



Review of Black Start Formula and Cost Components

PJM Performance Compliance Department

PJM Interconnection

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I. Black Start Service and Black Start Fuel Assurance: Executive Summary

Black Start Service is used to restart the grid after a loss of electrical service and is needed because most generators require electricity to start. Black start is the ability of generating units to start without an outside electrical supply.

A Fuel Assured Black Start Unit is a Black Start Unit that is capable of starting without an outside electrical supply and running 16 hours or more at full load and either stores at least 16 hours of fuel on site, can operate independently on 2 or more interstate pipelines, is directly connected to a natural gas gathering system, or is an intermittent or hybrid resource that has been evaluated by the Transmission Provider to be capable of providing 16 hours of full load operation with 90% confidence and meets all other requirements specified in the PJM manuals.¹

The PJM Open Access Transmission Tariff (Tariff)² requires PJM to review the formula and cost components utilized to compensate Black Start Service providers at least every five years. Specifically, Schedule 6A: Section 18 states:

Every five years, PJM shall review the formula and its costs components set forth in this section 18, and report on the results of that review to stakeholders.³

This paper is intended to document the review as required by Schedule 6A, and does not provide information and updates regarding any other Black Start initiatives presented at any of the PJM Committee meetings.

Since the 2019 prior review of Schedule 6A, Section 18, two revisions to Tariff, Schedule 6A were filed and accepted by FERC. The first revision occurred in 2021 which revised the Capital Cost Recovery (CRF) Rate and commitment period for units that make capital investments on or after June 1, 2021 (FERC Docket No. ER21-1635-000). The second revision occurred in 2023 which established fuel assurance requirements for Black Start Units to qualify as Fuel Assured Black Start Units (FERC Docket No. ER23-1874-000).

Every five years, PJM conducts an RTO Wide Black Start Request for Proposal. In addition, over the last five years there were four (4) Black Start Incremental Request for Proposals issued with three (3) completed and one (1) currently under review.

¹ PJM Tariff, Schedule 6A, section 2.

² <https://agreements.pjm.com/oatt/3897>

³ Tariff, Schedule 6A Black Start Service Section 18 Effective Date: 1/1/2024

II. Schedule 6A Changes since 2019 Review

A. 2021 Tariff Changes

On December 16, 2021, Docket ER21-1635-000, the Commission issued an Order accepting revisions to PJM Tariff, Schedule 6A (effective June 6, 2021). The Tariff revision included the following items:

- Commitment period and termination provisions for units providing Black Start service
- Capital Recovery Factor calculations applicable to Black Start Units selected to provide service after June 6, 2021.
- Changes to the Minimum Tank Suction Level (MTSL) calculation
- Other Tariff updates including, outage obligations, substitution and termination provisions and testing requirements

1. *Commitment Period and Termination Provisions*

Under the new provisions, the commitment period for units electing to recover capital costs under section 6 would now be the life of the Black Start Equipment. In addition, clarifying language was added to state that if a Black Start Unit that is recovering capital costs under section 6 and that has a lifetime commitment seeks to terminate Black Start service, the Generator Owner must provide one (1) year advance notice and get consent from PJM by demonstrating that one of the following reasons to terminate applies:

- Black Start Unit retirement or deactivation
- Expiration of permit(s) required for Black Start Unit operation or service;
- Required additional capital to maintain black start capability

2. *Outage and Substitution Restrictions*

The substitution provision was revised such that a substitute Black Start Unit may take the place of a current Black Start Unit, at the same plant, that is undergoing a planned or maintenance outage. The provision only allows for no more than one (1) Black Start Unit at a plant to be subject to a generator outage or maintenance outage at any one time without written approval of PJM or the Transmission Owner in the zone receiving Black Start Service. Substitutions for non-outage reasons must be supported by documentation or other information demonstrating or technical reasons. Substitutions must be accepted by PJM and may only occur once within a 12 month period.

3. *Testing Requirements*

Testing requirement provisions were revised such that any Black Start Units providing Black Start Service must have successful annual test on record with PJM within the preceding 13 months. Black Start Units under Schedule 6A, sections 5 & 6 that do not have a successful test every 13 months will forgo monthly revenue until a successful test is provided to PJM.

4. *Involuntary Termination*

In addition to the provisions on voluntary termination by Black Start Unit owners, provisions were added (Section 15) to provide for involuntary termination of Black Start Service. For Black Start Units under sections 5 and 6 that either fail or do not perform a black start test, and remain without a successful black start test on file with PJM for an extended period of time would forfeit Black Start Service revenues. If the owner of a Black Start Unit that failed the test does not make any repairs necessary to pass the test within 90 days, the unit may no longer qualify as a Black Start Unit and will be subject to forfeiture of all future Black Start Service revenues.

5. *Capital Recovery Factor*

The CRF as specified in section 18 was changed prospectively for Black Start Units selected to provide Black Start Service after June 6, 2021. Existing Black Start Units recovering capital costs and that were selected to provide black start service before Jun 6, 2021 would retain the stated CRF in the Tariff. On August 10, 2021, in Docket Nos. ER21-1635-001 and EL21-91-000 FERC issued an Order Accepting Tariff Revisions Subject to Conditions and Establishing a Show Cause Proceeding (“Aug 10 Order”). In the Aug 10 Order, FERC accepted the proposed Tariff revisions to become effective June 6, 2021, as requested. However, on the contested issue concerning whether the CRF rates for existing Black Start Units remain just and reasonable, FERC set that issue for separate Federal Power Act section 206 proceedings. As of October 10, 2024, the CRF hearing and settlement procedures are pending at FERC.

6. *Minimum Tank Suction Level (MTSL)*

The MTSL calculation used in the calculation of Fuel Storage Costs for oil fired Black Start Units was revised to only include the volume of fuel necessary to provide Black Start Service. MTSL is now calculated using a Black Start Energy Tank Ratio.

B. 2023 Tariff Changes – Fuel Assurance for Black Start Resources (“FRBSR”)

On October 6, 2023, Docket Number ER23-1874-000, FERC issued an order accepting revisions to PJM Tariff, Schedule 6A establishing a new category of Black Start Resource for Fuel Assured Black Start Units. A Fuel Assured Black Start Unit is a Black Start Unit that is capable of starting without an outside electrical supply and running 16 hours or more at full load and either stores at least 16 hours of fuel on site, can operate independently on 2 or more interstate pipelines, is directly connected to a natural gas gathering system or is an intermittent or hybrid resource that has been evaluated by the Transmission Provider to be capable of providing 16 hours of full load operation with 90% confidence and meets any other requirements in the specified in the PJM Manuals. This category was added to mitigate the adverse impacts of Black Starts Units potentially being unavailable during a restoration event due to fuel unavailability.

Compensation for Fuel Assured Black Start Units is covered for units that elect to recover Black Start costs under the Base Formula Rate. Black Start Units that elect to recover Capital Costs to become Black Start and/or Fuel Assured capable under the Capital Cost Recovery Rate under section 6 of Schedule 6A of the Tariff will receive no additional compensation until the Black Start Unit fulfills the recovery period and transitions to the Base Formula Rate.

Compensation for Black Start Unit’s under the Base Formula Rate will be as follows:

- “X” factor under fixed costs will be 0.02 for all Fuel Assured Black Start Units including hydro units
- The “Z” factor or Incentive Factor will be 0.2

Fuel Assured Black Start Units that store fuel on-site and fails in any month to store the fuel and non-fuel consumables to meet the fuel assurance requirements will forfeit Black Start Revenues for that month. Fuel Assured Black Start Units that can run on dual fuels must conduct an annual test on both fuels.

Note:

All Fuel Assured black start units regardless of fuel type will be required to maintain sufficient non-fuel consumables on site to meet the fuel assurance requirements as outlined in the PJM manuals.

III. Black Start: Current Total Revenue Requirements

Black Start Units can be designated as either a Black Start Unit (also referred to as a Non-Fuel Assured Black Start Unit) or Fuel Assured Black Start Unit.

The owners of Black Start Units and/or Fuel Assured Black Start Units receive payments for providing the service to the grid. A generator's Annual Black Start Service Revenue Requirement is the amount of compensation a black start unit receives per delivery year if it fulfills all the black start and fuel assurance black start requirements under the Tariff. The PJM Tariff, Schedule 6A specifies the formulas used to calculate the revenue requirements.

The annual calculation of Black Start Service revenue requirements shall become effective on June 1 of each delivery year (June 1 - May 31). The annual black start revenues are divided by 12 and distributed to Black Start Unit Generator Owners monthly. PJM records the tests of all Black Start Units receiving compensation through the PJM Tariff and alerts PJM Settlements to stop payment if requirements are not met.

Detailed requirements for units providing Black Start Service can be found in PJM Manual 12⁴.

A. Black Start Service Annual Revenue

The primary formula to calculate a Black Start Units' Annual Black Start Service Revenue Requirement can be found in the Tariff, Schedule 6A Section 18 as follows:

$$\text{Generator's Annual Black Start Service Revenue Requirement} = \{\text{Fixed BSSC} + \text{Variable BSSC} + \text{Training Costs} + \text{Fuel Storage Costs}\} * (1 + Z)$$

Where:

- Fixed BSSC = Fixed Black Start Service Cost
- Variable BSSC = Variable Black Start Service Costs
- Training Costs = \$3,750 per plant per delivery year (50 staff hours per plant per year multiplied by \$75 per staff hour)
- Fuel Storage Cost is the cost defined in the tariff for oil units with onsite storage (discussed below)
- Z = Incentive Factor that will be one of the following:
 - 10% (0.1) for Non-Fuel Assured Black Start Units
 - 20% (0.2) for Fuel Assured Black Start Units
 - Zero (0) for Black Start Units that are recovering new or additional Black Start capital costs or Fuel Assurance capital costs under section 6 of Schedule 6A

⁴ <https://www.pjm.com/-/media/documents/manuals/m12.ashx>

B. Fixed Black Start Service Cost (FBSSC)

Fixed Black Start Service Costs can be recovered through the PJM Tariff or through a FERC approved rate. Fixed Black Start Service Costs recovered through the Tariff are calculated in three possible ways depending on whether the unit is recovering costs under Tariff, Schedule 6A, Section 5⁵ or Section 6⁶ with the central difference being whether the Black Start Unit owner seeks to recover new or additional capital costs. The following figure shows the three methods for recovery of Fixed BSSC.

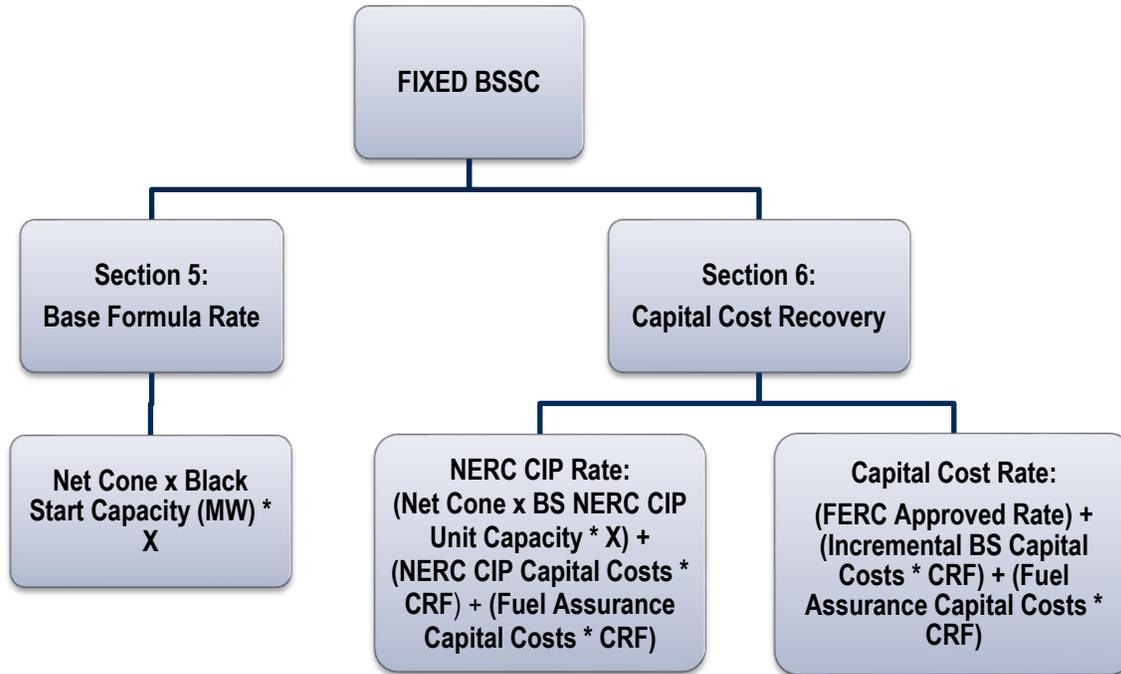


Figure 1: Three methods to recover fixed black start costs per Schedule 6A

If a Black Start Unit recovers Fixed BSSC through Tariff, Schedule 6A, Section 5, it elects to forego any recovery of Black Start Capital Costs. If a Black Start Unit elects to recover through Tariff, Schedule 6A, Section 6, then it must submit its capital costs for recovery. Black Start Units recovering capital costs under a FERC approved rate can also recover new or additional Black Start Capital Costs through the PJM Tariff and fall into the lower right box in Figure 1.

1. Section 5 Fixed Black Start Service Cost for Electing to Forego Any Recovery of Capital Costs

For Black Start Units recovering costs under Section 5, Fixed Black Start Service Costs are calculated using the Base Formula Rate below:

$$\text{Fixed BSSC} = \text{Net CONE} * \text{Black Start Unit Capacity} * X$$

Where Net CONE is “the then current installed capacity (“ICAP”) net Cost of New Entry (expressed in \$/MW year) for the CONE Area where the Black Start Unit is located”.

⁵ PJM Tariff, Schedule 6A, section 5.

⁶ PJM Tariff, Schedule 6A, section 6.

Net CONE values for the 2025/26 Delivery Year were reduced due to an increase in net Energy & Ancillary Service (E&AS) revenue. Net CONE values in some Transmission Zones are anticipated to be zero (0) for the 2026/27 Delivery Year based on planning period parameters for the Base Residual Auction.

Note:

Net Cone Area \$/MW day may be found by delivery year via PJM's website: <https://www.pjm.com/markets-and-operations/rpm.aspx>. Each delivery year contains a workbook titled "Planning Period Parameters for Base Residual Auction" with the values listed in the Net CONE worksheet.

Black Start Unit Capacity is defined, as "either: (i) the Black Start Unit's installed capacity, expressed in MW, for those Black Start Units which are not Fuel Assured Black Start Units that are Generation Capacity Resources; (ii) the awarded MWs in the Transmission Provider's request for proposal process under the PJM Manuals, for those Black Start Units, which are not Fuel Assured Black Start Units, that are Energy Resources; (iii) the Fuel Assured Black Start Unit's installed capacity for fuel assured non-intermittent Capacity Resources; or (iv) the monthly 90% confidence MW value calculated by the Transmission Provider for fuel assured intermittent or hybrid Capacity Resources. The 90% confidence MW value is calculated using Black Start Unit historical data to determine the hourly MW value the resource can provide each day in each month for 16 hours. The hourly MW value is then iterated until the confidence level of the unit providing the MW value on a monthly basis for 16 hours is 90%."

The term X is defined as "the Black Start Service allocation factor unless a higher or lower value is supported by the documentation of the actual costs of providing Black Start Service. For such units qualifying as Black Start Units on the basis of demonstrated ability to operate at reduced levels when automatically disconnected from the grid, X shall be zero. For Black Start Units with a commitment established under section 5, X shall be .01 for hydro units, .02 for Diesel or CT units. For Fuel Assured Black Start Units with a commitment established under section 5, X shall be 0.02 for all units."

2. Section 6 Fixed Black Start Service Cost for Units Electing to Recover Capital Costs

Capital Cost Recovery Rate - NERC-CIP Specific Recovery

For Black Start Units recovering NERC-CIP black start capital costs under section 6, Fixed Black Start Service Costs are calculated using the following equation:

$$\text{FIXED BSSC} = (\text{Net CONE} * \text{Black Start NERC-CIP Unit Capacity} * X) + (\text{Incremental Black Start NERC-CIP Capital Costs}) + (\text{Fuel Assurance Capital Costs} * \text{CRF})$$

Where Net CONE is "the then current installed capacity ("ICAP") net Cost of New Entry (expressed in \$/MW year) for the CONE Area where the Black Start Unit is located".

Black Start NERC-CIP Unit Capacity is "the Black Start Unit's installed capacity, expressed in MW, but, for the purposes of this calculation, capped at 100 MW for Hydro units, or 50 MW for CT units."

The term X is defined as "the Black Start Service allocation factor unless a higher or lower value is supported by the documentation of the actual costs of providing Black Start Service. For such units qualifying as Black Start Units on the basis of demonstrated ability to operate at reduced levels when automatically disconnected from the grid, X shall be zero. For Black Start Units with a commitment established under section 5, X shall be 0.01 for hydro units, 0.02 for Diesel or CT units. For Fuel Assured Black Start Units with a commitment established under section 5, X shall be 0.02 for all units."

Incremental Black Start NERC-CIP Capital Costs are defined as “those capital cost documented by the owner or accepted by the Commission for the incremental equipment solely necessary to enable a Black Start Unit to maintain compliance with mandatory Critical Infrastructure Protection Reliability Standards (as approved by the Commission and administered by the applicable Electric Reliability Organization”.

Fuel Assurance Capital Costs are defined as “the new or additional capital costs documented by the owner for the installation of equipment necessary for the unit to meet the fuel assurance criteria specified in the PJM manuals”.

“CRF” or “Capital Recovery Factor” is equal to the levelized CRF as set forth in the applicable CRF Table set forth in Table 1.

Capital Cost Recovery Rate

For units recovering incremental black start capital costs under Section 6, Fixed Black Start Service Costs are calculated using the following equation:

$$\text{FIXED BSSC} = (\text{FERC-approved rate}) + (\text{Incremental Black Start Capital Costs} * \text{CRF}) + (\text{Fuel Assurance Capital Costs} * \text{CRF})$$

FERC-approved rate is defined as “the Black Start Unit’s current FERC-approved recovery of costs to provide Black Start Service, if applicable. To the extent that a Black Start unit owner is currently recovering black start costs pursuant to a FERC-approved rate, which cost recovery will be included as a formulaic component for calculating the Black Start Unit’s annual revenue requirement pursuant to this section 18⁷. However, under no circumstances will PJM or the Black Start Unit owner restructure or modify that existing FERC-approved rate without FERC approval.”

Incremental Black Start Capital Costs are defined as “the new or additional capital cost documented by the owner or accepted by the Commission for the incremental equipment solely necessary to enable a unit to provide Black Start Service in addition to whatever other product or services such unit may provide. Such costs shall include those incurred by a Black Start Owner in order to meet NERC Reliability Standards that apply to Black Start Units solely on the basis of the provision of Black Start Service by such unit. However, incremental Black Start Capital Costs shall not include any capital costs that the Black Start unit owner is recovering for that unit pursuant to a FERC-approved recovery rate.”

Fuel Assurance Capital Costs are defined as “the new or additional capital costs documented by the owner for the installation of equipment necessary for the unit to meet the fuel assurance criteria specified in the PJM manuals. However, Fuel Assurance Capital Costs shall not include any capital costs that the Fuel Assured Black Start Unit owner is recovering for that unit pursuant to a FERC-approved recovery rate”.

“CRF” or “Capital Recovery Factor” is “equal to the Levelized CRF based on the age of the Black Start Unit, which is modified to provide Black Start Service”. See Table 1 for additional details.

⁷ PJM Tariff, Schedule 6A, section 18.

C. Capital Recovery Factor (CRF)

The CRF applicable to Black Start Capital Costs of Black Start Units selected for Black Start Service prior to June 6, 2021, shall continue to be determined in accordance with the following table:

Age of Black Start Unit (Years)	Term of Black Start Commitment	Levelized CRF
1 to 5	20	0.125
6 to 10	15	0.146
11 to 15	10	0.198
16+	5	0.363

Table 1: Levelized Capital Recovery Factors (CRF)

In those circumstances where a Black Start Unit owner has elected to recover incremental Black Start Capital Costs, in addition to a FERC-approved recovery rate, its applicable term of commitment shall be the greater of:

- (i) the FERC-approved recovery period
- OR
- (ii) the applicable term of commitment as established by the CRF table in Table 1

After a Black Start Unit has recovered its allowable Incremental Black Start Capital Costs or Incremental Black Start NERC-CIP Capital Costs, as provided by the applicable Capital Cost Recovery Rate, and has satisfied its applicable commitment period required under Schedule 6A: Section 6, the Black Start Unit shall be committed to providing Black Start Service in accordance with Section 5 of Schedule 6A and calculate its Fixed BSSC in accordance with the Base Formula rate.

The CRF applicable to Black Start Capital Costs and/or for Fuel Assurance Capital Costs, of Black Start Units selected for Black Start Service after June 6, 2021, shall be updated annually for the following criteria:

- (i) Federal income tax rates as utilized by the U.S. Internal Revenue Service in effect at the time of the annual CRF update
- (ii) Average state tax rate
- (iii) debt interest rates and shall be posted on the PJM website by March 31 each year⁸

⁸ <https://www.pjm.com/-/media/markets-ops/ancillary/black-start-service/2024-pjm-calculated-annual-capital-recovery-factor.ashx>

The CRF values shall be calculated for a recovery period based on the age of a Black Start Unit using the following equation:

$$CRF = \frac{r(1+r)^N \left[1 - \frac{sB}{\sqrt{1+r}} - s(1-B)\sqrt{1+r} \sum_{j=1}^L \frac{m_j}{(1+r)^j} \right]}{(1-s)\sqrt{1+r}[(1+r)^N - 1]}$$

Formula Symbol	Description
r	After Tax Weighted Average Cost of Capital (ATWACC), which equals (equity percentage)(cost of equity) + (debt percentage)(debt interest rate)(1 – effective tax rate)
s	Effective Tax Rate, which equals (1 – state tax rate)(federal tax rate) + state tax rate
B	Bonus depreciation percent in effect at the Black Start Unit in-service date
N	Cost recovery period based on the age of the unit in years, as established in the Age of Unit/Applicable Recovery Period table below
L	The lesser of N or 16 years
m_j	Modified Accelerated Cost Recovery System (MACRS) depreciation

The following assumptions are utilized for the calculation of the CRF:

- The current federal tax and depreciation rates are as established by U.S. Internal Revenue Service
- The state tax rate is an average of the income tax rates for all the states in the PJM Region
- The capital investment necessary to make a unit qualify for Black Start Service is made up of 50 percent equity
- The capital investment necessary to make a unit qualify for Black Start Service is made up of 50 percent debt
- The debt interest rate is based on the most recent Net CONE quadrennial review after-tax weighted average cost of capital (ATWACC) and shall be updated as follows:
 - The debt interest rate will be updated during the Net CONE quadrennial review
 - If the 2-year change in the Moody Utility Index for bonds rated Baa1 is more than 200 basis points, this change will be added to the interest rate used in the most recent Net CONE quadrennial review and will be used as the current year's debt interest rate
- The cost of equity shall be equal to an after tax internal rate of return on equity of 12%

- The debt term is equal to the applicable recovery period specified in the Age of Unit/Applicable Recovery Period as outlined in Table 2.

Age of Unit (Years)	Incremental Black Start Capital Costs Applicable Recovery Period (Years)	Fuel Assurance Capital Costs Recovery Period
1 to 5	20	20
6 to 10	15	15
11 to 15	10	10
16+	5	10

Table 2: Capital Recovery Periods

D. Variable Black Start Service Cost (BSSC)

All Black Start Units calculate Variable BSSC in accordance with the following formula:

$$\text{Variable BSSC} = \text{Black Start Unit Operation and Maintenance (O\&M) Cost} * Y$$

Where Black Start Unit O&M is *“the operations and maintenance cost attributable to supporting Black Start Service and must equal the annual variable O&M outlined in the PJM Cost development Guidelines set forth in the PJM Manuals. Such costs shall include those incurred by a Black Start Owner in order to meet NERC Reliability Standards that apply to a Black Start unit solely on the basis of the provision of Black Start Service by the unit.”*

Y is 0.01, *“unless a higher or lower value is supported by documentation of costs. If a value of Y is submitted for this cost, a (1-Y) factor must be applied to the Black Start unit’s O&M costs on the unit’s cost-based energy schedule, calculated based on the Cost Development Guidelines in the PJM Manuals”*

E. Training Costs

All Black Start units calculate training costs in accordance with the following formula:

$$\text{Training Costs} = 50 \text{ staff hours/year/plant} * 75/\text{hour}$$

F. Fuel Storage Costs

Black Start Units that do not use oil as their fuel must set their Fuel Storage Costs to zero. Black Start Units that can use oil for fuel shall calculate Fuel Storage Costs as:

$$\text{Fuel Storage Costs} = (\text{Minimum Tank Suction Level}) + (\# \text{ of Run Hours Required} * \text{Fuel Burn Rate}) * (\text{12 Month Forward Strip} + \text{Basis}) * \text{Bond Rate}$$

Run Hours are defined as *“the actual number of hours a transmission provider requires a Black Start Unit to run. Run Hours shall be at least 16 hours or as defined by the Transmission Owner restoration plan, whichever is less”.*

Fuel Burn rate is “actual fuel burn rate for the Black Start Unit”.

12 Month Forward Strip is defined as “the average of forward prices for the fuel burned in the Black Start unit traded the first business day on or following April 1”.

Basis is defined as “the transportation costs from the location referenced in the forward price data to the Black Start unit plus any variable taxes”.

Bond rate is defined as “the value determined with reference to the Moody’s Utility Index for bonds rated BAA1 reported the first business day on or following April 1”.

Minimum Tank Suction Level (MTSL) “shall apply to oil fired Black Start Units’ storage tanks that have an unusable volume of oil. In the case where a Black Start Unit shares a common fuel tank, the Black Start Unit will be eligible for recovery of the Black Start Energy Tank Ratio of the MTSL in its fuel storage calculation”.

The Black Start Energy Tank Ratio Calculation shall be calculated as:

$$\text{Black Start Energy Tank Ratio} = \frac{\text{Fuel Burn Rate} * \text{Minimum Run Hours}}{\text{Tank Capacity} - \text{MTSL}}$$

Where the MTSL fuel storage calculation shall be:

$$\text{Fuel Storage Costs} = (\text{Black Start Energy Tank Ratio} * \text{MTSL}) + (\# \text{ of Run Hours Required} * \text{Fuel Burn Rate}) * (\text{12 Month Forward Strip} + \text{Basis}) * \text{Bond Rate}$$

G. Z Factor (Incentive Factor)

The Z factor shall be an incentive factor solely for Black Start Units with a commitment established under Schedule 6A Section 5 and shall be ten percent for Non-Fuel Assured Black Start Units and twenty percent for Fuel Assured Black Start Units. For those Black Start units that elect to recover new or additional Black Start Capital Costs under Section 6, the incentive factor (Z), shall be equal to zero.

IV. Request for Proposals (RFP) since 2019

April 7, 2021: Black Start Incremental Request for Proposal for BGE & Pepco Zones. PJM requested bids for additional black start capability within the BGE & PEPCO transmission zones. This RFP is now closed.

August 1, 2022: Black Start Incremental Request for Proposal in the PECO Zone. PJM requested bids for additional black start capability within the PECO transmission Zone. This RFP is now closed.

June 20, 2023: PJM 2023 RTO wide Black Start Request for Proposal. This was the third PJM RTO wide black start Request for Proposal process and requested bids for new black start and fuel assured capability in accordance with the Five-Year Black Start Selection Process as documented in PJM Manual 14D. This RFP is now closed.

April 29, 2024: Incremental Request for Proposal for Fuel Assured Black Start Service. PJM requested bids for additional Fuel Assured Black Start Service RTO wide. This RFP is currently active.

V. Conclusions

PJM Manual 14D⁹: Generator Operational Requirements; Section 10: Black Start Generation Procurement outlines the PJM black start selection process and includes the RTO wide black start RFPs, PJM incremental black start RFPs, and PJM Reliability Backstop processes. Resources that are awarded Black Start Service or Fuel Assured Black Start Service are compensated under Tariff, Schedule 6A, with the associated formulas and cost components documented in this paper and in accordance with the PJM Manuals.

A. Non-Fuel Assured Black Start

PJM has received, reviewed, and approved several resources during the multiple RFPs listed above. As a result, no additional changes are needed due to the response following the above mentioned RTO Wide and Incremental RFPs.

B. Fuel Assured Black Start

The 2023 PJM 2023 RTO wide Black Start Request for Proposal solicited proposals for both non-fuel assured and fuel assured resources. Proposals for fuel assured resources were not received for several transmission zones which required the issuance of an incremental RFP for fuel assured black start resources in 2024. This RFP is active and additional fuel assured resources are currently under evaluation.

⁹ <https://www.pjm.com/-/media/documents/manuals/m14d.ashx>

VI. Recommendations/Considerations

A. Short Term

- Planning period parameters from the 2025/26 Base Residual Auction (BRA) are indicating a decline in the Net CONE values due to an increase in Net Energy and Ancillary Service (Net E&AS) revenue. The planning period parameters for the 2026/27 BRA are indicating a further decline in the Net CONE values, which is reduced to zero in several transmission zones, due to multiple changes including a greater increase in Net E&AS revenue and the change in methodology for calculating Net E&AS to a forward calculation. If unchanged, units recovering black start revenues through the Base Formula rate will receive reduced revenues in the 2025/26 delivery year, and possibly zero for the Fixed Black Start Service Cost (FBSSC) component for the 2026/27 delivery year depending upon where the resource is located, since the Net CONE values are used to calculate fixed BSSC costs. It is possible that reduction in Net CONE could lead to resources terminating Black Start Service which could lead to black start shortages in some zones. As a result, PJM is exploring several options to mitigate this issue and will be presenting these proposed solutions to stakeholders in the near future.

B. Long Term

- Generator outreach was performed to understand the lack of response of Fuel Assured (FA) proposals from the 2023 RTO Wide Black Start RFP. Some Generator Owners indicated that FA compensation may not be sufficient to offset the risk of lost revenues by not maintaining 16 hours of fuel and non-consumables. PJM will continue to monitor and review adequacy of fuel assured black start resources from the most recent 2024 Incremental RFP for Fuel Assured Black Start Service which is currently ongoing.