

PJM Manual 27:

Open Access Transmission Tariff Accounting

Revision: 93

Effective Date: August 31, 2020

Prepared by
Market Settlements Development Department

PJM © 2020



***Redlines not highlighted in yellow = M27 periodic review

***Redlines highlighted in yellow = Fuel assurance

Section 7: Black Start Service Accounting

Welcome to the *Black Start Service Accounting* section of the **PJM Manual for Open Access Transmission Tariff Accounting**. In this section, you will find the following information:

- An overview of the black start service accounting process (see “Black Start Service Accounting Overview”).
- How credits for black start service are calculated (see “Black Start Service Credits”).
- How charges for black start service are calculated for Network and Point-to-Point Transmission Customers (see “Black Start Service Charges”).

7.1 Black Start Service Accounting Overview

To ensure the reliable restoration following a shutdown of the PJM Transmission System, Black Start Service is necessary to facilitate the goal of complete system restoration. Black Start Service is the capability of generating units to start without an outside electrical supply or the demonstrated ability of a generating unit with a high operating factor to automatically remain operating at reduced levels when disconnected from the grid. Black Start Service enables the Transmission Provider in collaboration with Transmission Owners to designate specific generators (Black Start Units) whose location and capabilities are required to re-energize the transmission system following a system-wide blackout as further described in the PJM Manual 12: Balancing Operations, Section 4. (see the **PJM Manual for Balancing Operations (M-12)** for more details and eligibility).

Black Start Service is provided by the Transmission Provider, and all Transmission Customers must purchase this service from the Transmission Provider, pursuant to the PJM Open Access Transmission Tariff Schedule 6A.

The credits for this service are billed on a monthly basis. The monthly credit is equal to one-twelfth (1/12) of the annual revenue requirement for each Black Start Unit.

The charges for this service are based on a formula rate that allocates generation owners’ black start revenue requirements and applicable Day-ahead and Balancing Operating Reserve Credits to Network and Point-to-Point Transmission Customers based on their monthly transmission use on a megawatt basis. Customers serving zonal Network and Point-to-point load are allocated a ratio share of the total revenue requirements and applicable Day-ahead and Balancing Operating Reserve Credits in the applicable zone(s). Customers serving non-zone load (including Point-to-Point Transmission Customers not serving PJM load) are allocated a ratio share of the total revenue requirements and applicable Day-ahead and Balancing Operating Reserve Credits for PJM. ~~Effective December 1, 2012, the applicable Day-ahead and Balancing Operating Reserve Credits are those credits associated with the scheduling of units for Black Start service or testing of Black Start units.~~

7.2 Black Start Service Credits

Black Start Units must meet specific PJM and NERC criteria to be deemed a Black Start Unit. These units also must follow testing protocols to verify the Black Start Capability. Both the criteria and testing are further described in the PJM Manual 12: Balancing Operations, Section 4. Annual revenue requirements are determined as described in Open

~~Access Transmission Tariff, Schedule 6A and PJM Manual 15: Cost Development Guidelines, section 13. Revenue requirements for joint-owned black start units are allocated to the owners based on their ownership shares. s that meet the PJM and NERC criteria, receives a monthly Black Start Service credit equal to one-twelfth (1/12) of its annual black start revenue requirement. Revenue requirements for Black Start Service may include the following, where applicable: NERC CIP Capital Costs, fixed black start unit costs, variable black start costs, training expenses, fuel storage costs for liquefied natural gas, propane or oil and an incentive factor. Revenue requirements for units with the ability to disconnect from the grid automatically and remain operating at reduced levels (ALR) may only recover training costs, NERC compliance costs, and an incentive factor. For more information on Black start unit revenue requirements, please see **Schedule 6A, PJM's Open Access Transmission Tariff (OATT).**~~

~~Existing Black Start Unit owner's monthly credits will be one-twelfth (1/12) of their annual revenue requirement.~~

~~A n~~New Black Start Unit owner's monthly credits will be held by PJM in a non-interest bearing account until PJM's acceptance of the owner's annual revenue requirement pursuant to section 17 of the Open Access Transmission Tariff Schedule 6A. ~~After PJM's acceptance, n~~New Black Start Unit owners will begin to receive monthly credits, including any monthly credits held by PJM, back to its in-service date and any required estimated annual revenue requirement true up in the monthly bill. ~~after PJM's acceptance of the new Black Start Unit owner's annual revenue requirement.~~

For Fuel Assured Black Start Units that are recovering Fuel Assurance Capital Costs, pursuant to section 17B of Schedule 6A, shall have its monthly credits reduced, but not less than zero, by the positive net value of the Day-ahead Energy Market and Real-time Energy Market revenues from being committed using the fuel assurance fuel minus the cost of running on that fuel. The Black Start Unit's monthly credits shall not be increased. The PJM energy revenues will only include revenues from the Day-ahead energy (Spot, Transmission Congestion, Transmission Losses), Balancing energy (Spot, Transmission Congestion, Transmission Losses), Operating Reserve (Day-ahead and Balancing) and Load Reconciliation associated with each. For Fuel Assured Black Start Units that are recovering Fuel Assurance Capital Cost and the Fuel Assurance Capital Costs increased the Installed Capacity Rating (ICAP) of the unit, monthly credits shall be reduced, but not less than zero, by the monthly capacity revenues for the increased ICAP. Monthly credits will only be reduced during the Fuel Assurance Capital Cost recovery period.

Monthly ~~B~~black ~~S~~start ~~S~~service revenues are forfeited ~~for~~when a:

- ~~Black Start U~~units ~~that fails~~ a black start test and ~~does~~ not successfully pass a test within a ten ~~(10)~~ day grace period immediately following a failed test;
- ~~Black Start U; and, for~~units without a successful black start test on record with PJM within the last thirteen ~~(13)~~ months;
- Fuel Assured Black Start Unit has a deficient fuel inventory below the run hour requirement unless such deficiency is a result of a regulatory requirement for an approved planned outage (full derate) or operating during a Performance Assessment Interval then monthly credits are not forfeited; or,
- Fuel Assured Black Start Unit has a deficient non-fuel consumables inventory below the run hour requirement unless such deficiency is a result of a regulatory requirement for

an approved planned outage (full derate) or operating during a Performance Assessment Interval then monthly credits are not forfeited.

~~Revenue requirements for joint-owned black start units are allocated to the owners based on their ownership shares.~~ Zonal revenue requirements equal the total revenue requirements of all ~~B~~black ~~S~~start ~~U~~units nominated as critical by the Transmission Provider in that zone regardless of zonal location and the share of annual revenue requirements of ~~B~~black ~~S~~start ~~U~~units designated as critical across multiple zones (cross-zonal coordination).

The current zonal revenue requirements are posted on the PJM website under Markets & Operations > /Billing >, Settlements & Credit - <http://www.pjm.com/markets-and-operations/billing-settlements-and-credit.aspx>.

7.3 Black Start Service Charges

~~This section describes the process of calculating the Black Start Service charges.~~ Charges for ~~B~~black ~~S~~start ~~S~~service are calculated for zone load (Network Customers and customers serving load with Point-to-Point Transmission Service) and for non-zone load (Non-Zone Network Customers and Point-to-Point Transmission Customers) ~~load~~ separately. The sum of all customers' monthly charges equal one-twelfth (1/12) of the total annual black start revenue requirements that are credited to ~~G~~generation ~~O~~owners of ~~B~~black ~~S~~start ~~U~~units plus as well as a share of the applicable Day-ahead and Balancing Operating Reserve Credits that are credited to ~~G~~generation ~~O~~owners of ~~B~~black ~~S~~start ~~U~~units for the month. ~~Effective December 1, 2012, the applicable Day-ahead and Balancing Operating Reserve Credits are those credits associated with the scheduling of units for Black Start service or testing of Black Start units.~~

~~Total annual black start revenue requirements will include estimated annual revenue requirements for new Black Start Units from the date the units enter Black Start Service to the last day of the month preceding PJM's acceptance of the unit's annual revenue requirement. The estimated annual revenue requirement will be based on the Black Start Unit owner's best estimate at the time the unit enters Black Start Service. Any estimated annual revenue requirement true up will be included in the monthly bill after PJM accepts the new Black Start unit's annual revenue requirement.~~

Each Transmission Customer's charge is calculated by determining the Transmission Customer's monthly zone and non-zone ~~transmission use charge on a megawatt basis.~~

- Black Start Charge = Black Start Zone Charge + Black Start Non-Zone Charge
- ~~Monthly zone transmission use is the sum of a Transmission Customer's Network daily peak load contributions to a PJM zone and daily average Point-to-Point energy reservations where the point of delivery is within a PJM zone.~~
- ~~Monthly non-zone transmission use is the sum of a Transmission Customer's nonzone Network daily peak load contributions and daily average Point-to-Point energy reservations where the point of delivery is the border of PJM.~~

~~Transmission Customers with monthly non-zone transmission use are charged a share of the total PJM pool-wide black start revenue requirement and applicable Day-ahead and Balancing Operating Reserve Credits based on their portion of the total PJM monthly transmission use. Transmission Customers with monthly zone transmission use are charged a share of the applicable zonal black start revenue requirements and applicable Day-ahead and Balancing Operating Reserve Credits (less the total share of revenue requirements~~

recovered from nonzone transmission use) based on their portion of monthly transmission use in that zone(s).

7.3.1 Black Stat Zone Charge

Transmission Customers with monthly zone transmission use are charged a share of the applicable zonal black start revenue requirements (less the total share of revenue requirements recovered from non-zone transmission use) based on their portion of monthly transmission use in that zone(s). This is billed as the Black Start Zone Charge.

PJM calculates the Black Start Zone Charge by multiplying the sum of the zonal total monthly black start requirement plus the Day-ahead Operating Reserve Credits associated with Black Start plus the Balancing Operating Reserve Credits associated with Black Start by the Transmission Customer's ratio share of monthly zone transmission use and then applying an Adjustment Factor. The Adjustment Factor accounts for the share of the revenue requirement that is recovered from non-zone transmission use. This calculation is applied to each zone separately.

- Black Start Zone Charge = (PJM Zonal Monthly Black Start Revenue Requirement + PJM Black Start DA Operating Reserve Credit + PJM Black Start BAL Operating Reserve Credit) * (Transmission Customer's Monthly Zone Transmission Use / PJM Total Transmission Use) * Adjustment Factor
 - PJM Zonal Total Monthly Black Start Revenue Requirement = (existing Black Start Unit monthly revenue requirement + new Black Start Unit monthly estimated revenue requirement) / 12
 - New Black Start Unit Monthly Estimated Revenue Requirement = Black Start Unit owner's revenue requirement estimate at the time the unit enters Black Start Service until PJM's acceptance.
 - PJM Black Start DA Operating Reserve Credit = Day-Ahead Operating Reserve credits associated with scheduling and/or testing Black Start Units
 - PJM Black Start BAL Operating Reserve Credit = Balancing Operating Reserve credits associated with scheduling and/or testing of Black Start Units
 - Transmission Customer's Monthly Zone Transmission use = sum of daily Network Service Peak Load contributions to a PJM zone + daily average Point-to-Point energy reservations where the point of delivery is within a given PJM zone
 - PJM Total Zone Transmission Use = sum of all Transmission Customers' monthly zone transmission use
 - Adjustment Factor = total monthly zone transmission use for all PJM Zones / PJM Total Monthly Transmission Use
 - Total Monthly Zone Transmission Use for all PJM Zones = sum of all Transmission Customers' monthly zone transmission use in all PJM Zones
 - PJM Total Monthly Transmission Use = sum of all Transmission Customers' monthly zone transmission use + non-zone transmission use

7.3.2 Black Start Non-Zone Charge

Transmission Customers with monthly non-zone transmission use are charged a share of the total PJM monthly black start revenue requirement based on their portion of the total PJM monthly transmission use. This is billed as the Black Start Non-Zone Charge.

PJM calculates the Black Start Non-Zone Charge by multiplying the total monthly black start revenue requirement by the Transmission Customer's ratio share of non-zone transmission usage.

- Black Start Non-Zone Charge = (PJM Zonal Monthly Black Start Revenue Requirement + PJM Black Start DA Operating Reserve Credit + PJM Black Start BAL Operating Reserve Credit) * (Transmission Customer's Monthly Non-Zone Transmission Use / PJM Total Transmission Use)
 - PJM Zonal Total Monthly Black Start Revenue Requirement = (existing Black Start Unit monthly revenue requirement + new Black Start Unit monthly estimated revenue requirement) / 12
 - New Black Start Unit Monthly Estimated Revenue Requirement = Black Start Unit owner's revenue requirement estimate at the time the unit enters Black Start Service until PJM's acceptance.
 - PJM Black Start DA Operating Reserve Credit = Day-Ahead Operating Reserve credits associated with scheduling and/or testing Black Start Units
 - PJM Black Start BAL Operating Reserve Credit = Balancing Operating Reserve credits associated with scheduling and/or testing of Black Start Units
 - Transmission Customer's Monthly Non-Zone Transmission use = sum of daily Network Service Peak Load contributions in zone(s) that have no black start revenue requirement + (daily average Point-to-Point energy reserve where the point of delivery is within a given PJM zone (adjusted for PJM curtailments) / 24)
 - PJM Total Monthly Transmission Use = sum of all Transmission Customers' monthly zone transmission use + non-zone transmission use

- ~~The PJM accounting process collects each generation owner's day-ahead operating reserve credits and balancing operating reserve credits that are associated with the scheduling of units for black start service or black start testing for each zone. Additional details on testing of units for Black Start service can be found in PJM's Manual 12, Balancing Operations. The PJM accounting process retrieves the point-to-point energy reservations for each Transmission Customer.~~
- ~~The PJM accounting process calculates each Transmission Customer's monthly non-zone transmission use (MW) by summing for all hours in the month all of their point-to-point energy reservations (adjusted for PJM curtailments) and dividing that value by 24.~~
- ~~The PJM accounting process calculates each Transmission Customer's monthly zone transmission use (MW) by summing for all days in the month all of their daily network integration transmission service peak load contributions for each zone (see~~

~~**Network Integration Transmission Service Accounting** section of the **PJM Manual for Open Access Transmission Tariff Accounting**).~~

- ~~The PJM accounting process calculates charge allocations for each Transmission Customer with monthly non-zone transmission use as follows:~~

- ~~$$\text{Monthly Non-Zone Charge} = \left(\frac{\text{Transmission Customer's Monthly Non-Zone Transmission Use}}{\text{PJM Total Transmission Use}} \right) \times (\text{PJM Total Generation Owners' Monthly Black Start Revenue Requirements} + \text{PJM Total Monthly Day-ahead and Balancing Operating Reserves Credits associated with Black Start})$$~~

- ~~The PJM accounting process calculates an Adjustment Factor to be applied to all monthly zone charges as follows:~~

$$\text{Adjustment Factor} = \frac{\text{Total Monthly Zone Transmission Use for all PJM Zones}}{\text{PJM Total Monthly Transmission Use}}$$

- ~~The PJM accounting process calculates charge allocations for each Transmission Customer with monthly zone transmission use as follows:~~

$$\begin{aligned} \text{Monthly Zone Charge} = & \left(\frac{\text{Transmission Customer's Monthly Zone Transmission Use}}{\text{Total Monthly Zone Transmission Use in Zone}} \right) \\ & \times (\text{Total Generation Owners' Monthly Black Start Revenue Requirements in Zone} \\ & + \text{Total Generation Owners' Monthly Day-ahead and Balancing Operating Reserves Credits associated with Black Start in Zone}) \times \text{Adjustment Factor} \end{aligned}$$

- ~~The PJM accounting process calculates each Transmission Customer's total monthly black start service charge by summing its monthly charge allocations for all zone and non-zone transmission use.~~