

A Summary of PJM's Perspective on the RCSTF's Long-Term Scope

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New Reserve Products

Challenges to Be Addressed



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The Day-Ahead Energy Market clears enough supply to meet bid-in demand, which may be lower than the PJM load forecast for the next day.



PJM's operations 30-Minute reserve requirement is routinely higher than the 30-Minute reserve requirement reflected in PJM's markets.



PJM's markets do not procure flexibility to mitigate several key uncertainties (i.e., load, wind, solar, interchange and forced outage rates), which PJM must manage to ensure reliability.



PJM's markets do not procure ramping capability to manage expected ramping/flexibility needs in the near term.

These challenges all represent instances where PJM's markets do no align with operational needs today, and this will only increase through the energy transition.



PJM's perspective is that new reserve constructs are required to address these challenges.



New reserve product(s) are needed day-ahead to schedule the system entering the operating day, and to manage risks associated with uncertainty and ramping events intra-day.



More reserves may be needed day-ahead than during real-time, and the market will need to handle that appropriately.



The market should recognize any avoidable costs incurred to resources providing these services through reserve offers.



Appropriate and clear performance obligations, settlement impacts, and cost allocation structures will need to be defined for these new products.



New approaches to locational procurement may be necessary to ensure that procured reserves are deliverable.



Additional Points Under Consideration



PJM is evaluating the potential to redesign our existing 30-Minute Reserve product to meet these operational needs.



In a previous presentation, PJM indicated that we believed that reserves to manage the day-ahead energy gap and reserves for managing uncertainty and ramping needs should be separate products. While that may still be PJM's ultimate perspective, we are looking more closely at whether these products could be combined to simplify the market design.



Reforms to PJM's existing reserve markets, such as incentives to follow PJM dispatch and updates to our existing Operating Reserve Demand Curves (ORDCs) may be needed to make these new products effective and to ensure a cohesive market design.



Enhancements to Existing Reserve Markets

Challenges to Be Addressed



PJM's existing ORDCs are based on data from a single event over 17 years ago, and do not reflect current operational reality or the reliability value that reserve services provide.



The cost of advanced fuel arrangements and other availability measures to provide reserves may be unrecoverable through PJM's existing market constructs.

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As PJM relies more heavily on reserves to manage uncertainty, it is critical that resources follow PJM dispatch instructions.



Consequences of non-performance may not currently be structured to sufficiently promote reserve certainty.

These challenges all represent instances where PJM's markets do no align with operational needs, leading to market inefficiency, out-of-market actions and reliability concerns.



PJM's perspective on needed reforms to our ORDCs.



PJM believes that reforms are needed to our ORDCs to better reflect the value of reserve services into the market and to align with system operational needs.



Analysis of a recent shortage event showed that reserves were available on the system above the current \$850 penalty factor.



PJM is considering factors such as the value of lost load, the costs incurred to make reserves available and the costs of emergency actions that would be taken during Capacity Emergencies to inform our willingness to pay for reserve services.



Ultimately, the design of PJM's ORDCs should be product specific and the ORDCs for different reserve products should fit together to promote market efficiency and overall market coherence.



PJM also believes that additional reserve reform discussions

may be necessary.



New performance evaluation and settlement impacts for when resources fail to perform



Changes or clarification to reserve performance obligations and resource qualification for providing reserves are needed.



New incentives to follow PJM dispatch, including reforms to how deviation charges are calculated.



Reforms to reserve offers rules to reflect avoidable costs as well as any other structural changes need to accurately reflect resource capability.



IT SCED Enhancements

In parallel with the RCSTF's efforts, PJM intends to consider enhancements to its Intermediate Term Security Constrained Economic Dispatch (IT SCED) engine that are complimentary with reserve market reforms advanced and anticipates exploring several things, which may include but are not limited to:



Increasing the IT SCED look ahead window and evaluating how intervals are spaced within that window



The forecast information that is used



How the network is represented in future time intervals



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Challenges to be Addressed

- The Day-Ahead Energy Market does not procure sufficient reserves to manage operational risk, leading to out-of-market reliability actions.
- PJM's markets do not procure flexibility to manage forecast uncertainty (i.e., load, wind, solar, interchange and forced outage rates).
- PJM's real-time dispatch engine does not account for flexibility and ramping needs forecasted in future intervals.
- PJM's ORDCs are based on an old market design.
- The cost of advanced fuel arrangements and other availability measures to provide reserves may at times be unrecoverable through PJM's existing market constructs.

Proposed Solutions to Explore

Enhancements to Existing Reserve Markets

- Updates to PJM's ORDCs
- Changes to resource offer rules into reserve markets to enable cost recovery
- IT SCED enhancements to better manage upcoming flexibility needs
- Performance evaluation and incentives to ensure alignment with operational needs
- Incentives to follow PJM dispatch
- Locational procurement of reserves for reliability

New Reserve Products

- Day-ahead reserve product(s) to better align with dayahead operational needs
- Ramping/uncertainty reserve products to manage growing operational uncertainty





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A Summary of PJM's Perspective on RCSTF Long Term Scope







Acronym	Term & Definition
RTO	A Regional Transmission Organization is an entity, such as PJM Interconnection, that manages and coordinates the flow of electricity across a large geographical region.
ISO	An Independent System Operator is an organization that manages and coordinates the electric grid in a geographical region.
FERC	The Federal Energy Regulatory Commission is
NERC	The North American Electric Reliability Corporation is
MW	A Megawatt is a unit of power equaling one million watts (1 MW = 1,000,000 watts) or one thousand kilowatts (1 MW = 1,000 KW).
ORDC	An Operating Reserve Demand Curve is a market mechanisms that dictates the maximum willingness to pay for reserves at different levels.



Acronyms

Acronym	Term & Definition
VOLL	Value of Lost Load the willingness to pay to avoid electrical service interruption, often considered in dollars per megawatt-hour.
DASR	Day-Ahead Scheduling Reserve is the quantity of reserves PJM carries to ensure that sufficient reserves are available going into the operating day to manage risks associated with load forecast error and generator forced outage rates.
LOLP	Loss of Load Probability is the probability that firm load will need to be shed based on operational risk factors.
OR	Operating Reserves are available generating capacity that can be used to balance supply and demand.
IT SCED	The Intermediate Term Security Constrained Economic Dispatch is the intra-day commitment engine that PJM uses to evaluate future intervals and ensure that sufficient generation capacity is online to meet forecasted demand for its look ahead window.

