

A decorative graphic consisting of multiple thin, white, curved lines that flow from the top left towards the bottom right, creating a sense of movement and depth against the blue background.

# **PJM Response to the 2023 State of the Market Report**

**August 2024**

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## Introduction

PJM wishes to recognize the comprehensive and thorough analysis of the PJM markets prepared by Monitoring Analytics in the 2023 State of the Market Report (SOM). The report serves as a valuable source of information and analysis concerning each of the markets operated by PJM. PJM encourages stakeholders to review the document and utilize, to the extent they deem appropriate, the detailed data presented in the report concerning different aspects of the PJM markets.

The SOM contained 255 recommendations that provide the perspective of Monitoring Analytics, the Independent Market Monitor (IMM) or Market Monitoring Unit (MMU) for PJM, regarding changes to the PJM market design, rules and administration intended to enhance the competitiveness, efficiency and durability of PJM's markets. The purpose of this document is to review several of the 14 new recommendations made for 2023 and provide PJM's initial responses as to the applicability of the recommendation to the current market and any next steps for pursuing design enhancements related to the recommendation, including referencing currently ongoing stakeholder engagements.

PJM looks forward to continuing to engage in productive discussions on these topics with Monitoring Analytics, members and other stakeholders as it remains committed to maintaining forward progress toward more competitive and efficient wholesale electricity markets.

## Responses to Selected Recommendations From the 2022 SOM Report

### Capacity Market Recommendations

#### Reliability Standard in Capacity Auctions

*The MMU recommends that the same reliability standard be used in capacity auctions as is used by PJM transmission planning. One result of the current design is that a unit may fail to clear in a Base Residual Auction (BRA), decide to retire as a result, but then be found to be needed for reliability by PJM planning and paid under Part V of the OATT (“Reliability Must-Run,” RMR) to remain in service while transmission upgrades are made.*

#### PJM Response

As a general matter, PJM supports aligning the structure and parameters used in the markets with the criteria and actions taken to maintain reliability in planning and operations. This alignment is essential to producing market results that align with the reliability needs of the system and send incentives that promote cost-effective actions to maintain reliability. PJM understands this recommendation to seek to align reliability standards between capacity auctions and transmission planning. While we recognize the importance of consistency in reliability assessments across our markets and planning processes, it is not clear to PJM that this recommendation will resolve the stated problem as presented.

The capacity market is designed to ensure resource adequacy at a zonal and sub-zonal level, using Locational Deliverability Areas (LDAs) as the primary construct for capturing locational constraints. This design necessarily involves some level of simplification to enable a market-clearing process that is computationally feasible and produces timely results. In contrast, transmission planning studies involve more granular, complex analyses that consider a wide range of reliability criteria, including thermal and voltage limitations under multiple scenarios. Further, the planning analyses performed when a resource retires is done at a nodal level, whereas the capacity market solves a more regional problem. As such, it is not clear how using the “same reliability standard” could address the Market Monitor’s stated concern regarding RMR contracts without substantial structural changes to the capacity market, including making it significantly more locationally granular.

Additionally, the interactions between system elements, particularly in voltage-related constraints, make it challenging to directly translate the detailed reliability standards used in transmission planning into the capacity market framework. For instance, the impact of a single unit’s deactivation can affect hundreds of reliability tests, some in ways only observable in non-linear AC power flow simulations, which are not readily captured in the current LDA-based resource adequacy assessments.<sup>1</sup>

Despite these challenges, PJM acknowledges the value in working toward greater consistency between locational capacity market signals and transmission reliability needs. Given the complexity of the issues, PJM is open to

<sup>1</sup> PJM studies the impact of announced deactivations by comparing reliability performance on selected base cases, using tests including but not limited to N-1-1 (thermal), N-1-1 (voltage deviation + voltage magnitude), generation deliverability, load deliverability, and N-1 (thermal, voltage).

engaging stakeholders in discussions of potential solutions and innovative approaches to aligning reliability criteria across our markets and planning processes. Potential areas of improvement include:

- **Enhanced CETL/CETO Studies:** Refine the Capacity Emergency Transfer Limit (CETL) and Capacity Emergency Transfer Objective (CETO) studies to better reflect the range of system conditions under which constraints transmission constraints may bind. Today CETL studies are conducted only under a subset of representative (peak-like) system conditions. This may involve developing more sophisticated modeling approaches that can incorporate a broader range of reliability considerations under more varied system conditions.
- **Increased Locational Granularity:** Investigate the feasibility of introducing more granular locational constructs within the capacity market, potentially allowing for better alignment with transmission planning studies. This could involve further sub-zonal modeling or alternative methodologies for defining LDAs.
- **Alternative Market Representations of Local Transmission Criteria:** Research alternative market designs that could better incorporate detailed, sub-zonal reliability considerations while maintaining the efficiency and competitiveness of the capacity market.

PJM believes that these enhancements may ameliorate, but would be insufficient to fully solve, the issues related to RMR identified by the IMM in this recommendation. Improved alignment between the representation of locational constraints in the capacity market and transmission planning would allow the market more opportunities to cost-effectively address local transmission security and reliability issues. However, it is an incomplete solution given that generation and transmission investments cannot be perfectly timed and sized to meet every local reliability issue, particularly in a one-year commitment, three-year-forward capacity market where both generation and transmission investments are discrete (lumpy), and given the impossibility of perfect competition to address very localized transmission security issues.

While full alignment of reliability standards between capacity auctions and transmission planning may not be immediately or fully achievable, PJM is committed to continuous improvement in this area. We believe that incremental enhancements to our processes, coupled with ongoing stakeholder collaboration, can lead to more efficient and effective market outcomes that better reflect system reliability needs.

## Treatment of Reliability Must-Run Units in Reliability Analysis

*The MMU recommends that units that are paid under Part V of the OATT (RMR) not be included in the calculation of CETO or reliability in the relevant LDA, in order to ensure that the capacity market price signal reflects the appropriate supply and demand conditions.*

### PJM Response

While we understand the intent behind this recommendation to ensure that capacity market price signals reflect appropriate supply and demand conditions, PJM believes that our current approach is more appropriate for maintaining system reliability and accurate market signals.

It is important to clarify that PJM already has measures in place to address some of the concerns underlying this recommendation. Specifically:

- RMR units typically do not participate in capacity auctions, and
- These units thus do not satisfy the reliability requirement for a given LDA or the PJM (RTO) region.

These existing measures help ensure that RMR units do not directly influence capacity market clearing prices or artificially suppress market signals.

Under the current process, PJM believes that including RMR units in the assessment of local reliability requirements and CETO calculations is important. First, note that the physical presence of an RMR unit can (sometimes significantly) alter the patterns of risk within an LDA. Excluding these units from the analysis could result in an incomplete and potentially inaccurate assessment of local reliability needs. Under the current design, risk patterns can vary across LDAs, while resource capacity accreditation is determined based on the RTO-wide risk pattern. Therefore, our reliability analysis must assess the total quantity of system-accredited capacity necessary to meet local reliability needs based on local risks, which inherently includes considering all physical resources expected in the area, including RMR units. Additionally, it is important to be consistent in the modeling of the necessary transmission upgrades associated with an RMR unit. The RMR units are included in the assessment of local reliability requirements, CETO and CETL calculations, but the necessary transmission upgrades are appropriately not included. This consistency removes the potential for distorted price signals that would incentivize generation where transmission upgrades could have replaced that need. It is of crucial importance to have consistent modeling of resources in the CETO and CETL analysis given that those values are intended to be directly comparable; further, it is necessary that the thermal and voltage analysis underlying the CETL calculation reflects the actual physical system as accurately as possible in order to produce meaningful results. This is consistent with including the RMR units expected to be operating and impacting power flows on the system during times of reliability need.

Including RMR units in the analysis also ensures that we determine the appropriate total reliability requirement and CETO for each LDA. In some cases, excluding these units could lead to an overestimation of the capacity needed from the market, potentially resulting in over-procurement and inefficient market outcomes. In other cases, excluding RMR units from the analysis could lead to under-procurement of local capacity, potentially creating greater local reliability risks.

While we understand the Market Monitor's concern about potential distortions to market signals, we believe that excluding RMR units from reliability assessments could introduce more significant distortions and an inaccurate assessment of PJM's resource adequacy risk profile. The current approach strikes a balance between maintaining accurate market signals and ensuring comprehensive resource adequacy assessments (by including these units in CETO and local reliability requirement calculations).

## Capacity Interconnection Rights of Retiring Resources

*The MMU recommends that all Capacity Interconnection Rights be returned to the pool of available interconnection capability on the retirement date of generation resources in order to facilitate competitive entry into the PJM markets, open access to the transmission system, and maintain the priority order defined by the queue process.*

### PJM Response

PJM acknowledges the Market Monitor's recommendation regarding the return of Capacity Interconnection Rights (CIRs) to the pool of available interconnection capability upon the retirement of generation resources. While this proposal has merit in terms of potentially facilitating competitive entry and maintaining queue process priority, it also represents a fundamental shift in the nature and purpose of CIRs as they have been designed and implemented in the PJM market. PJM is aligned with the objective of ensuring that projects that enhance reliability can be processed through the interconnection queue in a timely manner and that CIRs are available (to the extent consistent with the physical transmission system) to enable development of these resources by a potential competitor to the CIR holder.

CIRs were introduced with the implementation of PJM's locational marginal pricing (LMP) energy market and generation interconnection queues. They represent a right to inject generation as a Capacity Resource into the transmission system at a specific point of interconnection. A key principle in the design of CIRs was and is their transferability. This feature allows market participants, who have invested in system upgrades necessary to make their capacity deliverable, to potentially transfer these rights to another market participant developing a resource in the same area (perhaps the same site or nearby with the same point of interconnection). This transferability increases the value of CIRs and increases the incentive for developers to bear the costs of necessary system upgrades, which are not directly borne by customers in PJM's market design.

The current rules require CIRs to be returned or forfeited one year after the resource is retired or withdraws capacity status. This approach strikes a balance between allowing time for economically efficient bilateral CIR transactions and ensuring that interconnection rights do not remain indefinitely tied to inactive resources. The relatively short time frame provides an opportunity for CIRs to be reused by another developer, promoting efficient use of the transmission system. While the Market Monitor's recommendation could potentially increase the speed at which interconnection capability becomes available for new entrants, it would reduce the transferability of CIRs and impact market participants who have made investments based on the current design. This change could potentially reduce the incentive for developers to fund system upgrades, which is a crucial aspect of PJM's market design.

However, certain aspects of the current process may undermine efficient access to transmission system capability. For example, under current rules, CIR holders are able to submit queue requests within the one-year window, effectively extending their ability to retain CIRs. Depending on circumstances, this can be either productive or counterproductive to the goal of efficiently utilizing existing transmission capability: retaining CIRs makes it more straightforward for the rights holder to replace retired local capacity with other generation solutions, especially at the same physical site, but may preclude other developers from accessing the available capacity in cases where there are faster and/or lower-cost alternatives.

PJM believes that the current CIR design is grounded in solid principles that have served the market well. However, recognizing that market designs can evolve to meet the evolving needs of the system, we remain open to discussing



alternatives to the current approach with stakeholders in the appropriate venue, with an overall goal aligned with that in the Market Monitor's recommendation of making system transmission capability available to new generating resources as efficiently as possible. Any potential changes to the CIR structure would require careful consideration of the impacts on market incentives, transmission planning and overall system reliability.

## Incremental Auction Design

*The MMU recommends that PJM not buy any capacity in any Incremental Auction if PJM has already procured excess reserves.*

### PJM Response

PJM does not believe that categorically refraining from buying capacity in Incremental Auctions (IAs) when excess reserves have been procured is the correct approach when seeking to optimize system reliability and costs.

One fundamental principle underlying PJM's capacity market design is that the value of incremental capacity decreases as reserve margins increase, but it does not abruptly drop to zero at any specific threshold. This principle is reflected in the downward-sloping demand curves used in the Base Residual Auction (BRA), which provide a reasonable representation of the incremental value of additional capacity on the system.

The same is true for Incremental Auctions. Even when reserves exceed the target level necessary to meet the 1-in-10 reliability standard, additional capacity still holds value in terms of enhanced system reliability. The marginal value may be lower, but it is not zero.

There are several reasons why PJM believes it's important to maintain the ability to procure capacity in IAs, even with excess reserves:

- **Dynamic System Needs:** Between the BRA and the delivery year, system conditions can change. The ability to procure additional capacity in IAs provides valuable flexibility to respond to evolving reliability needs.
- **Risk Management:** Excess reserves serve as a buffer against unforeseen circumstances, such as extreme weather events or unexpected resource unavailability. Cost-effectively increasing this buffer through IAs can enhance overall system resilience.
- **Market Signals:** Allowing PJM to purchase in IAs, even with excess reserves, maintains important price signals for market participants. It provides ongoing incentives for resource performance and availability.
- **Smooth Price Formation:** The ability to procure small amounts of additional capacity in IAs can help mitigate price volatility between auctions and promote more stable, predictable market outcomes.
- **Operational Flexibility:** Additional reserves provide system operators with greater flexibility in managing the grid, potentially reducing the need for out-of-market actions during stressed system conditions.

Notwithstanding the above, there may well be opportunities to refine the IA demand curves. Instead of implementing a binary rule prohibiting capacity purchases in IAs when excess reserves exist, PJM proposes to work with stakeholders to revisit the IA demand curve design to more accurately reflect the declining, but non-zero, value of incremental capacity beyond target reserve levels.



## Demand Response Recommendations

### DR Dispatch Performance Reporting

*The MMU recommends that PJM report the response of demand Capacity Resources to dispatch by PJM as the actual change in load rather than simply the difference between the amount of capacity purchased by the customer and the actual metered load. The current approach significantly overstates the response to PJM dispatch.*

#### PJM Response

PJM appreciates the Market Monitor's recommendation regarding the reporting of demand response (DR) dispatch performance. We recognize the importance of accurate and transparent reporting of DR performance and agree that providing more comprehensive data can be beneficial for market participants and stakeholders.

It is important to clarify the distinction between the "energy" reduction provided by dispatched DR and the "capacity" commitment fulfilled by DR resources. Currently, the energy reduction is measured or estimated by comparing the load level during dispatch to the load during several recent, similar test days. On the other hand, the capacity commitment of DR is based on reducing load to a certain, committed Firm Service Level (FSL) regardless of the current load level upon dispatch. Any DR resource that reduces load to its individual FSL is considered to have met its capacity obligation even if the energy reduction is less than the accredited value of reducing load to the FSL.

Reporting the total accredited capacity (UCAP) of committed DR dispatched is a useful metric, as it reflects the capacity commitment fulfilled by these resources. And, consistently, current reporting of "capacity" value provided assesses this capacity value in a manner consistent with how DR installed capacity (ICAP) is calculated: as the difference between the loads' peak load contribution (PLC, in summer) or winter peak load (WPL). However, we also recognize the value in reporting the actual energy reduction achieved by DR resources during dispatch events. This information has been provided historically for certain important DR dispatch events, and we plan to make this reporting more consistent and comprehensive.

PJM commits to continue reporting the total UCAP of committed DR dispatched, as this metric reflects the capacity obligation fulfilled by these resources, as well as to enhance our reporting to include the actual energy reduction achieved by DR resources during significant dispatch events. PJM can engage with stakeholders to determine the most useful format and frequency for reporting this additional DR performance data, and will endeavor to provide clear explanations and context alongside the reported data to ensure that market participants and stakeholders understand the distinction between capacity commitments and energy reductions in DR performance.

In the longer term, there may also be opportunities to improve the accuracy and granularity of our energy reduction calculations for DR resources, taking into account the challenges associated with establishing accurate baselines for diverse types of DR participants.

PJM aims to provide a complete picture of DR performance while maintaining the integrity of our capacity market design. We believe this approach will address the Market Monitor's concerns about potentially overstating DR response while also preserving the important role that DR plays in our markets. PJM remains committed to transparency and continuous improvement in our market operations and reporting. We look forward to working with

the Market Monitor and other stakeholders to refine our DR performance reporting and ensure that it provides valuable insights for all market participants.

## DR Participation Framework

*The MMU recommends that demand resources offering as supply in the capacity market be required to offer a guaranteed load drop (GLD) to ensure that demand resources provide an identifiable MW resource to PJM when called.*

### PJM Response

PJM believes that requiring demand resources to offer a guaranteed load drop (GLD) instead of, or in addition to, the current firm service level (FSL) approach would introduce unnecessary complexities and potential inaccuracies into our capacity market performance assessment process.

The FSL construct was specifically chosen in part because it significantly simplifies the assessment of whether dispatched demand response (DR) resources have met their capacity commitments. Under the FSL approach, compliance checking is straightforward: PJM compares the actual load to the committed FSL and when the actual load is less than or equal to the FSL, compliance is achieved. In contrast, a GLD approach would introduce the need to determine a “baseline,” which would attempt to estimate what the DR would have consumed had it not curtailed. This introduces an unknown and unknowable counterfactual into the measurement of DR, which would seemingly reduce accuracy when measuring compliance.

While we currently have methods to estimate energy reductions using baseline approaches, requiring GLD for capacity market participation would reintroduce complexities into the capacity market performance assessment process that the FSL approach was designed to avoid. This could potentially lead to disputes over performance and complicate the administration of the capacity market.

Nevertheless, PJM recognizes the importance of accurately valuing the expected Capacity Resource adequacy contribution of FSL commitments for each Capacity Resource or registration. This issue is directly related to ongoing discussions in the Market Implementation Committee following the approval of a Problem Statement and Issue Charge concerning the appropriate capacity valuation of DR Capacity Resources. PJM is committed to working with stakeholders to ensure that the capacity value of all DR resources is accurately assessed, given the FSL commitments they undertake. We believe that focusing on improving the accuracy of capacity valuation within the current FSL framework is a more effective approach than shifting to a GLD requirement.

By maintaining the FSL approach while refining our capacity valuation methodologies, we can preserve the simplicity and clarity of performance assessment while ensuring that DR resources are appropriately valued for their contribution to system reliability. PJM looks forward to continuing these important discussions with the Market Monitor and other stakeholders to further enhance the effectiveness and efficiency of our capacity market.

## DR Real-Time Capability Reporting

*The MMU recommends that PJM revise the requirements for reporting expected real-time energy load reductions by Curtailment Service Providers (CSPs) to PJM to improve the accuracy and usefulness to PJM's system operators.*

### PJM Response

PJM supports this recommendation and believes there are operational benefits to enhancing the requirements for reporting expected real-time energy load reductions by Curtailment Service Providers (CSPs). Ideally, CSPs would report expected real-time energy load reductions available based on their current load and curtailment capabilities. While we acknowledge that this approach would require substantial additional data reporting from CSPs, we believe it is worthwhile given the potential improvements to system operations and reliability combined with the fact that the vast majority of DR only curtails during emergencies when data accuracy is of the utmost importance.

More accurate and timely information about available demand response capabilities would enable PJM system operators to make more informed decisions in real time, potentially leading to more efficient dispatch, more accurate pricing and enhanced grid reliability. This improved visibility into demand-side resources could also contribute to better integration of demand response with other grid resources.

PJM looks forward to pursuing this recommendation in the appropriate stakeholder venue. We will work collaboratively with CSPs, the Market Monitor, and other stakeholders to develop a reporting framework that balances the need for improved operational information with the practical considerations of data collection and reporting for CSPs. Our goal would be to enhance the value of demand response in our markets while minimizing any undue burden on market participants.

PJM appreciates the Market Monitor's focus on this aspect of demand response participation and looks forward to working toward implementing this improvement to our operational capabilities.

## DR Operations and Performance Requirements

*The MMU recommends that PJM define when operators can and should call on demand resources, given that a call on demand resources no longer triggers a Performance Assessment Interval. The MMU recommends that PJM revise the performance requirements for demand resources to include an event specific measurement for dispatch occurring outside of Performance Assessment Events and penalties for nonperformance.*

### PJM Response

We believe that our current procedures and recent market reforms adequately address these concerns, but we remain open to further discussion and refinement.

PJM's emergency procedures, which include the deployment of demand resources, are clearly defined in our operating manuals and align with North American Electric Reliability Corporation (NERC) standards. These procedures include a "Load Management Alert" that provides advance notice of potential demand resource

utilization. This alert, along with other emergency procedure levels, provides a clear framework for when operators may call on demand resources.

It is important to note that PJM operators retain the flexibility to deploy any resources, including demand resources, when necessary for system reliability. This approach is consistent with our treatment of generation resources, which may be committed out-of-market when deemed necessary for reliability.

Regarding performance requirements and penalties, we believe that the recent capacity market reforms filed by PJM and accepted by FERC in ER24-99 address many of these concerns. These reforms include enhanced testing requirements for both generation and demand response resources. The alignment of demand response performance requirements with those of generation resources is an important principle in our market design.

Historically, demand response resources have demonstrated good performance in both testing and actual events. Given this track record, we do not currently see a pressing need to implement additional performance requirements or penalties specific to demand response resources outside of Performance Assessment Intervals. However, PJM is committed to continually monitoring the performance of all resources, including demand response. We will continue to evaluate the effectiveness of our current procedures and market rules. If specific issues arise or if the Market Monitor has detailed proposals related to this recommendation, we are open to further discussion in the appropriate stakeholder forums.

## ***Ancillary Services Recommendations***

### **Regulation Market Design**

*The MMU recommends that the two-signal regulation market design be replaced with a one-signal Regulation Market design.*

#### **PJM Response**

We believe that our recent Regulation Market redesign, which was approved by FERC in June 2024, addresses the underlying concerns and provides a more efficient and effective approach to regulation services.

In April 2024, PJM filed proposed revisions to redesign our Regulation Market from the current two-signal, single-product approach (RegA or RegD) to a two-product approach, Regulation-Up (RegUp) and Regulation-Down (RegDown). This new design moves beyond the single-signal approach suggested by the Market Monitor to a more sophisticated and flexible framework.

The new design allows PJM to value and price RegUp and RegDown as separate products, and to send a singular dispatch signal that identifies whether RegUp or RegDown is needed, increasing our tools and flexibility to manage area control error (ACE). This approach enables separate procurement and pricing of RegUp and RegDown services, which is expected to result in more efficient economic dispatch and reduced overall lost opportunity costs.

Key benefits of this new design include:

- Enhanced determination of lost opportunity costs for resources providing regulation instead of energy

- Improved performance scoring for commitment and compensation
- Elimination of the benefits factor and updates to regulation offer rules
- More accurate price signals that reflect resources' actual costs to provide regulation
- Consideration of a resource's ramp rate in opportunity cost calculations, leading to more efficient energy dispatch signal following

In the recent order, FERC found that this new approach should result in efficient price signals for regulation service and more accurate compensation for resources providing this service. The design allows for better meeting system needs based on operating conditions and results in market clearing prices that more accurately reflect resources' costs.

While we understand the Market Monitor's recommendation for a simpler one-product, one-signal design, we believe our approved two-product approach offers greater benefits and addresses the underlying concerns more comprehensively. PJM remains committed to continually improving our market designs and will closely monitor the implementation and performance of this new Regulation Market structure.

## Electronic Synchronous Reserve Deployment

*The MMU recommends that to minimize lag and improve performance, PJM use an electronic synchronized reserve event notification process for all resources and that all resources be required to have the ability to receive and respond to the notifications.*

### PJM Response

PJM concurs with the Market Monitor's recommendation to implement an electronic synchronized reserve event notification process for all resources. We recognize the importance of minimizing lag and improving performance in reserve deployment, and we are actively pursuing improvements in this area.

In particular, PJM is addressing this recommendation through the ongoing work of the Reserve Certainty Senior Task Force. As part of this effort, PJM has proposed a "reserve deployment" package that includes a significant enhancement to our notification process. Specifically, we proposed to transition from the current "all-call" system to a more efficient method where reserve deployment instructions to generators will be transmitted as an update to basepoints. Under this new approach, deployed reserve megawatts will be added to the current output of each resource and sent out immediately through telemetry, along with a notification of a spin event. This method will occur outside of the dispatch and pricing optimization and will not directly impact LMP calculations.

This proposed change addresses several key challenges in our current deployment process, including:

- Providing dispatchers with more flexible tools to deploy reserves
- Reducing communication delays associated with the current all-call system
- Improving consistency between spin event instructions and normal dispatch procedures
- Clarifying PJM's requests from resources during a spin event

We are pleased to report that in June, stakeholders voted to endorse PJM's reserve deployment package with over 90% support. A final vote at the Markets and Reliability Committee is scheduled for late July.

PJM is committed to implementing this improved electronic notification process, which we believe will enhance the responsiveness and efficiency of our synchronized reserve deployment. We will continue to work with our stakeholders to refine and implement these changes, ensuring that all resources have the ability to receive and respond to these electronic notifications effectively.