacity market rules accurately reflect the physical contribution that resources can offer during periods of system stress.

We estimate these options can mobilize up to 10–20 gigawatts (GW) unforced capacity (UCAP) of additional resources over the next few years— thus addressing RA shortfalls of the recent and upcoming 3-year forward auctions through future incremental auctions. To the extent PJM's near-term load forecasts increase (or if PJM corrects an already-identified "misalignment" of loads and weather in its resource adequacy simulations), the near-term benefits of enabling the estimated 10-20 GW of latent resources will even be higher. Mobilizing the additional resources to ease the near-term shortfalls will also allow for more holistic, more thoughtful, and less rushed improvements to PJM's market design, interconnection processes, and large load accommodations necessary to durably address the region's longer-term challenges.

We group the available options into five categories, summarized in Table 1 below:

1. Unlock the capacity available from thermal plants;
2. Mobilize additional seasonal resources;
3. Reduce entry barriers for storage and recognize the RA value of non-firm resources
4. Reform interconnection and transmission policies to support RA; and
5. Refine the PJM capacity market design parameters to facilitate these options.

TABLE 1: NEAR-TERM OPTIONS TO ADDRESS PJM'S RESOURCE ADEQUACY CHALLENGES

#	Category		Recommendation	Potential Benefits (UCAP GW)
1	**Unlock Capacity Available from Thermal Plants**	**[a]**	Recognize and Incentivize Confirmed Winterization Through a Separate ELCC Class	5–10 GW
		[b]	Recognize that PJM's Advance Commitment of Gas-Fired Plants During Winter Cold Snaps Reduces Fuel and Cold Start Risk	Overlapping with 1a
2	**Mobilize Additional Seasonal Resources**	**[a]**	Take Advantage of Higher Winter Rating for Thermal Units and Higher Winter Grid Capacity for Injection (supported by 5a, 5b)	4–5 GW (Winter)
		[b]	Enable Participation of More Summer-only DR (linked to 5a, 5b)	5 GW (Summer)
3	**Reduce Barriers for Storage and Recognize the RA Value of Non-Firm Resources**	**[a]**	Recognize the RA value of Non-Firm Energy to Unlock Full Value of Renewables & Storage	Up to 2.3 GW; unlocks full value of storage & renewables
		[b]	Reform Rules on SIS Resources' Market Participation to Enable Storage Development	5 GW of added storage enabled
4	**Reform Interconnection and Transmission Policies to Support Resource Adequacy**	**[a]**	Embrace RAS and GETs to Quickly Create Interconnection Headroom	10–20 GW of headroom, UCAP depends on resources
		[b]	Reform and Fast-track ERIS (in combination with 3a and 4a)	Facilitates fast-track entry of new resources with non-firm interconnection
		[c]	Facilitate and Fully Account for the RA Value of Non-firm Imports over External Interfaces	Capture more RA value of interregional transmission
5	**Refine RPM Design**	**[a]**	Reform Penalties for Storage, Solar, and Seasonal Resources to Match Penalties to Possible Performance	Remove inefficient barrier to entry for storage, renewable, and seasonal resources
		[b]	Implement Seasonal Capacity Market & Seasonal Resource and Capacity Emergency Transfer Limit (CETL) Ratings	More efficiently attracts and clears resources
		[c]	Buy More in Incremental Auction to Avoid Surplus and Enable Short-lead-time Resources	Mobilizes short term resources and avoids excess purchases
		[d]	Reform the FRR Option to Facilitate Self-supply and Eliminate Excluded Capacity	1 GW

While these options do not void the need for a comprehensive long-term solution, each of them represents a "no regrets" improvement that should be carried forward regardless of how the capacity market is refined or replaced. They include:

1. Increasing the capacity available from thermal plants seeks to recognize improvements offered by winterizing gas-fired and other thermal plants to mitigate the history of higher winter outage risks. Poor historical winter performance has reduced the capacity accreditation of

thermal resources and, as a consequence, created the need for additional capacity resources to clear the market so as to meet the RPM reliability requirement. However, the winter outage risk of these plants can be reduced by: (a) recognizing winterization upgrades already made and creating stronger incentives to winterize plants; and (b) further extending and formalizing PJM's practice to pre-commit plants in advance of cold weather events to reduce risks related to fuel supply coordination and cold start (which PJM has been expanding since Winter Storm Elliott). If PJM updates the effective load carrying capacity (ELCC) to recognize this step change in expected performance of thermal plants, additional UCAP will be made available in the capacity auctions. The added value that can be captured by higher-performing plants will help attract investment in winter-hardening both existing and new plants.

2. Mobilizing additional seasonal resources focuses on improving the market participation options of seasonally available capacity. This includes taking advantage of: (a) higher installed capacity (ICAP) available from gas-fired plants during the winter (due to higher plant efficiency and grid capability at low ambient temperatures); and (b) facilitating participation of summer-only demand response resources, including virtual power plants (VPPs), that can meet eligibility requirements.

3. Reducing barriers faced by storage resources and recognizing the RA value of non-firm energy improves capacity market outcomes by: (a) correctly accounting for the RA value of energy from generating resources delivered over the non-firm portion of their interconnections (i.e., above their Capacity Interconnection Right (CIR) levels), including the added energy available to charge storage resources and increase their RA value; and (b) updating market participation rules for resources sharing grid connections with newly developed storage resources through surplus interconnection service (SIS).

4. Reforming interconnection and transmission policies to support RA includes: (a) quickly creating more interconnection headroom with wider use of remedial action schemes (RAS) and grid enhancing technologies (GETs) as acceptable solutions to address interconnection-related transmission needs (by avoiding the long lead times necessary to build traditional grid upgrades); (b) creating an accelerated new Energy Resource Interconnection Service (ERIS) pathway for resources utilizing non-firm interconnection (similar to the "connect-and-manage" option for flexible large loads envisioned in the Federal Energy Regulatory Commission's (FERC's) show cause orders); and (c) recognizing and enabling the full RA value of non-firm imports over the interties with neighboring regions, taking advantage of the fact that extreme weather systems do not affect all regions at exactly the same time.

5. Refining the PJM capacity market design supports the previous options and includes actions such as: (a) reforming performance penalties so plants are not penalized for performance they

cannot possibly provide (like solar during the night, akin to plants on PJM-approved outages); (b) shifting towards a seasonal capacity market construct; (c) mitigating capacity procurement uncertainty and facilitating additional entry of short lead-time resources (such as demand response (DR) and VPPs) by increasing procurement volumes in incremental auctions; and (d) enhancing the option to self-supply capacity through the fixed resource requirements (FRR) by enabling the option utilize or to sell currently excluded capacity.

Our recommendations do not imply that current practices are unreasonable or that implementing these reforms will necessarily be "simple." In many ways, PJM has been a leader among ISOs/RTOs in its analyses of RA risks and accreditation of resources' contributions to avoid such risks. As we point out in the body of this report, most of the reforms we recommend here have been previously proposed by PJM and others (such as PJM's Independent Market Monitor, E3, Analysis Group, GridLab and PowerGem/Telos, Voltus, RMI, ACORE, ODEC, and others as noted below). But these reforms have not been pursued when capacity prices were lower and RA shortages were not yet present—in part due to implementation challenges and in part due to FERC confirming that the existing capacity market design was just and reasonable even without them.

Now that the system is stressed by both capacity shortages and affordability challenges, revisiting and developing the proposed reforms can address PJM's most urgent near-term needs. Of course, doing so will still require refining the designs and addressing implementation complexities to ensure that the 1-event-in-10-years ("1-in-10") RA standard is maintained. Pursuing these options will require further study by PJM to validate effectiveness, relative implementation complexities, magnitude of relief offered, and any trade-offs that may arise. Since most of these issues have already been explored by PJM and stakeholders, the reforms can be expedited. Yet there may also be a need to prioritize, given the limited bandwidth of PJM staff and of stakeholders, with a goal to mobilize as much capacity as possible as quickly as possible, considering the value at stake.

Introduction

PJM is in the midst of RA challenges which led to significantly higher prices in its capacity market. The most recent base residual auction (BRA) for 2028–29 cleared 6.8 GW short of its RA requirement, following the 2027–28 auction which cleared 6.5 GW short of PJM's requirement.[1] Capacity prices in the last three auctions have cleared at the administratively imposed price cap of approximately $330/MW-day,[2] providing little relief to ratepayers, particularly as only 2.1 GW (UCAP) of new generation has entered the market over this time.[3] The combination of repeated capacity shortfalls, persistently high clearing prices, and limited recent entry of new supply (in part due to severe supply chain constraints) underscores the difficulty of resolving PJM's current RA imbalance over the next several years.

PJM and its stakeholders have recognized the need for both near-term action and longer-term reform. Following the latest auction, the PJM Board directed development of a Reliability Backstop Procurement and measures intended to ensure that new large loads that do not bring new supply bear more significant reliability consequences during periods of grid stress. In parallel, PJM has begun to directly address challenges associated with large loads and has additionally undertaken a broader review of market design questions through its *Powering Reliability Through Market Design* initiative.[4] We believe these efforts will address important structural questions, but comprehensive market redesign takes time, and the impact of the improved market design will not be realized until the early 2030s.

This report addresses a complementary but more immediate question: **what options can PJM implement to more quickly mobilize additional resources and their RA value in the near-term?**

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1 PJM, *2028/2029 Base Residual Auction Report*, July 14, 2026 at https://www.pjm.com/-/media/DotCom/markets-ops/rpm/rpm-auction-info/2028-2029/2028-2029-bra-results-report.pdf, p.3.

2 The 2026/27, 2027/28, and 2028/29 BRAs cleared at their respective cap prices of $329.17, $333.44, and $325/MW-UCAP. See "Base Residual Auction Report" (Table 1) for each BRA, retrievable online at: https://www.pjm.com/markets-and-operations/rpm

3 The 2026/27, 2027/28, and 2028/29 BRAs cleared, respectively, 1,474.6, 423.6, and 207.6 MW-UCAP of new resources. See "Base Residual Auction Report" (Figure 2) for each BRA, retrievable online at: https://www.pjm.com/markets-and-operations/rpm

4 PJM, *Powering Reliability Through Market Design: Addressing Rising Demand and Constrained Supply, and Stimulating Investment To Support Durable Reliability*, May 6, 2026 at https://www.pjm.com/-/media/DotCom/library/reports-notices/special-reports/2026/20260506-powering-reliability-through-market-design.pdf

The options examined here are not meant to address large load policies, long-term capacity needs, or more fundamental reforms of PJM's market design. Rather, they are focused on providing near-term reliability benefits and relief for existing loads and customers by: (1) more accurately recognizing the added annual and seasonal capability of winterized resources; (2) expanding access for seasonal demand response; (3) educing barriers for storage and recognizing the RA value of non-firm resources; (4) reforming interconnection and transmission policies to accelerate entry of new resources; and (5) modifying RPM rules to incent seasonal capacity and the entry of shorter-lead-time resources—such as solar, storage, and VPPs—that can be mobilized more quickly than the (at least) 4–6 years it currently takes to develop new thermal power plants.

These reforms will improve market incentives for attracting new resources by ensuring that PJM's reliability modeling and capacity market rules accurately reflect the physical contribution resources offer during periods of system stress. Implemented carefully, these reforms will help mitigate PJM's capacity shortage in the near-term to allow for more holistic and less rushed improvements to PJM's overall market design to address the region's significant long-term challenges. Doing so is particularly important now that RA requirements are growing quickly and the cost of satisfying PJM's RA requirement is high, leading to growing concerns over both affordability and reliability in the region.

I. Unlock Capacity Available from Thermal Plants

A. Recognize and Incentivize Confirmed Winterization Through a Separate ELCC Class

Opportunity: Add over 6 GW of capacity by recognizing certified winterization efforts

The expected RA value, measured as ELCC, for gas resources currently is only between 59% and 75% of their ICAP (as per the latest BRA parameters).[5] The low ELCC is driven in large part by cold-temperature-correlated plant outage experience during winter cold snaps, such as during the 2014 Polar Vortex, 2022 Winter Storm Elliott, and other extreme weather events.[6]

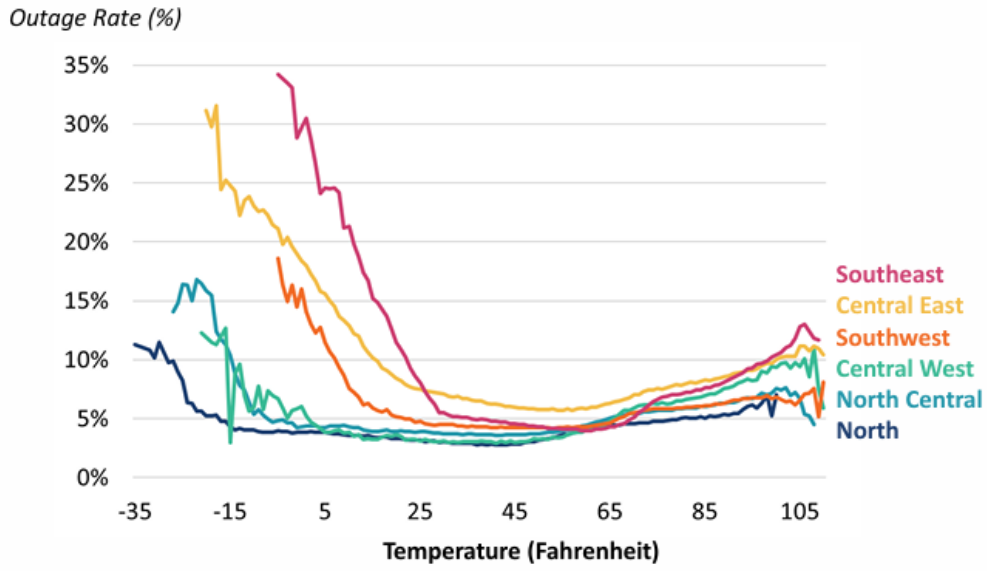
As industry experience shows, however, improved winter-hardening of plants can substantially reduce outage rates during cold weather events as illustrated by the temperature-correlated outage rates for Southwest Power Pool (SPP) thermal units shown in Figure 1 below.[7]

[5] PJM defines ELCC Class Ratings for 'Gas Combined Cycle', 'Gas Combustion Turbine', and 'Gas Combustion Turbine Dual Fuel', with ratings of 75%, 59%, and 76%, respectively. See PJM, "ELCC Class Ratings for the 2029/2030 Base Residual Auction" at https://www.pjm.com/-/media/DotCom/planning/res-adeq/elcc/29-30-bra-elcc-class-ratings.pdf.

[6] Gas resource winter reliability issues were explicitly mentioned in the context of risk modeling and accreditation in PJM's reform package presented to FERC in 2023. See PJM Interconnection, L.L.C., "Capacity Market Reforms to Accommodate the Energy Transition While Maintaining Resource Adequacy," before FERC, Docket No. ER24-99-000, October 13, 2023, https://www.pjm.com/pjmfiles/directory/etariff/FercDockets/7657/20231013-er24-99-000.pdf, p.13.

[7] For example, as Figure 1 shows, SPP documented that, at a temperature of 5 degrees Fahrenheit, the outage rates of well-winterized thermal plants in northern SPP was approximately 5%, while the outage rates of less winterized thermal plants in southern SPP ranged from 10% to 30%. See The Brattle Group, *SPP Future Energy & Resource Needs Study (FERNS)*, prepared for Southwest Power Pool, February 2025 at https://www.brattle.com/wp-content/uploads/2025/03/Future-Energy-Resource-Needs-Study-FERNS.pdf, p. 65.

FIGURE 1: TEMPERATURE-CORRELATED OUTAGE RATES OF THERMAL PLANTS IN SPP



Source: Brattle, SPP Future Energy & Resource Needs Study (FERNS), April 2026.

Under the current PJM accreditation process, individual plants are able to obtain higher (or lower) capacity accreditation than the class-average ELCC only through the ELCC Resource Performance Adjustment.[8] This performance adjustment is backward-looking, based on actual performance during a specific set of challenging performance hours since 2012. Therefore, even generation plants that have been winterized in recent years to comply with new NERC winterization rules,[9] in collaboration with Reliability First winterization programs,[10] or specifically improve their winter performance in PJM's capacity market remain "penalized" for any poor pre-winterization performance during every extreme weather event since 2012. The accredited capacity of recently winterized existing gas resources and any winterized new plants is therefore systematically undercounted. As a result, this approach not only understates the

[8] Unforced capacity (UCAP) accreditation forms the basis of resources' capacity award. It is calculated as the product of a capacity resource's ICAP, ELCC class rating, and resource performance adjustment (RPA). The adjustment factor incorporates each resource's historical performance since June 1, 2012, combined with coincident weather data and the distribution of weather patterns in PJM since June 1, 1993. Instances of below-average performance during extreme weather can reduce a resource's accreditation and thus the amount of capacity it can sell in future delivery years, whereas above-average performance can augment it. For more information see PJM Manual 20A pp. 15–17 and Manual 21B pp. 18–20.

[9] NERC, OP-012-2 – Extreme Cold Weather Preparedness and Operations, December 2024 at https://www.nerc.com/globalassets/standards/reliability-standards/eop/eop-012-2.pdf

[10] See Reliability First at https://www.rfirst.org/tools-and-services/winterization/ and Sam Ciccone, *Continuous Improvement: Freeze protection requirements and winterization best practices*, April 2024, at https://www.rfirst.org/resource-center/continuous-improvement-freeze-protection-requirements-and-winterization-best-practices/

available capacity, but also provides poor investment signals to incentivize the winterization of new plants and poorly performing existing plants by not providing a path for these resources to be rewarded adequately for making improvements.

Recent estimates indicate that only a portion of PJM's gas fleet is winterized[11] and that raising ELCC values to 85% through the weatherization of more plants can add over 6 GW of annual UCAP in PJM.[12] Importantly, because winter-hardening of poorly-performing gas plants can be achieved within the next year or two, proper incentives likely can add a substantial portion of this capacity well before it is needed during the 2028/29 through 2031/32 delivery years (including capacity procured through incremental auctions for these delivery years).

Solution: Separate ELCC class for confirmed winterization of thermal plants

We recommend implementing stronger incentives and standards to winterize thermal plants, especially natural gas-fired units, to lower the risk of cold-weather plant outages and improve the RA contribution of PJM's gas fleet. Adding a separate ELCC class that reflects the higher performance for winterized gas plants will provide strong investment signals to improve winter performance. Notably, a similar structure is already employed by offering higher accreditation for dual-fuel combustion turbines (CTs) in recognition of their improved winter performance. Such a separate ELCC class for winter-hardened gas plants has been proposed previously in the PJM Stakeholder Process by East Kentucky Power Cooperative.[13]

Concerns over whether claimed winterization efforts will actually improve winter performance can be addressed by: (1) PJM specifying in detail what measures are required to qualify for the winterized ELCC class, including insulation and heating, cold-weather operating protocols, inspections, and other critical measures that have been identified by NERC; (2) requiring certification of the winterization effort by experienced engineering firms; and (3) applying the ELCC Resource Performance Adjustment (RPA) to reflect differences in the plants' actual post-winterization performance.

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[11] Kumar, Nikhil, "PJM's Gas Fleet Gives Up Gigawatts Every Winter," GridLab, July 30, 2026 at https://www.linkedin.com/pulse/pjms-gas-fleet-gives-up-gigawatts-every-winter-nikhil-kumar-ywaqc/

[12] GridLab and PowerGEM, "Hiding in Plain Sight: Market Design Options to Quickly Unlock Capacity in PJM," August 31, 2026 at www.gridlab.org/publications.

[13] Daymark Energy Advisors, *Accreditation Reform Proposal on behalf of East Kentucky Power Cooperative*, July 22, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/elccstf/2025/20250725/20250725-item-03e---ekpc-solution-package.pdf.

There will be uncertainties about individual plant's winterization effectiveness, particularly before being tested through a range of extreme cold snap events. If many plants winterize to improve their own performance, aggregate performance of non-dual-fuel resources might become more limited by fuel availability. Such issues will have to be addressed so resources' improvements to their capabilities are recognized more accurately than today. Doing so will send better investment signals and increase the capacity available to address winter RA challenges.

B. Recognize that PJM's Advance Commitment of Gas-Fired Plants Reduces Fuel and Cold Start Risks

Opportunity: Recognize winter performance is improved by new PJM operational practice

Since Winter Storm Elliott, PJM has extended its conservative cold-weather operational protocol, which includes advanced commitment of units to facilitate fuel nomination, starting plants sufficiently in advance of extreme winter conditions, and paying uplifts to settle out-of-market commitment costs.[14] This conservative operational posture reduces the outage risk associated with cold starts during extreme winter conditions and also helps mitigate the multi-day-ahead gas purchase challenges that impacted operations during Elliott. For example, up to 25 GW of generation was unavailable due to fuel supply issues during Elliott.[15] Furthermore, 70.5% of units that had not run in the weeks before Elliott experienced an outage compared to 45.5% for units that had run in the weeks prior, reflecting the importance of operating plants to avoid cold-start outages.[16] Yet ELCCs have not been adjusted upward to reflect this lower outage risk from PJM's advanced scheduling practices. Concerns about inconsistencies between ELCC accreditation and improved performance have been noted by both the Independent

[14] For example, see PJM's report on Operations during Winer Storm Fern: PJM, January Cold Weather Operations, February 5, 2026 at https://www.pjm.com/-/media/DotCom/committees-groups/committees/oc/2026/20260205/20260205-item-03---cold-weather-update.pdf; and its operations during Winter Storm Gerri: PJM, Winter Storm Gerri Review January 13-18, 2024, January 24, 2024, https://www.pjm.com/-/media/DotCom/committees-groups/committees/mrc/2024/20240124/20240124-item-02---winter-storm-gerri-review---presentation.ashx

[15] FERC, North American Electric Reliability Corporation (NERC) and Regional Staff Entity Report, Inquiry into Bulk-Power System Operations During December 2022 Winter Storm Elliott, October 2023, at https://www.ferc.gov/sites/default/files/2024-02/24_Winter-Storm_Elliot_0207_UPDATE.pdf, p. 95

[16] FERC, NERC and Regional Staff Entity Report, p. 148.

Market Monitor (IMM) and the Old Dominion Electric Cooperative (ODEC) in prior stakeholder proposals.[17,18]

Solution: Update gas ELCCs to reflect PJM's mitigation of winter outage risks

Assuming PJM will continue its conservative posture (whether out of market or eventually in-market through a new ancillary service), we propose that PJM update its ELCC calculations to reflect the higher performance gas-fired plants have achieved. Such an update will reflect the achieved reduction in winter RA risks while ensuring capacity market accreditation aligned with actual performance. The higher and more accurate ELCC levels will send a stronger, more accurate capacity price signal to retain existing resources and attract the entry of new plants, even as capacity market prices remain capped.

Of course, winter-hardening of plants and improved PJM operational protocols will not avoid all outage risks, such as the possibility of fuel supply shortages similar to those experienced during Winter Storm Uri in 2021.

II. Mobilize Additional Seasonal Resources

A. Take Advantage of Higher Winter Rating for Thermal Units and Higher Winter Grid Capacity

Opportunity: Mobilize 6.3 GW of additional gas capacity available only during the winter

Thermal resources, in particular combustion turbines, typically have higher generation capacity in winter conditions than summer, due to denser air entering the turbine and a higher temperature differential between the cold and hot ends of the turbines. However, plants are generally not able to utilize their higher winter capacity because their injection levels are limited

[17] Monitoring Analytics (IMM), *IMM Proposal*, June 30, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/committees/mc/2025/20250820/20250820-item-03c---1-elccstf-imm-proposal---presentation.pdf

[18] ODEC, *ELCC Accreditation Solution Package*, August 20, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/committees/mc/2025/20250820/20250820-item-03b---elcctf-alternative-solution-package-f---presentation.pdf

to the PJM-approved maximum facility output (MFO), which is an annual value that does not currently allow for higher winter ratings of both generating plants and the grid. In its reliability calculations, PJM uses Capacity Interconnection Rights (CIRs) based on summer ICAP (for thermal plants generally equal to MFO), which similarly assumes a plant cannot operate at its higher winter capability. In other words, the use of annual generation limits (MFOs) prevents PJM from taking advantage of the additional capacity offered by plants (mostly natural gas plants) with higher winter ratings. This presents two related challenges: first, the physical ability of many plants to produce more during the winter (and of the grid to accommodate higher injections during the winter) is not enabled and, second, the full winter (ambient-adjusted) capability of the plants consequently is not recognized in their capacity accreditations.[19] Given that PJM's RA risk is now greater during the winter, these barriers to taking advantage of higher winter capacity materially impacts capacity market outcomes.

PJM has already estimated that the aggregate additional winter ICAP of thermal resources is 8,561 MW higher than their annual ICAP and MFO ratings.[20] Given that (1) winter RA challenges occur when demand is well below summer peak loads, and (2) winter transmission ratings exceed summer ratings (particularly during cold snaps), the added headroom on the grid will typically enable the deliverability of the additional winter generating capability.[21] In fact, another preliminary assessment by PJM has found that 6.3 GW of the higher winter-only capability is already deliverable.[22] PJM's analysis of winter ICAP also found that recognizing the winter capability rebalances winter and summer seasons' loss-of-load risks, which increases the

[19] For example, PJM has noted that "Cold and windy weather can increase a line's usable transmission capacity by 10% to 40%" in *PJM Becomes First RTO To Implement Ambient-Air Ratings for Transmission Under FERC Order 881*, PJM Inside Lines, March 9, 2026 at https://insidelines.pjm.com/pjm-becomes-first-rto-to-implement-ambient-air-ratings-for-transmission-under-ferc-order-881/

[20] PJM, ELCC Accreditation Methodology: Update on Sensitivity Analyses, May 22, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/elccstf/2025/20250617/20250617-informational-only---repost-of-may-22-2025-pjm-presentation-on-sensitivity-analyses.pdf, p. 16.

[21] Energy+Environmental Economics (E3), "PJM ELCC/RRS Model Evaluation: Prepared for PJM," December 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/elccstf/2025/20251209/20251209-item-02---pjm-elcc-rrs-model-evaluation---e3-report.pdf, p. 28.

[22] PJM, Accreditation Methodology: PJM Proposal, June 17, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/elccstf/2025/20250617/20250617-item-02a---elccstf-accreditation-reforms---pjm-proposal.pdf slide 45.

annual RA and ELCC values of gas-fired plants (by up to 14%), solar plants (by up to 7% points), and storage resources (by up to 20% points).[23]

PJM also identified two offsetting factors. First, shifting the risks toward summer's higher load periods (as a result of reducing winter risk) will increase the UCAP-denominated reliability requirement, which partly offsets the benefit of higher ELCCs. Second, PJM noted that its RA simulations would need to be "adjusted" to correctly align daily future load forecasts with temperature profiles. This would further increase PJM's winter RA requirements.[24] However, since this load-temperature adjustment, if confirmed, would be a necessary correction in any case, it is even more important to mobilize the higher winter capabilities of plants to avoid further worsening the supply shortage and providing improved price signals to existing and new resources that can add enhanced winter capabilities.

Solution: Enable higher winter capability and reflect it in capacity accreditations

We recommend that PJM enable and confirm higher winter ICAP and winter CIR (or deliverable winter MFO) levels for thermal units and incorporate them into capacity accreditations. As noted, initial analyses by PJM indicate that these reforms unlock more than 6 GW ICAP of additional winter deliverability across gas, coal, nuclear, and other thermal units, which can provide 4–5 GW of additional winter UCAP (depending on the share of each unit type and their respective ELCC class), albeit offset somewhat by an increase in the demand for capacity as risk shifts back to higher-peaking summer events.

To avoid plants incurring penalties for underperforming (i.e., not meeting their higher annual UCAP) during summer RA events, performance penalties should also be made consistent with expected seasonal ICAP and resource performance (as discussed in V.A below and consistent with a transition to a seasonal capacity market design as discussed in V.B). Incorporating higher winter ELCC levels into a seasonal capacity market construct (as discussed in V.B) will offer

[23] See p. 18 of PJM, ELCC Accreditation Methodology: Update on Sensitivity Analyses, May 22, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/elccstf/2025/20250522/20250522-item-02---elcc-accreditation-methodology-update-on-sensitivity-analyses---pjm-presentation.pdf

[24] Id., pp. 11-15 and 20.

additional market efficiency gains but is not a precondition to implementing this recommendation.[25]

B. Enable Participation of Additional Summer-Only DR

Opportunity: Enable capacity-market participation of (possibly 5 GW) summer-only resources

The PJM footprint has substantial demand response capability that can perform during the summer but cannot provide equivalent year-round capability. An example is air conditioner rotation programs enabled through smart thermostats. The potential capability of smart thermostat DR (only one of many demand-side resource options) has recently been estimated to be 4.9 GW.[26]

Prior to the 2020/21 delivery year, participation for "summer-only" DR programs was explicitly accommodated. Since transitioning to an all-annual Capacity Performance framework as of the 2020/21 delivery year, however, the ability of standalone summer-only DR to earn capacity revenues has been noticeably reduced. When seasonal DR was enabled as a stand-alone capacity resource prior to the auction for the 2021/20 delivery year, DR capacity ranged between 8–11 GW. Since annual performance was mandated, DR levels have dropped by approximately 2 GW and have remained in the 6–8 GW range ever since, in spite of load growth and much higher capacity prices incenting more DR.[27] Although multiple factors may be influencing DR participation, the participation challenges for summer-only DR are a prominent one.

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[25] Our recommendation is consistent with that of PJM's market monitor, who similarly recommended "that capacity accreditation recognize the winter capability of thermal resources rather than limiting such resources to summer ratings," further noting that "[t]here is no reason that excess winter CIRs cannot be assigned to these resources immediately." See p. 6 of Monitoring Analytics, *Analysis of the 2025/2026 RPM Base Residual Auction Part A*, September 20, 2024 at https://www.monitoringanalytics.com/reports/Reports/2024/IMM_Analysis_of_the_20252026_RPM_Base_Residual_Auction_Part_A_20240920.pdf

[26] Voltus v PJM, Docket No. EL26-4-000, Supplement to Complaint, October 8, 2025, at https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20260601-5334, p. 2.

[27] PJM, *2025 Demand Response Operations Markets Activity Report: April 2026* at https://www.pjm.com/-/media/DotCom/markets-ops/dsr/2025-demand-response-activity-report.pdf, Figure 3.

Under existing rules, Summer-Period Capacity Performance (CP) Resources can still participate, but only in combination with cleared winter-period capacity to form annual CP commitments.[28] However, because PJM is a summer-peaking system, summer-only demand response remains a valuable tool during challenging hot weather conditions irrespective of its ability to find matching winter-only resources. Annual matching requirements are administratively burdensome for market participants, create investment risks for seasonal resources that expect but ultimately cannot find matching resources for the other seasons, and prevent summer DR capability from participating when winter-only capacity is insufficient to match it. Further, performance penalties create challenges for matched resources, and the current annual matching approach is based on a relatively inefficient heuristic that awards 50% of the annual capacity price to the summer-only and winter-only matched UCAP (without differentially rewarding the higher-value capacity in the tight season with a greater share of the capacity revenue).

Solution: Offer capacity market accreditation to summer-only resources

We recommend that PJM (again) allow summer-only demand-side resources to sell UCAP in the capacity market, accredited at their annual (or future seasonal) ELCC values, in PJM's annual (or a future seasonal) capacity market without the need for winter-matching. This likely will unlock additional DR, possibly up to 5 GW, to improve reliability during summer peaks. Doing so will also help address RA challenges during shoulder months, such as the recent September 2026 scarcity event.[29]

To avoid summer-only resources incurring penalties for being unavailable during winter RA events, performance penalties need to be made consistent with the expected seasonal resource performance (as discussed in V.A below). Incorporating these summer-only resources into a

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[28] PJM, *2026/2027 RPM Third Incremental Auction Results*, March 9, 2026 at https://www.pjm.com/-/media/DotCom/markets-ops/rpm/rpm-auction-info/2026-2027/2026-2027-3ia-report.pdf, p.2. ("Total cleared summer-period Sell Offers must exactly equal total cleared winter-period Sell Offers across the entire RTO to ensure that seasonal CP Sell Offers clear to form annual CP commitments.")

[29] On Sept. 17 PJM issued A Maximum Generation / Load Management Alert and had to activate its Pre-Emergency Demand Response and Emergency Demand Response programs due to above-normal temperatures driving higher electricity demand in PJM while 36,000 MW of generation was on planned outages and high exports to neighboring systems (where the weather was even hotter). See https://insidelines.pjm.com/pjm-issues-maximum-generation-alert-for-sept-17/ and https://insidelines.pjm.com/pjm-operations-update-sept-17-2026/

Enabling additional "summer-only" demand response programs, such as air-conditioner controls, likely would have been beneficial during this late-season heat-wave event as well.

seasonal capacity market construct (as discussed in V.B) offers additional market efficiency gains but is not a precondition to implementing this recommendation.

III. Reduce Barriers for Storage and Recognize the RA Value of Non-Firm Resources

A. Correctly Account for RA value of Non-Firm Energy to Unlock Full Value of Renewables and Storage

<u>Opportunity</u>: Recognize up to 2.3 GW of understated solar, wind, and storage capacity to strengthen investment incentives

As a recent GridLab-Telos study notes, the generation output of resources with non-firm injection rights (often referred to as "non-firm resources" generating "non-firm energy") is excluded in PJM's RA simulations and ELCC calculations.[30] Even for resources with firm interconnections, PJM's RA simulations and ELCC calculations utilize energy deliverability caps (e.g., CIRs during summer periods), even if their MFO and actual generation output typically exceeds that CIR cap in PJM operations.

This understates the RA value of certain resources, such as wind and solar plants, for which energy output above CIR levels is rarely impacted by transmission constraints because:

- non-firm transmission capacity (e.g., to accommodate injections up to MFO) typically exceeds firm transmission limits (CIR levels);
- the occurrence of transmission contingencies that may require partial curtailment of non-firm energy from these resources tends to be uncorrelated with RA events; and
- curtailment of non-firm energy from solar, wind, and storage resources is particularly unlikely during winter RA events (even in the presence of transmission contingencies) because loads are typically well below annual peaks, some other generators are not (able to) operate at their full output, and transmission capability is higher due to lower ambient

[30] GridLab and Telos Energy, Understanding the linkage between transmission deliverability and resource adequacy, Update 1, July 2026 at https://gridlab.org/portfolio-item/gridlab-telos-presentation-deliverability-and-resource-adequacy/ ("GridLab-Telos (July 2026)").

temperatures (as, for example, reflected in higher ambient-adjusted transmission line ratings during cold snaps).

Excluding energy delivered over the non-firm portion of (generally available) interconnection rights is conceptually inconsistent with PJM's treatment of natural gas-fired plants with non-firm fuel supply: even though they have only non-firm access to transportation for fuel that is just as essential as transmission for delivering power, they are accredited at ELCC levels only moderately lower than gas plants with firm fuel (or backup fuel).[31] That approach to gas plants with non-firm fuel rightly recognizes that such resources still contribute to RA at a substantial nonzero (though discounted) rate even though curtailments of non-firm gas supply will tend to be more strongly correlated with winter RA events than the curtailment of non-firm transmission. Thus, all resources with non-firm transmission service should receive nonzero accreditation—and probably with less of a discount (relative to resources with firm transmission) than that for gas-fired resources with non-firm fuel (relative to those with firm or backup fuel). For all classes of resources, the principle should be to assess ELCC with as much statistical precision as possible based on the volume of energy that is anticipated (or has proven) to be available during times of system stress. ELCC should not be an artifact of interconnection study parameters that do not typically limit generation output during actual system operations and real-world RA challenges.

Limiting the modeled output of wind and solar resources also disregards that the resources' non-firm energy available *prior* to RA events is able to re-charge storage resources under real-world conditions—which is not currently captured in PJM's RA and ELCC modeling. If considered in the modeling, this increases (to more correctly reflect) the RA value of storage resources. As GridLab-Telos have estimated, removing the deliverability caps on wind and solar in PJM's simulations will likely recognize up to 2.3 GW of additional UCAP capacity.[32]

Importantly, understating the true RA contributions of wind, solar, and storage resources not only worsens scarcity in PJM's capacity auctions, it also under-compensates the resources for the capacity value they actually provide to the PJM system. This, in turn, reduces the revenues and the investment incentives for resources that currently can be developed in less than 2–3

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[31] For example, while the ELCC for natural gas plants with dual-fuel backup is 76%, the ELCC of gas plant with only non-firm gas supply is 59%, about 4/5th of the value of gas plants with firm fuel and well above zero. See PJM, "ELCC Class Ratings for the 2029/2030 Base Residual Auction" at https://www.pjm.com/-/media/DotCom/planning/res-adeq/elcc/29-30-bra-elcc-class-ratings.pdf

[32] GridLab-Telos (July 2026), p.27.

years,[33] which is approximately twice as fast as the development timelines of conventional (currently supply-chain-constrained) natural gas resources. Despite being resources that can more quickly address the current RA challenges, the business case for investing in these resources (particularly storage) is weakened because of their lower accreditation value and associated capacity market revenues.[34]

Solution: Recognize non-firm energy deliverable from PJM resources during RA events

We recommend that PJM recognize in its RA modeling and ELCC determinations that energy delivered over non-firm interconnection capacity is mostly deliverable (i.e., not zero, similar to how the ELCC value of natural gas plants with non-firm fuel is not zero). More specifically, because non-firm energy from PJM resources will mostly be fully deliverable,[35] we recommend that RA and ELCC simulations should be based on either (1) the MFO of the resources (rather than capping them) or (2) a study of actual or expected curtailments of the non-firm portion of interconnection rights during RA events. While we agree with prior analyses that incorporating detailed deliverability constraints in the RA model can add complexity,[36] it is unreasonable to "zero out" the significant generation that can be made available over the non-firm portion of injection rights.

If curtailments of non-firm delivery rights were to occur during RA events, the capacity accreditations associated with the non-firm portion of resource output that is actually subject to curtailments can be reduced based on realized curtailment (or, if implemented in the RA model, simulated performance). Implementing this recommendation also means that PJM's RA simulations will recognize the greater RA contributions (and ELCC values) of battery storage and pumped hydro due to the fact that at least some of the currently ignored non-firm energy will be available for charging these energy storage resources prior to RA-challenged periods. This increases the ELCC for storage resources, which improves the investment signals for new battery

[33] Several examples exist in PJM for physical deployment of storage assets being completed in under 18 months once development and interconnection prerequisites are in place. See 'Interconnection Customer's Submitted Milestone Schedule' for PJM AF1-028, PJM AF1-040, PJM AE2-019, and PJM AD2-077.

[34] Current ELCC ratings for solar are 6-7% and range from 57% for 4-hr storage to 76% for 10-hr storage. See "ELCC Class Ratings for the 2029/2030 Base Residual Auction," PJM, https://www.pjm.com/-/media/DotCom/planning/res-adeq/elcc/29-30-bra-elcc-class-ratings.pdf

[35] See GridLab-Telos (July 2026).

[36] Energy+Environmental Economics (E3), "PJM ELCC / RRS Model Evaluation: Prepared for PJM", p. 82.

storage facilities.[37] Correcting these investment signals is important because storage facilities can be interconnected and built more quickly than most other capacity resources.

B. Reform Rules on SIS Resources' Market Participation to Enable Storage Development

<u>Opportunity</u>: Enable approximately 5 GW of UCAP by reducing market participation barriers for SIS resources

PJM's recent modification of its Surplus Interconnection Service ("SIS") allows new generators that share an existing generator's interconnection capability to avoid network upgrades and enjoy an expedited interconnection process.[38] Due to their small footprint, geographic flexibility, and short construction times, storage resources are prime candidates for SIS-based sharing of the interconnection of existing or planned generation sites.[39] Recent FERC-approved reforms removed SIS eligibility restrictions in PJM that had effectively excluded grid-charging storage resources from taking advantage of SIS.[40] Despite these reforms, however, participation continues to be inhibited. To participate in PJM's capacity, energy and ancillary service markets, battery energy storage systems (BESS) using SIS must currently register as a "Hybrid Resource" in conjunction with the co-located existing generation. The battery cannot participate in PJM markets as a separate "Co-located Resource" but must be bid in combination with the existing plant as a single hybrid resource.[41] As already recognized by PJM, this hybrid participation requirement for separately owned resources greatly complicates offtake and financing

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[37] See GridLab-Telos (July 2026), p. 30.

[38] Gabel Associates, *ReSISting a Resource Shortfall: Fixing PJM's Surplus Interconnection Service (SIS) to Enable Battery Storage*, prepared for ACORE, September 17, 2024 at https://acore.org/wp-content/uploads/2024/09/Report-ReSISting-a-Resource-Shortfall-Fixing-PJMs-Surplus-Interconnection-Service-SIS-to-Enable-Battery-Storage.pdf, p.9.

[39] RMI, Miles Farmer PLLC, and Gabel Associates, "Surplus Interconnection Service: The Scale of the Opportunity and the Needed Reforms," presentation to PJM Members Committee, November 21, 2024 at https://www.pjm.com/-/media/DotCom/committees-groups/committees/mc/2024/20241121/20241121-item-04b---6-surplus-interconnection-service---presentation.pdf, p. 2.

[40] PJM, Manual 14H Revisions – Surplus Interconnection Service, March 19, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/committees/mrc/2025/20250319/20250319-item-03---1-surplus-interconnection-services-revisions---presentation.pdf

[41] PJM, Market Participation Options for Mixed Technology Facilities (MTF): Guidance for SIS Resources, June 26, 2026 at https://www.pjm.com/-/media/DotCom/committees-groups/subcommittees/ips/2026/20260626/20260626-item-04---market-participation-options-for-mixed-technology-facilities.pdf

arrangements for the purpose of energy and ancillary market participation,[42] potentially prohibiting up to 8 GW of added storage ICAP (or approximately 5 GW of accredited UCAP) in the PJM region.[43] The hybrid resource requirement is particularly challenging for participation in energy and ancillary markets.

Solution: Implement the already-proposed elimination of the requirement to participate as hybrid resources in the PJM energy and ancillary services markets

PJM has already opened a stakeholder process to evaluate eliminating the requirement that SIS resources participate as a single hybrid resource in the energy and ancillary services markets. We recommend that PJM implement this proposal expeditiously and allow the SIS resources to participate as independent co-located resources in the energy and ancillary services markets (even though they would still be required to participate as a single hybrid resource in the capacity market) for the purpose of more fully leveraging existing site's interconnection rights. In so doing, the two SIS-connected resources (such as solar and battery storage resources) can participate in the energy and ancillary service markets individually without the complicated commercial arrangements necessary for hybrid resources. Based on conversations with project developers, this will remove a significant barrier to storage facilities' ability to utilize SIS. This reform will consequently serve to unlock SIS as a more effective route to fast-track interconnection of an estimated 8 GW of additional BESS capacity (with approximately 5 GW of UCAP) by maximizing the use of existing interconnection rights of solar and other resources.

[42] PJM, "Issue Charge: Hybrid Resources Market Model Selection," 2026 at https://www.pjm.com/-/media/DotCom/committees-groups/committees/mic/2026/20260805/20260805-item-04-2---hybrid-resources-market-model-selection---issue-charge.pdf.

[43] Gabel Associates, *ReSISting a Resource Shortfall: Fixing PJM's Surplus Interconnection Service (SIS) to Enable Battery Storage*, prepared for ACORE, September 17, 2024, p. 15 at https://acore.org/resources/resisting-a-resource-shortfall-fixing-pjms-surplus-interconnection-service-sis-to-enable-battery-storage/

IV. Reform Interconnection and Transmission Policies to Support Resource Adequacy

A. Wider Use of RAS and GETs to Quickly Create Interconnection Headroom for New Generation

Opportunity: Quickly create 10–20 GW of generator interconnection headroom

Interconnection of generating resources is often delayed by years due to the time it takes to plan, permit, and construct the transmission upgrades necessary to interconnect the resources. At the same time, PJM does not currently allow addressing interconnection-related transmission needs through certain solutions that can be implemented much more quickly, such as RAS and GETs.[44] For example, consistent with the generally broader use of RAS by western grid operators,[45] the California Independent System Operator (CAISO) used RAS to reliably create

[44] Remedial Action Schemes or RAS refer to control systems that can allow power to flow up to the full capacity of a transmission line, rather than holding some "headroom" on transmission for contingencies. This is achieved by monitoring and actively responding to contingencies with automated changes in generator output or load consumption or system reconfiguration. For more information on RAS, see The Brattle Group, Remedial Action Schemes (RAS) to Quickly and Affordably Connect New Generation and Large Loads, presented to staff at the Federal Energy Regulatory Commission, June 2026 at https://www.brattle.com/wp-content/uploads/2026/06/Remedial-Action-Schemes-RAS-to-Quickly-and-Affordably-Connect-New-Generation-and-Large-Loads.pdf.

Grid Enhancing Technologies (GETs) refer to dynamic line ratings, dynamic transformer ratings, power flow controls, topology optimization, and advanced conductor technologies, that can enhance grid capacity. See Su, T., Zhao, J., Gomez-Exposito, A., *et al.,* Grid-enhancing technologies for clean energy systems, *Nat. Rev. Clean Technol.* 1, 16–31 (2025), https://doi.org/10.1038/s44359-024-00001-5 and Tsuchida et al., Building a Better Grid: How Grid-Enhancing Technologies Complement Transmission Buildouts, prepared for Watt Coalition, April 2023 at https://www.brattle.com/insights-events/publications/building-a-better-grid-how-grid-enhancing-technologies-complement-transmission-buildouts/.

[45] As has the Western Electricity Coordinating Council (WECC) notes in its 2022 Remedial Action Scheme Design Guide: "These schemes have become more common primarily because they are usually less costly and quicker to permit, design, and build than other alternatives such as major transmission lines and power plants." https://www.wecc.org/sites/default/files/documents/meeting/2024/WECC%20RAS%20Design%20Guide%202022.pdf

21 GW of incremental generator interconnection headroom, of which 15.5 GW was firmly deliverable.[46]

While PJM is accepting RAS and GETs under limited circumstances, these options are not currently considered a "preferred" solution to address transmission needs identified in PJM (or transmission owner) interconnection studies. This limits the region's ability to quickly create the headroom necessary to interconnect new generation resources. By delaying the interconnection of new resources, PJM's capacity market cannot benefit when more timely new entry is possible, which worsens RA challenges. Further, beyond the immediate value in speeding interconnection, considering RAS and GETs can typically offer low-cost, high-value transmission solutions, with additional savings from avoided congestion costs in the energy markets.

Solution: Accept RAS and GETs as solutions to address interconnection transmission needs

We recommend PJM embrace, where effective and reliable, greater use of RAS and GETs as "preferred" solutions to address interconnection-related (or any other) transmission needs. This will help bring new resources online more quickly, boosting resource adequacy. While it is possible that PJM's more networked grid may have less potential for using RAS than in the CAISO, these solutions should be enabled, studied, and adopted where appropriate.[47] We believe this likely unlocks at least an estimated 10–20 GW of interconnection headroom (conservatively using CAISO's experience but considering that PJM is approximately three times larger).

B. Reform and Fast-Track ERIS

Opportunity: More quickly interconnect non-firm generation with RA value

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[46] California ISO, "Briefing on Resources available for near term interconnection," December 5, 2023 at https://www.caiso.com/Documents/Briefing-ResourcesAvailable-NearTermInterconnection.pdf

[47] Doing so will likely require modifications to PJM's RAS implementation practices to bring them more in line with those of other systems who learned to use RAS more effectively. See, for example, RAS Guidelines in Section III of CAISO's Planning Standards at https://www.caiso.com/documents/iso-planning-standards-effective-feb22023.pdf.

Note that RAS are also more widely utilized by grid operators internationally. See, for example, the Australian Energy Market Operator's Remedial Action Scheme Guidelines at https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/publication-of-remedial-action-scheme-guidelines/further-information/final-remedial-action-scheme-guidelines.pdf and the Alberta Electric System Operator's System Operating Limit Methodology at https://www.aeso.ca/assets/Uploads/AESO-SOL-Methodology-for-the-Operating-Horizon-v3.pdf

PJM's Energy Resource Interconnection Service (ERIS) has stringent study criteria that reduces its viability. As a result, only 1% of PJM's interconnection queue contains ERIS interconnection requests compared to, for example, 34% in SPP and the 100% use of non-firm interconnections in ERCOT.[48] PJM's current ERIS study process is as time-consuming as interconnection studies for firm resources and, due to stringent study criteria, often triggers extensive network upgrades before resources are allowed to interconnect even on a non-firm basis, which slows down the entry of new resources even if they were to be willing to accept non-firm interconnection. As discussed previously in Section III.A, even non-firm resources provide at least some RA value (while benefiting PJM's energy and ancillary services market), including by increasing energy available for charging storage assets which, in turn, increases the RA value of storage resources.

Solution: Create a fast-track interconnection process for non-firm supply resources, similar to the non-firm interconnection options now being created for flexible large loads

We recommend, as others have,[49] that PJM consider offering a fast-tracked, truly non-firm ERIS interconnection option for new resources, similar to the fast-track "connect and manage" process ERCOT has been using and the non-firm interconnection options that FERC has now required for flexible large loads. (The resources should be able to choose to proceed in parallel through the traditional firm interconnection service process, so they eventually have the option to "upgrade" their initially non-firm interconnection to "firm".) As discussed in Section III.B, to incentivize fast entry of new resources, PJM should also offer resources with non-firm interconnection a capacity accreditation that, while lower than those of resources with firm interconnection, reflects the positive contribution to RA they are able to provide—considering that full curtailments likely are rare and even partial curtailments of non-firm resources (e.g., due to transmission line outages) are not typically correlated with RA events as discussed earlier.

Even if PJM did not allow such generators with non-firm interconnection to participate in the capacity market, their reliability benefit should still be accounted for when calculating PJM's RA requirements. However, to maximize the value of these resources and send proper investment

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[48] Shariq Siddiqui, August 25, 2026, https://www.linkedin.com/pulse/pjms-201-gw-queue-eris-question-platform-thats-how-submit-siddiqui-2jmic/

[49] See, for example, GridLab-PowerGem, Hiding in Plain Sight: Market Design Options to Quickly Unlock Capacity in PJM, August 2026, https://gridlab.org/portfolio-item/unlock-pjm-capacity/

See also: RTO Insider, Converting ERIS into Connect-and-manage Seen as a Fix for Speed-to-power, July 19, 2026, https://www.rtoinsider.com/136922-making-eris-into-connect-and-manage-seen-as-a-fix-for-speed-to-power/

incentives, it is critical to have a viable interconnection process that allows non-firm resources to quickly enter and participate in the market—which can be achieved by reforming PJM's current ERIS option and offering ERIS resources ELCC-based compensation for the RA benefit they provide to the system.

C. Facilitate and Account for the Resource Adequacy Value of Non-firm Imports over External Interfaces

Opportunity: Fully enable the RA value of non-firm interties with neighboring regions

Despite having at least 20 GW of import capability, PJM restricts the Capacity Benefit of Ties (CBOT) to the value provided by considering only 3.5 GW of intertie capacity in its RA model.[50] PJM then estimates that likely imports of non-firm energy over the capped 3.5 GW of intertie capacity result in a 2.4 GW reduction of PJM's RA requirement.[51] PJM has imported and exported more significant volumes of energy during extreme weather events (Uri, Elliott).[52] Since the availability of imports is influenced by how coincidental the PJM RA events are with RA events in neighboring systems, fully recognizing the RA value of interties requires probabilistic modeling that includes a realistic representation of the neighboring systems and their load and

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[50] NERC, *Interregional Transfer Capability Study (ITCS) Strengthening Reliability Through the Energy Transformation*, Final Report, November 2024 at https://www.nerc.com/globalassets/initiatives/itcs/itcs_final_report.pdf, pp. 66–67.

PJM interties with almost 40 GW of nominal interface limits do not reflect simultaneously deliverable imports. See PJM, *Energy Transition in PJM,* June 24, 2024 at https://www.pjm.com/-/media/DotCom/committees-groups/committees/mrc/2024/20240627/20240627-item-08---2-energy-transition-in-pjm-flexibility-for-the-future---report.pdf, Table 3, p. 17.

[51] CBOT represents the external emergency assistance that PJM relies on in the Installed Reserve Margin ("IRM") Calculation. PJM does not evaluate specific interties but instead has administratively determined a CBOT of 1.5% of 50/50 Solved Load, which has remained constant for several years. The IRM is effectively reduced by the CBOT, in turn reducing PJM's resource adequacy requirement. In 2026/27 and 2027/28, this represented approximately 2.4 GW reduction of PJM's RA requirement. PJM, *2025 PJM Effective Load Carrying Capability and Reserve Requirement Study (ELCC/RRS): PJM Resource Adequacy Planning*, October 22, 2025 at https://www.pjm.com/-/media/DotCom/planning/res-adeq/elcc/2025-pjm-elcc-rrs.pdf, pp. 11, 36–37, 42.

[52] For example, PJM exported over 6 GW to the Tennessee Valley Authority (TVA) and other neighboring Regional Transmission Organizations (RTOs) throughout Winter Storm Elliott, curtailing exports below this threshold during just two 6-10 hour periods on December 23rd and 24th. See PJM, *Winter Storm Elliott: Event Analysis and Recommendation Report*, July 17, 2023 at https://www.pjm.com/-/media/DotCom/library/reports-notices/special-reports/2023/20230717-winter-storm-elliott-event-analysis-and-recommendation-report.pdf, Figure 25, p. 45.

resource diversity—which PJM does not currently do.[53] Doing so will be important, however, because it has been shown that extreme weather events do not affect PJM and all neighboring regions at the same time, so PJM benefit from imports one day while exporting to its neighbors the next.[54]

Solution: Simulate interties more granularly and pursue intertie optimization

Energy imports are a resource option, just like other resources. While we recognize that the amount of energy that can be imported during PJM RA challenges will be less than PJM's full intertie capacity, their availability should be estimated based on probabilistic analysis of weather patterns in PJM and the individual neighboring regions. We acknowledge the added modeling complexity involved in explicitly simulating external zones but note that other Regional Transmission Organizations (RTOs) already undertake such analyses. For example, both the Independent System Operator of New England (ISO-NE) and New York Independent System Operator (NYISO) model their 3-4 neighbors individually as part of its probabilistic risk analysis, to understand the quantity of imports it may have access to during RA events.[55] Even large individual utilities in non-RTO regions include individual neighboring systems in their RA and ELCC simulations.[56] This is best practice for understanding import availability from neighboring systems and doing so is consistent with PJM following best practice in its ELCC based estimates of the performance of generation resources.

To increase the likelihood that imports of non-firm energy from neighboring regions are actually scheduled whenever resources are available to support these transactions, we recommend that PJM and its neighboring regions implement "intertie optimization" (also referred to as interface optimization or inter-market optimization) as already pursued by SPP on its western seam, and

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[53] GridLab-PowerGem, Hiding in Plain Sight: Market Design Options to Quickly Unlock Capacity in PJM, August 2026, https://gridlab.org/portfolio-item/unlock-pjm-capacity/

[54] See, for example, Grid Strategies, *Resource Adequacy Value of Interregional Transmission*, June 2025, https://cleanenergygrid.org/wp-content/uploads/2025/06/250610_RAValueInterregionalTx_Corrections.pdf

[55] ISO-NE Tie Benefits Assumptions for 2026-2027 Capacity Commitment Period (CCP) and Third Annual Reconfiguration Auction (ARA 3) at https://www.iso-ne.com/static-assets/documents/100026/a03_pspc_tie_benefit_assumptions_presentation.pdf

NYISO 2024 RNA MARS Assumptions Matrix at https://www.nyiso.com/documents/20142/44204719/05b_2024RNA-ResourceAdequacyAssumptions.pdf

[56] See, for example, Duke Energy Carolinas and Duke Energy Progress Effective Load Carrying Capability (ELCC) Report at https://dms.psc.sc.gov/Attachments/Matter/0fddc6ef-dd6e-431c-b4e0-1a3b93bb1148

recommended by both PJM's market monitor (since 2014) and several industry reports.[57] Given that PJM and MISO have requested FERC permission to terminate coordinated transaction scheduling (CTS) because it has proven to be ineffective in mitigating seams-related barriers to energy trades,[58] we recommend that CTS be replaced with available, more effective seam mitigation approach, such as even a simple design for intertie optimization.[59]

V. Refine the RPM Design

A. Reform Penalties for Storage, Solar, and Seasonal Resources

<u>Opportunity</u>: Improve investment signals by refining Capacity Performance (CP) penalties

Penalties and bonuses in the CP construct are designed to incentivize resources to meet their performance obligations. In 2014, after poor performance of capacity resources during the Polar Vortex, PJM introduced the CP framework to ensure that there were more direct financial consequences for committed capacity that failed to deliver when PJM needed it. Failure now results in a non-performance charge while, at the same time, resources that perform above their obligation receive performance bonus payments.[60]

The obligation is a function of the resources' UCAP which is fixed for all 8760 hours of the year, but for PJM-approved planned maintenance outages. This means, for example, that a solar resource is penalized if an RA event occurs during the night. As the Independent Market Monitor noted:

[57] For a summary, see Pfeifenberger, Intertie Optimization: Achieving Efficient Use of Interregional Transmission, 2025 at https://www.brattle.com/wp-content/uploads/2025/04/Intertie-Optimization-Achieving-Efficient-Use-of-Interregional-Transmission.pdf

[58] RTO Insider, *MISO, PJM to End Coordinated Transaction Scheduling After Meager Benefits*, June 24, 2026 at https://www.rtoinsider.com/135182-miso-pjm-to-end-coordinated-transaction-scheduling/

[59] Id., Slide 7.

[60] PJM, Capacity Performance at a Glance, 2015 at https://www.pjm.com/-/media/DotCom/library/reports-notices/capacity-performance/20150720-capacity-performance-at-a-glance

PJM's approach to ELCC is based on correct insights about the need to calculate the availability of different resource types but the actual implementation results in a set of illogical implications. For example, PJM assigned penalties to solar resources during Winter Storm Elliott in December 2022 when solar resources did not generate power after dark. A solar resource is not expected to generate at night and should not face penalties for failing to do what it obviously cannot.

The same is true for storage, after PJM instructed dispatch has used up all its charge, storage assets would be penalized for failing to produce power. [61]

Because solar resources cannot generate during the night and storage resources cannot generate after PJM has utilized their entire charge (similarly to how generators on planned maintenance are not able to generate), these penalties cannot incentivize better operational performance. Rather, these penalties (and the high un-mitigable risks associated with them) will tend to undermine investment signals, making it harder to finance these types of resources and therefore posing an unnecessary and inefficient barrier to entry. The same is true for resources that have capacity available on only a seasonal basis.

Solution: Do not penalize resources when they cannot possibly be available

While we recognize that FERC has confirmed that PJM's current penalty framework is just and reasonable,[62] we recommend that PJM improve it by considering a shaped performance obligation (rather than a static annual number) that is consistent with the maximum performance possible from these resources (as already considered in PJM's ELCC determinations). As long as the expected value of a shaped performance obligation is consistent with the profile considered in RA and ELCC determinations, there will be no net degradation in PJM's capacity outlook. Yet the investment signals for new resources are improved considerably by holding generators accountable only when they can and should be available.

[61] Monitoring Analytics, *Quarterly State of the Market Report for PJM: January through March* (2024) at https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2024/2024q1-som-pjm-sec5.pdf

[62] See FERC's January 30, 2024 Order approving PJM's marginal ELCC approach (186 FERC ¶ 61,080). While the Commission confirmed in that order that PJM's capacity performance penalty framework is just and reasonable, it also noted that protest about the existing penalty framework or how penalties are applied to resource such as solar plants were "beyond the scope of this proceeding" (at P. 128).

Under this revised penalty construct, solar will not face penalties for not generating during the night but instead will be expected to provide higher energy output levels during daytime; storage assets will be expected to provide their full capability during an RA event but will not be penalized once PJM has fully dispatched the available energy; and resources with strictly seasonal availability (such as VPPs based on controlling air conditioning loads during the summer or gas plants with higher winter-only ICAP) will not be penalized outside the seasons during which they are able to perform.

Exempting these resources from performance penalties during periods when they cannot generate is analogous to PJM's existing exemption for resources on planned maintenance. By trading higher obligations during available periods (e.g., daytime for solar) for no obligations during known unavailable periods when penalties cannot make a difference, the overall incentive structure is improved while the capacity performance product remains fully fungible. In fact, the incentive to perform when possible is strengthened, since any failure to perform when the resources should (for example, due to a forced outage) will be penalized at a higher rate.

B. Implement a Seasonal Capacity Market

Opportunity: Improve capacity market efficiency and take advantage of higher winter CETL

PJM's current capacity market design is based on annual needs, annual accreditations, and annual performance obligations. As PJM staff, market participants, analysts, and other RTOs have previously concluded, the annual construct is less efficient than a seasonal capacity market. As PJM and others have already pointed out,[63] seasonal capacity markets offer a number of compelling benefits, including:

[63] PJM, Capacity Market Reform: PJM Proposal, July 27, 2023 at https://www.pjm.com/-/media/DotCom/committees-groups/cifp-ra/2023/20230727/20230727-item-02a---cifp---pjm-proposal-update---july-27.pdf.

PJM, *2025 in Review: PJM Market Rules Support Efficiency, Resource Adequacy*, PJM Inside Lines, January 6, 2026 at https://insidelines.pjm.com/2025-in-review-pjm-market-rules-support-efficiency-resource-adequacy/.

Analysis Group, Evaluation of Sub-Annual Designs for PJM's RPM Preliminary Assessment of Sub-Annual Capacity Market Design—Results of Quantitative Model, December 12, 2025 at https://www.pjm.com/-/media/DotCom/committees-groups/task-forces/sacmstf/2025/20251212/20251212-item-02---analysis-group-sub-annual-capacity-market---presentation.pdf

Continued on next page

- More Targeted Reliability: Matches capacity procurement to actual seasonal RA risks rather than using substantially blunted signals derived from weighted-average annual values
- More Accurate Resource Accreditation: Better accounts for the true capability of capacity resources including those only available in specific seasons
- Better Price Signals: Reflects true seasonal scarcity or surplus instead of averaging prices across the year
- Expanded Market Participation: Allows seasonal-only resources—such as summer-only demand response programs—to participate more easily
- Lower Procurement Needs: Reduces the need to procure expensive year-round capacity when some of the seasons have lower RA challenges
- Take Advantage of Seasonally Varying Grid Capacity: Captures the benefit of higher grid capacity during the winter months

Solution: Implement PJM's seasonal capacity market, reflecting higher seasonal capabilities

We recommend that PJM implement the seasonal capacity market proposal it had previously developed, modified to implement the other refinements recommended in this report. This includes (1) modification to take advantage of seasonal variances in resources' ICAP (and Maximum Facility Output, MFO), such as higher winter capability of most natural gas plants, (2) the reform of performance penalties to reflect the actual maximum availability of resources, and (3) greater reliance on incremental capacity auctions to address uncertain future needs and enable participation of resources not available on a 3-year forward basis. A seasonal market design will also allow participation by resources that are expected to come online before the winter season (but are not expected to be online at the start of the delivery year).

While implementing a seasonal capacity market design is not strictly necessary to realize the capacity market benefits of the other options discussed in this report, a seasonal market will facilitate a streamlined implementation of several of these options (such as enabling seasonal resources) and yield more cost-effective auction outcomes and clearing. A seasonal capacity market design should also recognize the higher winter capability of the transmission grid in

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The Brattle Group, *Opportunities to More Efficiently Meet Seasonal Capacity Needs in PJM*, prepared for NRDC, April 12, 2018 at https://www.brattle.com/insights-events/publications/opportunities-to-more-efficiently-meet-seasonal-capacity-needs-in-pjm/

Written Testimony of Dr. Kathleen Spees, Dr. Samuel A. Newell, and Dr. Linquan Bai, before the Federal Energy Regulatory Commission, on behalf of the Midcontinent Independent System Operator, September 28, 2023 at https://www.brattle.com/wp-content/uploads/2023/10/Spees-Newell-and-Bai-Written-Testimony-2023-09-29-Docket-No.-ER23-2977-000.pdf

seasonal Capacity Emergency Transfer Limits (CETL) that can then be used for clearing the seasonal capacity market for import-constraint Local Deliverability Areas (LDAs).

In our view, a seasonal market can likely be implemented in its entirety in a short timeframe, by building on PJM's prior comprehensive proposal and drawing from the Midcontinent Independent System Operator's (MISO's) recent successful implementation of its seasonal market design. However, we also recognize that certain components of the seasonal market may be phased in over a multi-year period to expedite capturing the benefits of certain elements (such as improved seasonal resource accreditation). If a staged implementation is necessary, the design can be proposed to FERC in its entirety, but with a staggered implementation schedule.

C. Buy More Capacity in Incremental Auctions to Avoid Surplus and Enable Short-Lead-Time Resources

Opportunity: **Reduce cost of forecasting errors and enable short-lead-time resources**

PJM procures 100% of its projected capacity requirement three years in advance of the delivery period and does so based on an uncertain forecast of future reliability needs. As such, there is a risk that the BRAs commit PJM to more or less capacity than is actually needed. This has happened frequently in past auctions.[64] Because much of the reliability requirement has already been locked in through the BRA, any subsequent downward revisions to load forecasts do not necessarily translate into corresponding reductions in procured capacity, and any capacity released may yield a much lower resale price (such that effective price and volume recovered from customers remain at the original higher BRA level). This creates a higher risk of over-procurement when load forecasts are changing rapidly and are increasingly uncertain, as is the case today. In addition, the full 3-year forward procurements limit the scope of the incremental auctions, which constrain the ability of recently upgraded plants and certain short-lead-time resources (such as demand response or VPPs) to fully participate in the capacity market. This

[64] For example, the IMM has noted "analysis of the RPM auctions for the 2017/2018 through 2022/2023 Delivery Years shows that the peak load forecast (MW) for the Third Incremental Auction has been on average 2.0 percent lower (MW) than the peak load forecast (MW) used for the corresponding Base Residual Auction". See IMM (2023), *Analysis of the 2024/2025 RPM Base Residual Auction*. More recently, revisions have occurred in both directions, including a 2.6 GW downward revision for 2026/27.

may be the case, for example, because plants can still be upgraded (e.g., winterized) in time for the 2028/29 delivery year, but such an investment decision cannot be made in time for next 3-year forward auctions conducted later this year and in early 2027 (for the 2029/30 and 2030/31 delivery years). Similarly, demand response aggregators and VPP developers will have less visibility into customers' interest in these programs a full 3 years before they are expected to participate.[65]

Solution: Procure less than 100% of projected need in the next 3-year forward auctions

Consider reducing the 3-year forward capacity market procurement to less than 100% of the forecast (3-year out) reliability need. That lower level, such as the previously used 97.5% of projected needs, may be informed by the lower end of the range of load forecasts (i.e., uncertainty range) used to determine reliability requirements. The difference between the BRA procurement and updated forecasts of full reliability requirement will then be purchased through incremental auctions two years, one year, and just before each deliverability period. Doing so will increase the trading volume in incremental auctions and facilitate the participation of short-lead-time resources that may find it difficult to make commitments in the next several months (prior to the next two base auctions) but can be mobilized prior to the 2029/30 and 2030/31 delivery period.

We recognize that PJM's previous 2.5% "hold back" was eliminated in 2015 when FERC found the holdback was no longer necessary.[66] We believe, however, that current circumstances—such as high load forecasting uncertainty and growing demand for short-lead-time resources, such as uprates, demand flexibility, and VPPs—have changed sufficiently to revisit that decision. Nevertheless, to address concerns over price suppression in the base auctions, any new "holdback" will likely need to be combined with a modification to must-offer requirements and possibly revised offer caps (e.g., by reducing must-offer requirements for small generators without market power and adding a percentage margin in offer caps).

[65] See concerns over barriers faced by short-lead-time resources in the 3-year forward procurement as raised by Commissioner Glick in 2020: Commissioner Richard Glick Rehearing Dissent Regarding PJM MOPR, April 16, 2020, Docket Nos. EL16-49-001 and EL16-49-002, Orders E-4, E-5 at https://ferc.gov/news-events/news/commissioner-richard-glick-rehearing-dissent-regarding-pjm-mopr

[66] FERC order in Docket Nos. ER15-623 and EL15-29, June 9, 2015.

D. Reform the FRR Option to Enable Excluded Capacity

Opportunity: Enable self-supply and capacity currently excluded by current FRR rules

PJM has created the Fixed Resource Requirement (FRR) option to allow for self-supply of capacity by vertically integrated utilities. However, in an attempt to maximize direct participation in the three-year forward Base Residual Auctions, conditions were imposed on the FRR design that exclude certain amounts of capacity from the PJM market. For example, as we already noted in our 2008 review of RPM, FRR entities are required to exceed their RA requirement by the lower of 3% of their UCAP obligation or 450 MW.[67] To the extent that an FRR entity were to hold surplus capacity, the entity currently is not allowed to sell into RPM (or to others) more than the lesser of 25 percent of its UCAP obligation or 1,300 MW.[68] As a result, capacity that is physically available to support PJM reliability can effectively be stranded: it may neither clear in the capacity market nor be reflected as a reduction in the quantity PJM needs to procure elsewhere.[69] Between the added reliability requirement and sales cap, FRR rules may currently exclude up to 1,000 MW from the PJM capacity market.

Solution: Eliminate surplus reliability requirements and sales caps for FRR entities

We recommend that PJM reform the FRR option to facilitate the self-supply of market participants' capacity requirements and reduce the existing self-supply barriers by not "excluding" any capacity through the added reliability requirements and the sales cap.[70] Eliminating the added reliability requirement and sales cap will facilitate self-supply so that the BRAs can truly be focused on procuring only "residual" needs in the auctions (as initially intended). Importantly, it will make any currently excluded capacity available to meet PJM's RA needs rather than leaving it stranded behind FRR participation rules. Further, it will potentially

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67 See The Brattle Group, *Review of PJM's Reliability Pricing Model (RPM)*, June 30, 2008, pp. 71-76 at https://www.brattle.com/insights-events/publications/review-of-pjms-reliability-pricing-model-rpm/

68 Ibid.

69 For example, in the 2026/2027 BRA, AEP sought a waiver to offer 750 MW of capacity over its sales cap in the 3rd incremental auction. PJM supported the waiver request, but it was ultimately denied by FERC as PJM's updated load forecast and capacity accreditation left the Third Incremental Auction with a surplus of 2,630 MW (more capacity than had been reflected in the 2026/2027 BRA). See Federal Energy Regulatory Commission, Docket No. ER26-444-000 (February 2026).

70 The Brattle Group, *Review of PJM's Reliability Pricing Model (RPM)*, June 30, 2008 at https://www.brattle.com/insights-events/publications/review-of-pjms-reliability-pricing-model-rpm/

increase available supply by creating a level playing field for self-supply and RPM participation, including adjustments to capacity needs through incremental auctions.

Conclusions

This report has identified five groups of options through which PJM (upon validating their feasibility) can likely mobilize 10-20 GW of capacity over the next few years to address near-term reliability challenges. The identified options enable latent capacity from existing plants, improve price signals and investment incentives for short-lead-time resources, and fast-track interconnection options. They include:

- **Unlocking 5-10 GW of available capacity of gas plants** by recognizing and incentivizing winterization and accounting for the reliability benefits of PJM's practice of pre-committing plants ahead of cold-weather events.
- **Enabling 4-5 GW of seasonal resources to bid into PJM's annual capacity market**, including (a) higher 4-5 GW winter capacity of gas-fired plants (which becomes available at lower winter temperatures due to improved plant efficiency and grid capability) and (b) up to 5 GW summer-only demand response resources and VPPs.
- **Reducing entry barriers for up to 7 GW of storage resources** by recognizing the resource adequacy (RA) value of non-firm energy and updating market participation rules for resources using surplus interconnection service (SIS).
- **Fast-tracking 10–20 GW of resource connections to the PJM grid** through wider use of remedial action schemes (RAS) and grid-enhancing technologies (GETs); creating an accelerated Energy Resource Interconnection Service (ERIS) pathway for resources using non-firm interconnection (similar to the "connect-and-manage" option for flexible large loads); and enabling the full RA value of non-firm imports from neighboring regions through intertie optimization.
- **Adjusting PJM's capacity market design to support these options** by reforming resource performance penalties, introducing a seasonal capacity market, increasing procurement volumes in incremental auctions to mobilize short-lead-time resources, and enhancing the Fixed Resource Requirement (FRR) self-supply option.

The added resources can mitigate the current capacity deficiencies and yield customer value in PJM's upcoming forward and incremental capacity auctions. This will also create the time and space necessary to allow for a more holistic and less rushed redesign of PJM's market and state procurements to address the region's longer-term generation investment needs.

List of Acronyms

BESS	Battery Energy Storage System
BRA	Base Residual Auction
CAISO	California Independent System Operator
CBOT	Capacity Benefit of Ties
CETL	Capacity Emergency Transfer Limit
CIR	Capacity Interconnection Right
CP	Capacity Performance
CT	Combustion Turbine
DER	Distributed Energy Resources
DR	Demand Response
ELCC	Effective Load Carrying Capacity
ERIS	Energy Resource Interconnection Service
FCDS	Full Capacity Deliverability Status (representing firm interconnection rights in CAISO)
FERC	Federal Energy Regulatory Commission
FERNS	Future Energy & Resource Needs Study (performed by SPP)
FRR	Fixed Resource Requirement (the capacity self-supply option in PJM)
GET	Grid Enhancing Technology
GW	Gigawatt
ICAP	Installed Capacity of generating resources (also often referred to as nameplate capacity)
IMM	Independent Market Monitor
IRM	Installed Reserve Margin (setting PJM's RA requirement)
ISO-NE	Independent System Operator of New England
LDA	Local Deliverability Area (zones in PJM's capacity market)
MFO	Maximum Facility Output (of a generating plant, currently an annual value in PJM)
MISO	Midcontinent Independent System Operator
MW	Megawatt

NYISO	New York Independent System Operator
ODEC	Old Dominion Electric Cooperative
RA	Resource Adequacy
RAS	Remedial Action Scheme
RPA	Resource Performance Adjustment (for PJM capacity accreditation based on historical performance of generating resources)
RPM	Reliability Pricing Model (PJM's capacity market)
RRS	Reserve Requirement Study
RTO	Regional Transmission Organization
SIS	Surplus Interconnection Service (allows resource to share the capacity of grid interconnections)
SPP	Southwest Power Pool
TVA	Tennessee Valley Authority
UCAP	Unforced Capacity (ICAP derated for average expected availability during RA events)
VPP	Virtual Power Plant (a controllable aggregation of customer load flexibility)