



Section 19: Day Ahead Scheduling Reserve Accounting

Welcome to the *Day-ahead Scheduling Reserve Accounting* section of the **PJM Manual for Operating Agreement Accounting**. In this section, you will find the following information:

- A description of how Day-ahead Scheduling Reserves are provided and accounted for in the PJM Energy Markets (see “*Day-ahead Scheduling Reserve Accounting Overview*”).
- How credits are calculated for providers of Day-ahead Scheduling Reserve (see “*Credits for Day-ahead Scheduling Reserve*”).
- How the total cost of Day-ahead Scheduling Reserve is allocated (see “*Charges for Day-ahead Scheduling Reserve*”).
- How Day-ahead Scheduling Reserve charge reconciliations are calculated (see “*Reconciliation for Day-ahead Scheduling Reserve Charges*”).

19.1 Day Ahead Scheduling Reserve Accounting Overview

The Day-ahead Scheduling Reserve Market is a construct for a market based mechanism for the procurement of supplemental, 30-minute reserves on the PJM System. The Day-ahead Scheduling [30-Minute] Reserve Market is an offer-based market that will clear existing reserve requirements on a day-ahead, forward basis.

The Day-ahead Scheduling Reserve Market is designed to create an explicit value for an additional ancillary service in the PJM Markets, on a short-term basis. A Day-ahead Scheduling [30-Minute] Reserve market can provide a pricing method and price signals that can encourage generation and demand resources to provide Day-ahead Scheduling reserves and to encourage new resources to be deployed with the capability to provide such services.

[Operational conditions may occur that result in PJM increasing the Day-ahead Scheduling Reserve requirement on an hourly basis, as specified in section 11.2.1 of Manual 11: Energy and Ancillary Service Operations.](#)

The Day-ahead Scheduling Reserve Market is designed to interact with the current PJM Operating Reserve construct. While a clearing market for Day-ahead Scheduling [30-Minute] Reserves may reduce out-of-market payments to generators in the form of Operating Reserve credits, it will not eliminate them, and the remaining Operating Reserve costs will continue to be allocated.

19.2 Credits for Day Ahead Scheduling Reserve

At the end of each hour, PJM calculates the credits due each [customer account](#) [PJM Member](#) for Day-ahead Scheduling Reserve.

PJM Actions:

- PJM retrieves the following information:
 - Day-ahead scheduled minimum and scheduled [economic maximum](#) [emergency maximum](#) for each resource



- o Real-time economic minimum and ~~economic emergency~~ maximum for each resource
- o Real-time availability for each resource
- o Resource offer data – startup time and notification time (including real-time hourly updates)
- o Real-time generation MWh and demand resource MWh
- o Day-ahead Scheduling Reserve award quantity for each resource(MW)
- o Day-ahead Scheduling Reserve clearing price (\$/MWh)
- o Day-ahead Scheduling Reserve offer price for each resource (\$/MWh)
- o Day-ahead Scheduling Reserve bilateral transactions
- o Day-ahead Scheduling Reserve opportunity cost for each resource
- PJM determines the eligibility to receive Day-ahead Scheduling Reserve credits as follows:
 - o For resources with a start time plus notification time of greater than 30 minutes, the resource is required to be online and operating at PJM's direction during the hour of the award with a real-time dispatchable range (~~Economic Emergency~~ Max – Eco Min) at least as great as the day-ahead dispatchable range (~~Economic Emergency~~ Max – Scheduled Min). A resource does not have a real-time dispatchable range if the real-time fixed gen flag is enabled for the hour of the award.
 - o For resources with a start time plus notification time of less than or equal to 30 minutes, the resource would be required to be available to the PJM operator for dispatch during the hours of the award and start within 30 minutes if dispatched by PJM.
 - o If a unit with a Day-ahead Scheduling Reserve award for any hour in the day is requested to start in an hour that it did not receive a Day-ahead Scheduling Reserve award, the unit must start within 30 minutes in order to receive the award for the day.
 - o For Demand Resources, measurement is the difference between the demand resource's MW consumption at the time a resource is requested by PJM dispatch to reduce and its MW consumption after 30 minutes of the request. In order to allow for small fluctuations and possible telemetry delays, demand resources consumption at the start of the event is defined as the greatest telemetered consumption between one (1) minute prior to and one (1) minute following the issuance of the dispatch instruction. Similarly, a demand resource's consumption thirty minutes after the dispatcher request is defined as the lowest consumption measured between twenty nine (29) and thirty (31) minutes after the start of the request.
 - o Hydro resources are required to be available to the PJM operator for dispatch during the hours of the award.



- PJM calculates hourly Day-ahead Scheduling Reserve credits for each eligible generator and demand response resource as follows:

$$\text{Day-ahead Scheduling Reserve Credit} = \frac{\text{Day-ahead Cleared Day-ahead Scheduling Reserve (MW)} * \text{Day-ahead Scheduling Reserve Clearing Price } \$/\text{MW}}{\text{Day-ahead Scheduling Reserve Clearing Price } \$/\text{MW}}$$

- PJM sums the Day-ahead Scheduling Reserve credits for each customer account PJM Member, taking into account joint-ownership of generating units.
- If the resource's Day-ahead Scheduling Reserve offer price (plus opportunity costs, if applicable) is less than its Day-ahead Scheduling Reserve credit for that hour, the excess revenues received will offset any Balancing Operating Reserve credits received by that resource for that hour.

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19.3 Charges for Day Ahead Scheduling Reserve

At the end of each hour, PJM calculates the charges due each customer account PJM Member for Day-ahead Scheduling Reserve as follows:

- PJM calculates for each hour the Total Cost of Day-ahead Scheduling Reserve by summing the Day-ahead Scheduling Reserve credit for all customer account PJM Members.
- PJM determines each load serving entity's (LSE's) hourly load ratio share based on their real-time load (excluding transmission losses).

$$\text{Load Ratio Share} =$$

$$\frac{\text{Real-time Load (MWh)} / \text{Total PJM Real-time Load (MWh)}}{\text{Real-time Load (MWh)} / \text{Total PJM Real-time Load (MWh)}}$$

- PJM calculates an hourly ratio share of the base Day-ahead Scheduling Reserve requirement and the additional requirement based on the total Day-ahead Scheduling Reserve requirement.

Base Requirement = the requirement defined in PJM Manual M-13, Section 2, plus any additional reserves scheduled to account for operational uncertainty

Additional Requirement = Max(Forecast RT load (MWh) – Adjusted Fixed Demand (MWh), 0) as defined in Manual 11, Section 11

$$\text{Base Requirement Share} = \frac{\text{Base Day-ahead Scheduling Reserve Requirement MW}}{\text{Base Day-ahead Scheduling Reserve Requirement MW} + \text{Additional Day-ahead Scheduling Reserve Requirement MW}}$$

$$\text{Additional Requirement Share} = 1 - \text{Base Requirement Share}$$

- PJM calculates for each hour the Total Cost of the Base Day-ahead Scheduling Reserve and the Total Cost of the Additional Day-ahead Scheduling Reserve.

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Total Cost of Base Day-ahead Scheduling Reserve = Base Requirement Share * Total Cost of Day-Ahead Scheduling Reserve

Total Cost of Additional Day-ahead Scheduling Reserve = Additional Requirement Share * Total Cost of Day-Ahead Scheduling Reserve

- PJM calculates each LSE's Base Day-ahead Scheduling Reserve obligation by multiplying their load ratio share by the total amount of Base Day-ahead Scheduling Reserve resource eligible MW.

Base Day-ahead Scheduling Reserve Obligation =

Load Ratio Share * Total Base Day-ahead Scheduling Reserve Eligible MW

Total Base Day-ahead Scheduling Reserve Eligible MW = Total DASR Eligible MW * Base Requirement Share

- PJM adjusts the Base Day-ahead Scheduling Reserve Obligations to reflect Day-ahead Scheduling Reserve bilateral transactions among participants.

Base Day-ahead Scheduling Reserve Adjusted Obligation =

Base Day-ahead Scheduling Reserve Obligation - Day-ahead Scheduling Reserve MW purchased + Day-ahead Scheduling Reserve MW sold

- PJM determines each customer accountparticipant's hourly Base Day-ahead Scheduling Reserve Obligation ratio share based on their Day-ahead Scheduling Reserve Adjusted Obligation.

Base Day-ahead Scheduling Reserve Obligation ratio share =

Base Day-ahead Scheduling Reserve Adjusted Obligation / Total Base Day-ahead Scheduling Reserve Adjusted Obligation

- PJM calculates the hourly Base Day-ahead Scheduling Reserve charge for each customer accountPJM Member by multiplying their Base Day-ahead Scheduling Reserve Obligation ratio share by the Total Cost of Base Day-ahead Scheduling Reserve.

Base Day-ahead Scheduling Reserve Charge =

Total Cost of Base Day-ahead Scheduling Reserve * Base Day-ahead Scheduling Reserve Obligation Ratio Share

- For each customer account that is a net purchaser in Day-ahead, PJM calculates the hourly difference between their Day-ahead cleared -demand MWh net of cleared increment and decrement transactions and their actual Real-time load MWh including the impact of load reconciliation MWh where the Day-ahead demand net of cleared increment and decrement transactions is less than the actual Real-time load.

Demand Difference (MWh) = Max (Real-time load MWh including the impact of load reconciliation MWh - Max(Day-ahead -fixed demand MWh + cleared price sensitive demand MWh + cleared decrement MWh - cleared increment MWh), 0.0)

- PJM calculates the Total Hourly Demand Difference by summing up the Demand Difference for all customer accounts.

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- If the Total Hourly Demand Difference is equal to zero, then the Total Cost of Additional Day-ahead Scheduling Reserve for that hour is added to the Total Cost of Base Day-ahead Scheduling Reserve and allocated as a Base Day-ahead Scheduling Reserve Charge.
- PJM determines each customer account's ratio share of the Total Hourly Demand Difference.

Ratio Share of Demand Difference =

Demand Difference (MWh) / Total Hourly Demand Difference (MWh)

- PJM calculates the hourly Additional Day-ahead Scheduling Reserve charge for each customer account by multiplying their Ratio Share of Demand Difference by the Total Cost of Additional Day-ahead Scheduling Reserve.

Additional Day-ahead Scheduling Reserve Charge =

*Total Cost of Additional Day-ahead Scheduling Reserve * Ratio Share of Demand Difference*

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19.4 Reconciliation for Day-ahead Scheduling Reserve Charges

PJM will calculate reconciled Day-ahead Scheduling Reserve charges for EDCs and Retail Load Aggregators (a.k.a. Electric Generation Suppliers) for past months' billings that were based on load ratio shares. The reconciliation kWh data must be supplied to PJM by the EDCs, and represents the difference between the scheduled Retail Load Responsibility InSchedule and the "actual" usage based on metered data. This hourly kWh data must be reported separately for each applicable InSchedule contract.

PJM calculates the Day-ahead Scheduling Reserve charge reconciliations by multiplying the kWh data (de-rated for transmission losses) by the Day-ahead Scheduling Reserve billing determinant for that hour. The hourly Base Day-ahead Scheduling Reserve charge billing determinant (in \$/MWh) is calculated by dividing the total hourly Base Day-ahead Scheduling Reserve charges by the total real-time PJM load (de-rated for transmission losses) for in that hour. These charge reconciliations are then totaled for the month for each EDC or Retail Load Aggregator. Note that the reconciliation for Base Day-ahead Scheduling Reserve charges for a month may be either a positive or a negative value, and may even be such that the reconciled load responsibility MWh results in a negative load quantity.