This document is intended to clarify some of the reasoning and design features underpinning the proposal put forth by PJM in the Reserve Certainty Senior Task Force (RCSTF) in light of the presentation from the Independent Market Monitor (IMM) in the RCSTF meeting held on May 1, 2026, which miscategorized PJM's goals and proposal for the RCSTF effort .

Goals of PJM's Proposal in RCSTF

The IMM presentation inaccurately ascribes the following as the goals of PJM's RCSTF proposal:

- Raise prices in the day-ahead and real-time markets to shift revenue from capacity markets to energy markets and reduce uplift in energy markets.
- Incorporate advanced commitments made for conservative operations into the day-ahead market

PJM's design is **not** intended to either shift revenue from the capacity market into the energy market or to address multi-day advanced commitments that are made during conservative operations. PJM's design is instead intended to better reflect the operational needs for maintaining system reliability in its Day-Ahead and Real-Time Energy and Ancillary Service Markets.

With the increasing integration of renewable energy, distributed energy resources, and demand response, PJM anticipates increasing net-load ramp and uncertainty in grid operations, which must be addressed by flexible, dispatchable generation. Consequently, the design proposed by PJM is intended to address the net-load ramp and uncertainty as well as outage risks via in-market processes instead of continuous out-of-market actions that would otherwise be needed to maintain reliability.

To the extent that this increases prices during times of tight system conditions, PJM believes that this will appropriately create better incentives for performance during these critical periods and send the appropriate flexibility investment signals. This increase in prices would then have the effect of shifting revenue from the capacity market into the Energy and Ancillary Service Market because of the coupled nature of these markets. However, this is a natural outcome of the proposed reforms given the design of these markets, and not an objective of the proposal.

PJM's proposal is not explicitly designed to reduce uplift, especially due to conservative operations; rather, it is designed to improve day-to-day reliability and market efficiency. However, out of market operator actions are a significant driver of uplift in PJM's markets today, and to the extent that the reliability needs driving these actions can be reflected in PJM's markets, this will lead to more transparent and efficient market outcomes.

PJM's design is in keeping with the general principle of "*a pricing framework that incorporates reasonable prices for actions that the system operator may take to provide a security constrained economic dispatch*"[1] in real time.

PJM's Proposal

PJM proposes to address real-time net-load ramp and uncertainty needs through the introduction of 10-Min and 30-Min Ramp and Uncertainty Reserves (RUR). Procuring reserves to address uncertainties and ramping needs via in-market processes increases reliability (as it is automated instead of manual operator actions), improves market transparency by reducing out-of-market operator actions, and aligns price signals with the flexibility needs of the system thereby providing more accurate long-term investment signals. The prepositioning of real-time dispatch via RUR to address forward ramps also aligns real-time dispatch with IT-SCED commitments; this alignment would provide more efficient pricing and dispatch outcomes.

In the day-ahead market (DAM), we have higher levels of forecast uncertainties; the net-load uncertainty and outage risks are addressed via the Day-Ahead Scheduling Reserves (DASR). The percentile of uncertainty covered via DASR is determined by the operational risk to the system.[2] Moreover, on winter days with elevated risk, there is a higher probability of generation start-up failure when committed in real time (after the day-ahead market). Consequently, online Energy Gap (EG) Reserves are proposed to be procured in the day-ahead market so that sufficient generation is committed in DAM to cover the peak demand.

Since the dynamic RUR requirements align reserve requirements (and by implication, prices) with the real-time ramp and uncertainty experienced by the system, they act as a prepositioning signal to reduce shortages and scarcity pricing during hours of tight ramp margin and reduce prices in hours with lower ramping and uncertainty.

DASR and EG reserves are intended to reduce the out-of-market actions taken during the Reliability Assessment and Commitment (RAC) process. These reserves will reduce operational risk by allowing sufficient time for resources to arrange for real-time availability.

Energy and Capacity Markets

"Capacity markets may provide additional capacity that could be available in real-time. But capacity markets themselves do not create the correct incentives to operate capacity or change load in response to short-run scarcity conditions. Something more is needed." Hogan, 2013

In the context of the IMM's presentation and suggestions regarding energy and capacity markets interactions in PJM, it is worth emphasizing the distinction between operating reserves procured in energy markets and the planning reserves procured in the capacity market.

[1] https://whogan.scholars.harvard.edu/sites/g/files/omnuum4216/files/whogan/files/hogan_hepg_022714.pdf
[2] https://videos.pjm.com/media/1_6o3j7wgr

Operating reserves are reserves that are available and deliverable in real time to deal with sharp net-load ramps, uncertainties due to forecast errors, generation outages, transmission line losses, etc. In other words, they are a subset of planning reserves that can provide real-time reliability on short notice. Unlike the capacity procured via capacity markets based on forecasts months or years into the future, operating reserves are based on more accurate information about the supply, demand, and transmission conditions that are aligned with day-ahead or real-time operating conditions. The existence of a capacity market does not negate the need to procure and incentivize flexible operating reserves that are available in real time and are required for reliable operations.

Energy and capacity markets are complementary markets with two distinct products: energy and capacity. Having a capacity market should not preclude the need to align operational needs and market outcomes in Energy and Ancillary Service Markets, especially because attributes crucial for operational reliability, such as resource flexibility, are not featured in capacity markets. Further discussion on this topic can be found in Chapter 4 of Powering Reliability Through Market Design.

Look-Ahead Dispatch and IT-SCED

The IMM claims that look-ahead/multi-interval dispatch can be utilized to preposition the system for net-load ramps. However, the IMM has not provided any details on how the pricing from look-ahead dispatch would be settled. As evidenced by California and New York Independent System Operators (CAISO and NYISO), forward interval prices in look-ahead dispatch can have substantial deviation from settlement prices due to uncertainties; this can lead to market inefficiencies. This is in addition to software-related challenges. Moreover, despite utilizing multi-interval dispatch, CAISO has flexible ramping reserves to address short-term ramps that cannot be addressed at reasonable granularity through multi-interval dispatch.

While PJM recognizes that look-ahead dispatch may provide a useful pathway for intra-day, long-run optimization, it would require a significant overhaul of the current settlement rules without necessarily being a better alternative to the proposal put forth by PJM in RCSTF.

The IMM claims that net-load ramping can be addressed through IT-SCED. IT-SCED is used as a commitment tool and not as a dispatch tool. As described in the preceding discussion, there are substantial software and market efficiency-related challenges to using the dispatch and pricing from IT-SCED for operations and settlements at all pricing nodes.

Nesting and Unnesting of Reserve Products

The IMM appears to have a fundamental misunderstanding of the construct proposed by PJM. Contrary to the claims made by the IMM, the design proposed by PJM increases the supply of resources available to provide reserves and reduces costs as compared to the alternative put forth by the IMM; this is explained in the following:

The reserve pricing is primarily determined by eligibility rules, the reserve requirements, and the demand curves. Detailed explanations can be found in (i) RCSTF Package And Rationale; (ii) Reserve Service Nesting, Unnesting and Price Formation; and (iii) Product Nesting and Resource-level Constraints.

PJM recognizes that different types of energy-limited resources may satisfy the different types of operational requirements of the system. For instance, resources that can respond in 10 minutes and provide sustained performance for 60 minutes can satisfy the short-term flexibility needs via 10-Min RUR, while resources that can respond in 30 minutes and sustain performance for 4 hours can satisfy the intermediate-term flexibility needs via 30-Min RUR.

The IMM proposes that only resources that can sustain performance for 4 hours be allowed to provide reserves. PJM believes that this would unduly limit the ability of flexible energy-limited resources to provide 10-minute reserve services. As has been observed in other regions with more battery storage participation, highly flexible energy limited resources are well-suited to providing these short lead time reserve services, and PJM believes that limiting their participation could lead to market inefficiency and increased prices in the future.

The class of resources eligible to provide 10-Min RUR is not a strict subset of the class of resources eligible to provide 30-Min RUR or vice versa, which is why the unnested design is appropriate to recognize the potentially distinct value of the two different classes of reserves. PJM also recognizes that synchronized reserves (SR) are deployed via “All Call” during a spin event, while the RUR reserves are proposed to be deployed economically in a forward interval via RT-SCED; this merits an unnested design between SR and RUR. Where there is a clear hierarchy in terms of the service provided which justifies the price additivity concomitant with the nested reserve construct, PJM’s proposal maintains the nested design: for example, the online 30-Min RUR are a strict subset of all 30-Min Reserves and nested with the 30-Min reserves, in consequence.

Locational Reserves

PJM has provided the rationale as well as detailed technical information and examples on the locational procurement of reserves in a number of presentations and documents. A few of these are listed below:

- RCSTF Package And Rationale
- Locational Constraints for Reserve Services
- Additional Examples For Locational Reserves
- Locational Procurement of Reserves

As explained in these documents, the locational procurement of reserves, particularly those pre-positioning the system for future RT-SCED intervals, reduces payments to non-deliverable reserves by recognizing forward network constraints. Consequently, more stable locational marginal prices and greater efficiency in dispatch and pricing outcomes are anticipated due to the introduction of the locational procurement of reserves.

The IMM's presentation does not seem to recognize the importance of maintaining feasible dispatch/deployment of reserves accounting for transmission constraints. Reserve procurement misaligned with transmission constraints leads to inefficient market outcomes in addition to compromising operational reliability, which is why ISOs such as CAISO[3] and NYISO[4] have implemented or proposed the nodal procurement of reserves; other ISOs such as MISO[5] are also considering locationally driven reserve procurement.

The nodal pricing of reserves is not conceptually different from the locational marginal pricing (LMP) of energy. Therefore, the same guiding principles and benefits hold for nodal pricing at reserve nodes — see Harvey et. al, 2022 and RAP, 2026 and the references therein for a detailed discussion; as explained in these documents, the importance of locationality is accentuated with increasing ramping and uncertainty in the grid.

[3] https://www.caiso.com/documents/presentation-flexible-ramping-product-refinements-deliverability-refresher-training.pdf

[4] https://www.nyiso.com/documents/20142/48652880/2024-12-18%20Dynamic%20Reserves%20MC.pdf/3e34cb2d-7450-045f-f590-80ddd6157f53

[5] https://cdn.misoenergy.org/20260219%20MSC%20Item%2009b%20Enhance%20Reserve%20Deliverability%20for%20DA%20and%20RT%20Markets%20(MSC-2026-2)741979.pdf