# Additional Details on PJM's Proposed Solutions for Synchronized Reserves

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February 11, 2026

# Proposed Changes to Synchronized Reserve Consequences for Non-Performance

# Status Quo Consequences for Synchronized Reserve Non-Performance

- If a resource with a Synchronized Reserve assignment fails to fully convert the procured Synchronized Reserves to energy during a Synchronized Reserve Event, the resource must pay for the Synchronized Reserve Credits for the MW short fall at the real-time Synchronized Reserve Market Clearing Price in every interval in which it cleared during both:
  - The day of the event (including five-minute intervals outside of the event)
  - Over the immediate past interval, which is equal to the lesser of:
    - The average number of days between 10-minute events in the prior year OR
    - The number of days since resource's last non-performance
- If the event duration is less than 10 minutes, there is no obligation to refund credits due any shortfall.
- See section 6.3.3 of M28: https://www.pjm.com/-/media/documents/manuals/m28.ashx

# Why is PJM considering changes to the consequences for Synchronized Reserve Non-Performance?

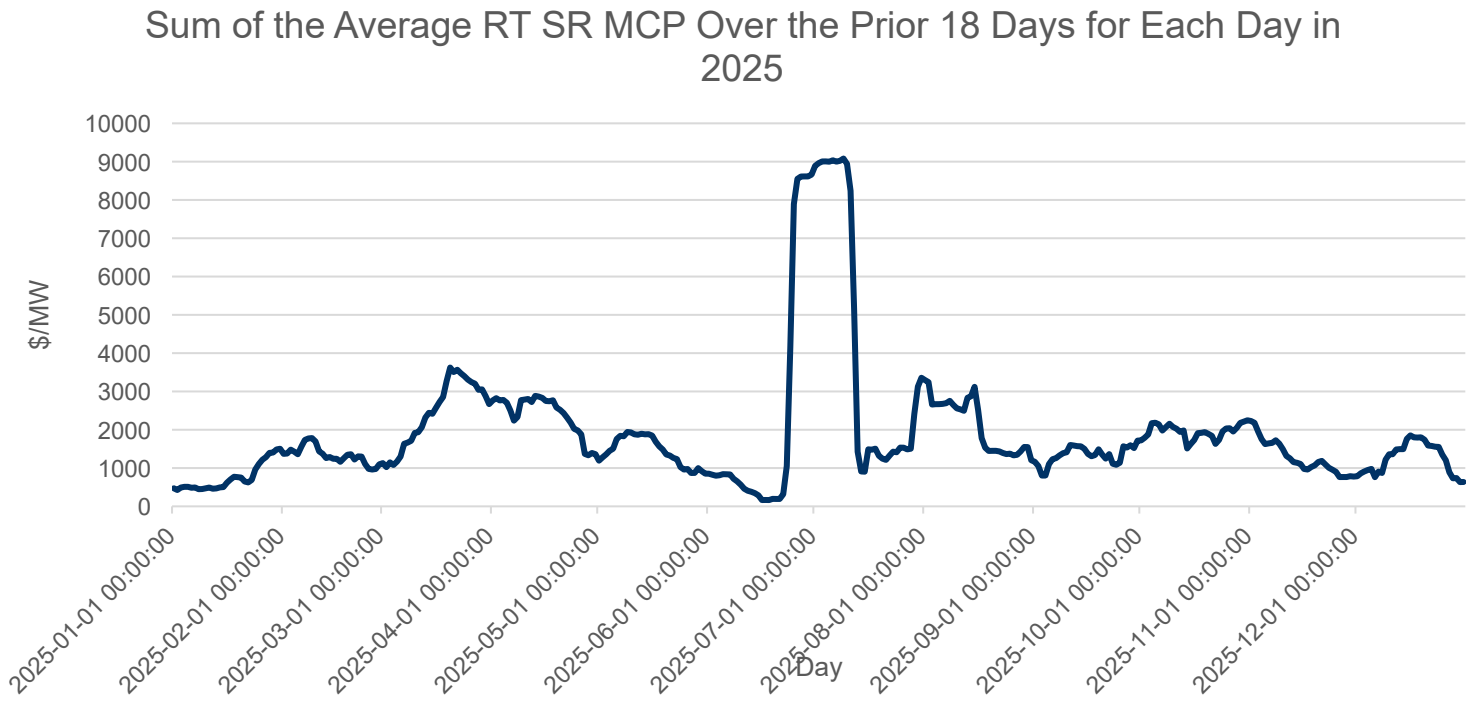
- PJM has a reliability obligation to recover from a unit loss within 15 minutes. To ensure compliance with this NERC Requirement, PJM's objective is to recover within 10 minutes. Given the importance of this reliability obligation, PJM believes that incentives to perform during a Synchronized Reserve Event should be meaningful.
- PJM increases the Synchronized Reserves it provisions based on resource performance. Today, PJM is carrying an additional 20%. This increases the cost of reserves, which is allocated to load.
- As presented to the RCSTF in 2024, the $/MW penalties today for different resources providing Synchronized Reserves varies significantly resource to resource even though resources are providing the same critical reliability service and the failure to provide that service has the same impact to the system.
- PJM is considering approaches that will (1) result in more consistent and transparent financial consequences (in $/MW) for non-performance for each resource for the same event and (2) more accurately reflect the cost incurred to the system to provision the reserve service.

# What might be another approach for considering what the consequences for non-performance should be?

- In 2025, the average time between Synchronized Reserve Events was 18 days.
- Today, the consequences for non-performance during an SR Event is that resources must pay back credits for intervals in which they cleared over that period.
- That was an attempt to require resources to return revenue they received, but it doesn't represent that amount that load paid for the service, which is probably the lower bound on the value of the service.
- If the goal was instead to have the SR penalties reflect the value of the service, where the lower bound is the amount load paid to procure it, we could instead consider the total amount paid (in $/MWh) for the service over that same period, the average time between SR Events (18 days for 2025).

# Estimating Synchronized Reserve Costs for 2025

- If we sum the average real-time Market Clearing Prices for SR for each day over each prior 18-day period in 2025, the per MW daily penalty rate varies considerably.
  - **Min:** $165/MW
  - **Max:** $9,080/MW
  - **Mean:** $1,910/MW



# What options has PJM considered?

1. Charging resources that fail to perform during an SR Event for each MW of shortfall at a rate of the per MW sum of the average real-time SR Market Clearing Prices over the prior period, defined as the average time between SR Events. Under this design, PJM would be estimating the amount paid for those reserves to provide a lower bound estimate of their value.

2. Charging resources based on the amount of SR revenue they received over the prior period but applying a penalty rate on top of that received revenue, similar to the approach proposed for other new reserve products. Under this design, resources would be required to pay back 150% of the SR revenue received for each MW of shortfall for the average time between SR Events.

# PJM's Current Proposal

- PJM would set the per MW penalty rate at the **greater** of

  a) The average of the daily penalty rates based on the real-time SR market clearing prices over the prior period (18 days in 2025) calculated from the prior year. This would be $1,910/MW based on 2025 data *(see previous slide).*

  b) The maximum system marginal energy price (SMP) in the 30 minutes following the SR deployment when the shortfall occurred.

- PJM would also introduce a 5% tolerance band when evaluating resource performance during SR Events.

# A Simple Example

- A resource receives a 20 MW Synchronized Reserve assignment
- PJM initiates a Synchronized Reserve Event and the system marginal energy price (SMP) for the 6 intervals following the event are given in the table to the right.
- The resource deploys 17 MW of its 20 MW assignment, which represents a 3 MW shortfall before the tolerance band is applied.
- The tolerance band is 5% of the resource's assignment or 20 MW x 5% = 1 MW
- Due to the tolerance band, 1 MW of the resource's 3 MW shortfall is not subject to consequences for non-performance
- The remaining 2 MW of shortfall are penalized at the greater of:
  a) $1,910 based on the calculation done for 2025, and
  b) $250 based on the highest SMP in the 6 intervals following the event.

| Int. | SMP |
|---|---|
| 1 | $50 |
| 2 | $100 |
| 3 | $150 |
| 4 | $200 |
| 5 | $250 |
| 6 | $200 |

The resource is charged 2 MW x $1,910/MW = **$3,820**

# Why does PJM think this proposed approach makes sense?

- PJM believes that a change to considering the impact to the system – and the total cost to load – as the core factor defining consequences for SR non-performance makes sense. This shifts some of the risk of non-performance from load to the generation fleet providing the service.
- PJM is proposing to use the average accrued cost of 1 MW of Synchronized Reserves over the average period between Synchronized Reserve Events (18 days in 2025) for the prior calendar year to define the per MW penalty rate. PJM believes that this strikes the balance between using actual costs to inform the penalty while reducing penalty volatility and increasing transparency.
- PJM is proposing to introduce a 5% tolerance band on resource performance during Synchronized Reserve Events. This is similar to the tolerance applied when evaluating deviations for resources following energy dispatch, and aligns with the 95% performance expectation PJM articulated as the trigger for removing the performance adder to SR.

# Synchronized Reserve Requirement Calculation

# Reminder: Status Quo Quantification of PJM's Largest Contingency

- When calculating the largest contingency on the system to set its Synchronized Reserve Requirement, PJM considers the largest resource on the system at any given time.
  - In the Day-Ahead Market, PJM's SR Requirement is equal to the economic maximum of this largest available unit.
  - In the Real-Time Market, PJM's SR Requirement is set based on the largest online unit. The quantity is equal to the greater of 1) this unit's economic maximum or 2) its current output.

- See section 4.3 of M11: https://www.pjm.com/-/media/DotCom/documents/manuals/m11.ashx

# Proposed Enhancement to the Synchronized Reserve Requirement Calculation

- PJM is exploring whether we can set the SR Requirement based on the resource with the greatest output.
- This would remove the lower bound on the SR Requirement based on the largest resource's economic maximum. This could reduce the amount of reserves PJM needs to carry if the largest resource is operating below its economic maximum value.
- This could also allow us to have the optimization evaluate the trade-off between the cost of carrying more reserves and the cost of dispatching a resource down to reduce the SR Requirement.
- NYISO is moving toward a more dynamic approach to setting their reserve requirements through their Dynamic Reserve initiative, and PJM believes this could lead to more efficient market outcomes. PJM intends to work with its vendors to understand whether this would introduce performance concerns that would make this new approach infeasible.

# Contact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**Additional Details on PJM's Proposed Solutions for Synchronized Reserves**

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# Acronyms

| Acronym | Term & Definition |
|---|---|
| SR | **Synchronized Reserves** are reserves provided by resources that are synchronized to the grid and can respond within 10 minutes. |
| RUR | **Ramp/Uncertainty Reserves** are reserves procured to meet expected net-load ramp and to manage net-load forecast uncertainty in upcoming intervals. |

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