6.1 Synchronized Reserve Accounting Overview

Synchronized Reserve shall be supplied from resources located within the metered boundaries of PJM that are on-line an able to provide additional MWs within 10 minutes or less. Synchronized Reserve resources include generators and Economic Load Response Participants.

The total PJM Synchronized Reserve Requirement is defined as the amount of 10-minute reserve that must be synchronized to the grid in accordance with the applicable NERC Council standards. Additional details on the Primary and Synchronized Reserve requirements can be found in the PJM Manual13: Emergency Operations.

Synchronized Reserve credits are awarded to resources in both the Day-ahead and Real-time Synchronized Reserve Markets based on pool-scheduled and self-scheduled MW assignment and RT MW output.

The Synchronized Reserve offer price for resources is capped at the expected value of the penalty for failing to provide Synchronized Reserve ad described and calculated in the PJM Manual 15: Cost Development Guidelines.

Pool-scheduled generator resources assigned synchronized reserve in Synchronous Condensing mode and which respond to a Synchronized Reserve Event are made eligible for make-whole payments to recover applicable start-up, no-load and minimum energy costs in the Balancing Operating Reserve billing line item. Economic Load Response Participant resources that respond to a Synchronized Reserve Event are eligible for make-whole payments to recover shutdown cost and are made-whole in the Operating Reserve for Load Response billing line item.

~~Resources that are assigned regulation when a Synchronized Reserve event is initiated are compensated based on the amount of response provided beyond their regulation commitment, as well as for any response in excess of their regulation high limit or economic maximum (whichever is lower). Additional details can be found in PJM Manual 11: Energy & Ancillary Services Market Operations, Section 4.8.~~

Each Market Participant that is a Load Serving Entity (LSE) or synchronized buyer that is not part of an agreement to share reserves with external entities subject to the requirements in NERC Reliability Standard BAL-002 incurs a Synchronized Reserve Obligation based on their Load Ratio Share and applicable reserve location's assignments during that hour. During hours when the Synchronized Reserve Market Clearing Price (SRMCP) is the same throughout the entire RTO Reserve zone, an LSE's Synchronized Reserve Obligation is equal to its Load Ratio Share of the RTO Reserve zone times the amount of Synchronized Reserve assigned for all Real-time Settlement Intervals for the RTO reserve zone. During hours when the SRMCP is different between the RTO reserve zone and Reserve sub-zone an LSE's Synchronized Reserve Obligation will be calculated based on their load in the active sub-zone and/or the portion of the RTO Reserve Zone outside of the active sub-zone (the "non sub-zone"). The LSE's active sub-zone Synchronized Reserve Obligation is equal to its Load Ratio Share within that active sub-zone times the amount of Synchronized Reserve assigned (pool and self-scheduled) in that active sub-zone. The LSE's Synchronized Reserve Obligation in the non subzone is equal to its Load Ratio Share in the non sub-zone times the amount of Synchronized Reserve assigned (pool/self-scheduled) in the non sub-zone portion of the RTO.

Participants may fulfill their Synchronized Reserve obligations by entering bilateral arrangements with other PJM Market Participants, or purchasing Synchronized Reserve from the PJM Synchronized Reserve Market.

6.2.2 Balancing Synchronized Reserve Market Clearing Price Credit

Balancing Synchronized Reserve Market Clearing Price credits are paid to a pool-scheduled or self-scheduled resource that is assigned Synchronized Reserve within the Real-time Market to satisfy the 30-minute Reserve Requirement, Primary Reserve Requirement and/or Synchronized Reserve Requirement.

PJM Actions

- PJM retrieves the following information for Balancing Synchronized Reserve Market Clearing Price credit:
  - Real-time Synchronized Reserve assignments (pool/self-scheduled) (MWh)
  - Economic Maximum MW
  - Real-time Synchronized Reserve Maximum MW
  - Real-time MW output
  - Day-ahead Synchronized Reserve assignments (pool/self-scheduled) (MWh)
  - Real-time Synchronized Reserve Market Clearing Price (RT SRMCP) ($/MWh)
  - Synchronized Reserve Shortfall MW
- PJM calculates for each Real-time Settlement Interval the Balancing Synchronized Reserve Market Clearing Price credit for each eligible resource by taking the difference between the capped Real-time Synchronized Reserve assignment and Day-ahead Synchronized Reserve assignment and multiplying it by the RT SRMCP, then dividing the product by 12.
    - Balancing Synchronized Reserve Market Clearing Price Credit = ((Capped Real-time Synchronized Reserve Assignment – Day-ahead Synchronized Reserve Assignment) * RT SRMCP) / 12
    - Capped Real-time Synchronized Reserve Assignment =
      - If no Synchronized Reserve Event occurs = Minimum (Real-time Synchronized Reserve Assignment MW, Max((Minimum (Economic Maximum MW, Real-time Synchronized Reserve Maximum MW) – Real-time MW Output),0))
      - If a Synchronized Reserve Event occurs = Real-time Synchronized Reserve Assignment MW
- Synchronized Reserve Shortfall Charge = If a pool-scheduled or self-scheduled generation resource or Economic Load Response Participant resource fails to provide the ~~Capped~~ Real-time Synchronized Reserve the resource was directed to deploy ~~Assignment~~ during a Synchronized Reserve Event, then the resource will be assessed a Synchronized Reserve Shortfall Charge equal to the product of the RT SRMCP and the lesser of the amount of the MW shortfall during the event or Capped Real-time Synchronized Reserve Assignment MW. If there are multiple Synchronized Reserve Events during the Operating Day, the maximum MW shortfall across all events is the MW shortfall used to determine the Synchronized Reserve Shortfall Charge. The calculation of the MW shortfall is further described in Manual 11, Section 4. This Shortfall Charge will apply to each Real-Time Settlement Interval the resource was assigned or self-scheduled for real-time Synchronized Reserve in the Operating Day on which the event

occurred. This charge is included in the calculation of the Synchronized Reserve Charge billing line item.

6.3.3 Synchronized Reserve Retroactive Penalty Charge

Resources that fail to provide ~~assigned~~ the Synchronized Reserve they were directed to deploy during a Synchronized Reserve Event incur a retroactive penalty charge. This retroactive penalty charge is determined by multiplying the retroactive penalty MWs times the RT SRMCP for all Real-time Settlement Intervals the resource was assigned or self-scheduled to provide Synchronized Reserve for a duration immediately preceding the Synchronized Reserve Event.

- Retroactive Penalty Charge for resources with a shortfall = Retroactive Penalty MW * RT SRMCP / 12
    - Retroactive Penalty MWs = Min (Synchronized Reserve Shortfall Charge MW, Capped Real-time Synchronized Reserve assignment (as determined and calculated in Section 6.2.2 of the PJM Manual)
    - The duration is equal to the lesser of the average number of days between Events or the number of days since the resource last failed to respond with its PJM-assigned or self-scheduled Synchronized Reserve amount in response to a Synchronized Reserve Event.
    - The average number of days between Events is determined by the annual review of the last two (2) years.
- Market Participants that own multiple resources assigned or self-scheduled to provide Synchronized Reserve are permitted to demonstrate aggregate response, such that any resource that responds greater than ~~their assignment~~the Synchronized Reserve the resource was directed to deploy (pool or self-scheduled) can be used to offset any resource that responds less than ~~their assignment of~~ the Synchronized Reserve the resource was directed to deploy during a Synchronized Reserve Event.
- The Market Participant's aggregate response does not affect how an individual resource is credited for Synchronized Reserve it provides as described above, but is used to determine what the Market Participant owes in retroactive penalty charges ~~for each resource that was assigned to provide Synchronized Reserve and responded less than their assignment or self-schedule of Synchronized Reserve~~.
- If there are multiple Synchronized Events during a day, the maximum Retroactive Penalty MWs, per resource, for the day is used to determine what the Market Participant owes in retroactive penalty charges.

If the Retroactive Shortfall MW value per the above equation is less than 0 MW, the Retroactive Shortfall MW is equal to 0 MW. The retroactive penalty charges calculated above are allocated based on a Market Participant's ratio share of the Synchronized Reserve obligation MW in the five-minute intervals of the Synchronized Reserve Event for the location for which the Synchronized Reserve event occurred. If the Event spans multiple hours, the retroactive penalty charges are prorated hourly based on the duration of the Event within each hour. Market Participants that incur a retroactive penalty charge and also have an applicable Synchronized Reserve Obligation during the hours(s) of the

Synchronized Reserve Event are not included in the allocation of such penalties. Additional details on verification and non-performance can be found in PJM Manual 11: Energy & Ancillary Services Market Operations, Section 4.

- Retroactive Penalty Charge for LSEs without a Synchronized Reserve shortfall = Total PJM Retroactive Penalty Charges * -1 * Synch Reserve Obligation Ratio Share excluding the obligations of those receiving a Retroactive Penalty Charge for a performance shortfall.