

provide additional evidence on the basis for the current CRF values. This answer seeks to clarify the evidence on the CRF values, to facilitate the decision making process and to indicate the evidence available for consideration of this issue. The request for rehearing should be dismissed.

I. ANSWER

A. The Request for Rehearing Is Not Ripe and Should Be Dismissed.

The request for rehearing is not ripe because the Commission has not made the finding that the request seeks to have reconsidered.⁴ There is no reason why the March 24th Order could not have found that the current CRF values include consideration of tax rates and other relevant economic information. The Market Monitor knows this to be the case because the Market Monitor performed the calculation of CRF values originally submitted by PJM. Despite its incorrect statements, PJM does not and cannot assert that the current CRF values are black box values, with no rational basis, because it did not perform the CRF calculations. In addition, PJM provided three public reports to stakeholders that explicitly state all the assumptions used in the CRF calculations. The record shows that the current CRF values were calculated based on economic information, including tax rates, and that PJM was aware

⁴ See *Equitrans, L.P.*, 181 FERC ¶ 61,235 at P 27 (2022) (“This matter is not ripe for rehearing. Rule 713(b) of the Commission’s Rules of Practice and Procedure permits requests for rehearing “of any final decision or other final order in a proceeding.”[footnote omitted] A final order is one that “imposes an obligation, denies a right, or fixes some legal relationship” as a consummation of the administrative process.[footnote omitted] The Commission’s show cause requirement in the Abandonment Order does not constitute issuance of a final order. Moreover, the Abandonment Order reflects only the preliminary finding that the Commission has “doubt that the primary function of the [Taylor County Field] facilities remains gathering.”[footnote omitted] That is not a final determination, and it is not subject to rehearing.[footnote omitted] Accordingly, we reject Equitrans’ argument because rehearing does not lie.”), citing *Reliable Automatic Sprinkler Co. v. Consumer Prod. Safety Comm’n*, 324 F.3d 726, 731 (D.C. Cir. 2003) (holding that “[f]inal agency action ‘mark[s] the consummation of the agency’s decision making process’ and is ‘one by which rights or obligations have been determined, or from which legal consequences will flow.’”) (quoting *Bennett v. Spear*, 520 U.S. 154, 178 (1997))) (citation omitted).

of the basis of the calculations.⁵ PJM knows or should know the basis for the current CRF values.⁶ The record is sufficient to support the finding that the current CRF values include tax rate inputs that became outdated in 2017 as a result of changes in the tax rates and depreciation provisions in the Tax Cuts and Jobs Act (TCJA).⁷

But the March 24th Order makes no finding on the basis for the current CRF values. The March 24th Order sets (at P 32) the issues of “whether, as a result of changes from the TCJA, the existing CRF values result in a Capital Cost Recovery Rate for generating units that were selected to provide Black Start Service prior to June 6, 2021 that is unjust and unreasonable.” The March 24th Order identifies (*id.*) the following fact issue to be resolved: “While the record does not contain conclusive evidence that the existing CRF values include a 35% tax rate, the Market Monitor has introduced sufficient evidence that those values may include a 35% tax rate, raising a disputed issue of material fact as to whether changes to the tax rate render the existing CRF values unjust and unreasonable.”

The issue remains unresolved. The request for rehearing is premature. The request for rehearing should be dismissed.

B. Ample Record Evidence Shows that the CRF Values Are Based on Relevant Economic Inputs.

In the course of the hearing and settlement judge proceedings instituted by the March 24th Order, the Market Monitor will provide additional information on how the current CRFs were calculated.

There is no question that the CRFs are based on pre-TCJA tax rates and depreciation assumptions. The Market Monitor performed the calculation. PJM is fully aware of the

⁵ See Comments of the Independent Market Monitor for PJM, Docket No. ER21-1635-000 (April 28, 2021) at 5–7.

⁶ *Id.*

⁷ Pub. L. 116-97.

method and assumptions used to calculate the CRFs, and has documented and reviewed the calculation with stakeholders on at least three occasions. The Market Monitor takes this opportunity, afforded by Vistra’s rehearing request which claimed (at 12) the Commission established “a hearing to investigate whether the stated CRFs remain just and reasonable based solely on arguments raised by the market monitor that the stated CRFs are premised on pre-TCJA tax rates,” to indicate the nature of the evidence on the inputs actually used for the calculation of the CRFs.

The Market Monitor first calculated the CRF values as determinants in the Avoidable Project Investment Recovery Rate (APIR) which is a component of the Avoidable Cost Rate, defined as part of the PJM Capacity Market rules.⁸ The CRF values were included in the original PJM RPM filing.⁹ Affidavits attached to the original RPM filing by Joseph Bowring and Raymond Pasteris make clear that the CRF values originally calculated for the APIR accounted for income taxes and incorporated modified accelerated cost recovery system (MACRS) depreciation rates; however the income tax levels, both federal and state, were not explicitly stated in the affidavits.^{10 11} Based on a review of an internal spreadsheet, the Market Monitor can confirm that the financial assumptions were as stated in the Market Monitor’s comment in this docket.¹² The financial parameter and income tax assumptions are repeated here in Table 1.

⁸ See OATT Attachment DD § 6.8(a).

⁹ PJM Filing, ER05-1410 (August 31, 2005) Tab C (Revised Original Sheet No. 590).

¹⁰ PJM Filing, ER05-1410 (August 31, 2005) (Tab G, Affidavit of Joseph E. Bowring at 23).

¹¹ PJM Filing, ER05-1410 (August 31, 2005) Tab I (“Independent Study to Determine Cost of New Entry Combustion Turbine Power Plan Revenue Requirement” at 3–4, Attachment to the Affidavit of Raymond M. Pasteris on Behalf of PJM Interconnection, L.L.C.).

¹² See Comments of the Independent Market Monitor for PJM (Corrected) (November 18, 2021), Attachment 2, Table 2.

Table 1 Financial Structure and Income Tax Assumptions for original black start CRF

Parameter	Parameter Value
Equity Funding Percent	50.00%
Debt Funding Percent	50.00%
Equity Rate	12.00%
Debt Interest Rate	7.00%
Federal Income Tax Rate	36.00%
State Income Tax Rate	9.00%
Effective Income Tax Rate	41.76%

At the time the CRF values were originally calculated, the federal corporate income tax rate was 35 percent for income between \$10 and \$15 million, 38 percent rate for income between \$15 million and \$18.3 million, and 35 percent for income in excess of \$18.3 million. The 36 percent income tax rate assumption is an average rate over the top brackets of the federal corporate income tax schedule. There is no valid question on whether the current CRF values include an assumed 36 percent tax rate and are not black box values.

PJM knows or should know that these assumptions were the basis for the CRFs, and stakeholders know or should know that PJM has reviewed these assumptions with stakeholders on a periodic basis since the CRFs were first incorporated into Schedule 6A of the OATT. When the CRF values were placed in the OATT for black start capital cost recovery, the tariff provisions included a requirement that PJM review the black start revenue requirement formula and costs components every two years with PJM stakeholders.¹³ To date there have been at least three reviews of the black revenue requirement formula with PJM

¹³ OATT Schedule 6A, para. 18. This provision was changed to a five year review in 2014, *see PJM Interconnection, L.L.C.*, 149 FERC ¶ 61,121 at P 6 (2014).

stakeholders. The most recent review occurred at the MC Webinar on October 30, 2019, and included a report which described the black start CRF table.^{14 15}

The CRF table has several different assumptions such as: the Capital Recovery Factor based on a levelized proforma for a 100MW Combustion Turbine for \$1M, 2.5% inflation, 36% federal tax rate, 9% state tax rate, income tax rate 41%, 50% equity and 50% debt with a 7% interest rate, and a 12% internal rate of return on equity.¹⁶

The 2.5 percent inflation rate assumption has no bearing on the CRF. This is the fixed O&M inflation assumption used in the PJM pro forma CONE calculation for the RPM.¹⁷ The CRF calculation only addresses capital recovery and the fixed O&M was set to zero to calculate the original CRF values.

The first black start revenue requirement review was conducted in 2011 and also included a report.^{18 19} That report included the same description of the CRF model that was included in the October 30, 2019, report.²⁰ The 2011 report states that the “CRF was originally

¹⁴ PJM, *Review of Black Start Formula and Cost Components*, (October 30, 2019) at Attachment A (Item 5 MC Webinar meeting materials).

¹⁵ See *Protest of American Municipal Power, Inc. and Old Dominion Electric Cooperative*, ER21-1635-000 (April 25, 2021) at Attachment A.

¹⁶ *Id.* at 8.

¹⁷ PJM Filing, ER05-1410 (August 31, 2005) Tab I (“Independent Study to Determine Cost of New Entry Combustion Turbine Power Plan Revenue Requirement” at 4, Attachment to the Affidavit of Raymond M. Pasteris on Behalf of PJM Interconnection, L.L.C.).

¹⁸ The report was included in the meeting materials and reviewed at a meeting of the Black Start Service Task Force on June 21, 2011.

¹⁹ Laura Walter, PJM, *Review of Black Start Formula and Cost Components* (June 2011) at Attachment B.

²⁰ *Id.* at 7.

taken from the capacity market,” consistent with the Bowring affidavit in the original RPM filing.²¹

The second black start revenue requirement review occurred in January 2015.^{22 23} The associated report includes the same language regarding the financial parameter and income tax rate assumptions underlying the CRF calculation.²⁴ The author of this report, Thomas Hauske, submitted an affidavit in the precursor (ER21-1635) to the current docket.²⁵ The Hauske affidavit is incomplete and misleading. Witness Hauske does not offer that PJM has full knowledge of the CRF calculation and underlying assumptions, instead he writes that the CRF are “essentially” black box values, but only because the details are not included in the PJM Tariff or Manuals. If that were the standard, the entire PJM Tariff could reasonably be considered to be a black box.

But neither the Tariff nor the PJM Manuals specify the bases, assumptions, or calculation method of the existing Black Start Service CRF values, which are thus essentially “black box” values. Since the assumptions and method are not documented in the Tariff or PJM Manuals, PJM did not have a process in place to update these “black box” values when they changed.²⁶

PJM reported in October 2019 that black start request for proposals (RFPs), including RFPs issued after the TCJA in February 2018 and February 2019, had been successful,

²¹ *Id.*

²² A report was included in the meeting materials and reviewed at the MC Webinar on January 20, 2015.

²³ Thomas Hauske, PJM, *Review of Black Start Formula and Cost Components* (December 2014).

²⁴ *Id.* at 8.

²⁵ PJM Filing, ER21-1635 (April 6, 2021) Attachment B (Affidavit of Thomas Hauske on Behalf of PJM Interconnection, L.L.C.).

²⁶ *Id.*

allowing PJM to procure the needed black start service.²⁷ PJM concluded that no changes to the black start formula and cost components were needed, without addressing the change in the tax laws.²⁸ Clearly this conclusion was an error and the Market Monitor communicated to PJM that an update to the CRF was necessary around the time of this report.

There are 18 black start units with \$181.4 million in capital investments that began black start service and capital cost recovery before the TCJA. All of these units have capital recovery terms of 10 years or more, and the overpayment to these units was a result of the change in the federal income tax rate. There are 20 black start units with \$90.3 million in capital investments that began black start service and capital cost recovery after the TCJA. The overpayment to these units was a result of the change in the federal income tax rate and the change to the depreciation rules, both included in the TCJA. Bonus depreciation, which allows 100 percent depreciation of the capital investment in the first year of service, has a significant impact on the CRF.²⁹

The March 24th Order states (at P 27) that the Market Monitor contends that its proposal to update the CRF could be “implemented without any retroactive resettlement or disgorgement.” This may no longer be the case due to the passage of time. Since the Market Monitor made this proposal in November 2021, the payments at the incorrect rates have continued and the equity investors in black start units with five year capital recovery terms that began black start service after the TCJA may have already recovered their investments, and the only means for restoring a 12 percent return on the equity investment with no over recovery is to return overpayments to customers.

²⁷ See PJM, *Review of Black Start Formula and Cost Components* (October 30, 2019) at Attachment A, at 10.

²⁸ *Id.*

²⁹ The actual return and equity investment is dependent upon the financial structure of each individual investment.

II. MOTION FOR LEAVE TO ANSWER

The Commission's Rules of Practice and Procedure, 18 CFR § 385.213(a)(2), do not permit answers to requests for rehearing unless otherwise ordered by the decisional authority. The Commission has made exceptions, however, where an answer clarifies the issues or assists in creating a complete record.³⁰ In this answer, the Market Monitor provides the Commission with information useful to the Commission's decision making process and which provides a more complete record. Accordingly, the Market Monitor respectfully requests that this answer be permitted.

III. CONCLUSION

The Market Monitor respectfully requests that the Commission afford due consideration to this answer as the Commission resolves the issues raised in this proceeding.

Respectfully submitted,



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³⁰ See, e.g., *Cal. Indep. Sys. Operator Corp.*, 129 FERC ¶ 61,241 at P 16 (2009) (“We will accept the answers and responses to the requests for rehearing because they provide information that assisted us in our decision making process.”); *ISO New Eng., Inc.*, 120 FERC ¶ 61,087 at P 30 (2007) (“We will accept the parties’ answers to the petitions for rehearing . . . because they have provided information that assisted us in our decision-making process.”); *KN Wattenberg Transmission LLC*, 94 FERC ¶ 61,189 at 61,671 (2001) (finding good cause to accept an answer to a request for rehearing to ensure a complete record).

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Dated: May 9, 2023

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Eagleville, Pennsylvania,
this 9th day of May, 2023.



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Attachment A



Review of Black Start Formula and Cost Components

PJM Operation Analysis & Compliance Department

PJM Interconnection

October 2019

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Black Start: 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. Traditional black start is the ability of generating units to start without an outside electrical supply. Another type of black start unit is an Automated Load Rejection (ALR) unit that is a generator with a high operating factor and the demonstrated ability¹ to automatically remain operating at reduced levels when disconnected from the grid.

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 is not intended to provide information and updates regarding the current PJM Operating Committee Special Sessions for Fuel Requirements for Black Start Resources. Current and future updates of the PJM Operating Committee Special Session for Fuel Requirements for Black Start Resources may be found via PJM's website for the PJM Operating Committee.⁴

Since the 2014 prior review of Schedule 6A, Section 18, a revision to the tariff language took effect on November 16, 2017 to clearly define the initial annual black start revenue requirement review process for new black start units. The initial review process for new black start units includes an initial annual black start revenue estimate to be collected during the document and compensation review period. This change has resulted in minimizing the potential for large after the fact black start rebilling charges to network service customers and point-to-point reservations.

During the past five years, PJM has held an RTO Wide Black Start Request for Proposal and four Black Start Incremental Request for Proposals with three completed and one currently under review. Generator Owner interest and black start service bidding remains active with multiple RFP responses. As a result, PJM is not recommending modifications to the current version of Schedule 6A, Section 18.

¹ Subject to Transmission Provider concurrence

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

³ Schedule 6A Black Start Service Section 18 Effective Date: 9/1/2018

⁴ <https://www.pjm.com/committees-and-groups/committees/oc.aspx>

Schedule 6A Changes since 2014 Review

Initial Review for New Black Start Units

On September 22, 2017, Docket No. ER17-2332-000, the Commission issued an Order accepting revisions to PJM Tariff, Schedule 6A setting forth a process for establishing the initial revenue requirement for a new Black Start Unit entering service in PJM (effective date November 16, 2017). The new process can be found in the tariff, Section 17B which allows for the submittal of new Black Start Service revenue requirements (including supporting data and documentation) to PJM and the Market Monitoring Unit for review and analysis by no later than 90 days after entering Black Start Service. The Market Monitoring Unit has a 90-day period to review the submittals and calculate the new Black Start Unit's annual revenue requirement and submit to PJM and the Black Start Unit owner. More time is allotted in the event of more than three new Black Start owner submittals. In this case, the Marketing Monitoring Unit has an additional 90 days to review the next set of three submittals and so on until complete. The Black Start Owner has 7 days to notify PJM and the Marketing Monitoring Unit if it disagrees with the Market Monitoring Unit's determination. PJM shall determine within 30 days if the values submitted by the Black Start Unit owner meet the requirements of the Tariff and PJM Manuals. If PJM does not accept the values submitted by the Black Start Unit owner, the owner may file its proposed values with the Commission for approval. If PJM accepts the Black Start Unit owner's Black Start revenue requirements, the Market Monitoring Unit may petition the Commission for an order that would require the Black Start Unit owner to utilize the values determined by the Market Monitoring Unit or PJM or such other values determined by the Commission.

During this initial period, PJM will hold the new Black Start Unit owner's monthly credits in a non-interest bearing account. Following acceptance of the new Black Start Unit owner's annual revenue requirement (per Section 17B), the Black Start owner will begin to receive monthly credits, including any monthly credits held by PJM back to the date the unit enters Black Start Service (Section 22). Zonal rates will be based on Black Start Service capability or share of generation units designated by the Transmission Provider and allocated to network service customers and point-to-point reservations. Zonal rates will include estimated annual revenue requirements as estimated by the unit entering Black Start Service. Any estimated annual revenue requirement true up will be included in the monthly bill following the acceptance of the new Black Start unit's annual revenue requirement (Section 25)

Black Start: Current Total Revenue Requirements

Black start service supplies electricity for system restoration in the unlikely event that the entire PJM Interconnection grid would lose power. In the event that power would be lost across the entire grid, black start service is to be used to supply electricity to help restore the system. Black start service is provided by generating units that have the ability to start up and deliver power to the grid without an outside source of power – or units that can remain in operation at reduced output levels when disconnected from the grid. Such units must be able to reconnect to the grid within 180 minutes after a request from the Transmission Owner (specific to the Transmission Owner's System Restoration Plan). They also must be able to maintain frequency and voltage under varying loads. To be designated as a black start resource, a generating facility must pass a series of performance tests every 13 months. In a system-restoration situation, black start units can be used to reestablish the regional electric system. Once connected, they supply power to other generating units and help restore load. This must be a careful, deliberate process that keeps generation in balance with load in order to avoid the possibility of another loss of service.

The owners of 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 requirements under the tariff. The PJM tariff Schedule 6A outlines the formulas used to calculate the revenue requirements.

Traditional Black Start Units

The primary formula to calculate a traditional black start generator's Annual Black Start Service Revenue Requirement can be found in the tariff, Section 18 of Schedule 6A is 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 = the incentive factor of 10 percent

The Annual Black Start Service Revenue Requirements is allotted monthly, and may change every delivery year (June 1 – May 31). 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.

Automatic Load Rejection Units (ALR) or Units with a High Operating Factor

Automatic Load Rejection Units are generating units with a high operating factor that have demonstrated the ability (subject to Transmission Provider concurrence) to automatically remain operating at reduced levels when disconnected from the grid. These units can be considered black start where appropriate, but they do not receive the same black start payments as black start units that start without an outside electrical supply. The revenue requirements for ALR units are as follows⁵:

$$\text{ALR Generator's Annual Black Start Service Revenue Requirement} = \text{Training Costs} * (1 + Z)$$

- Where Z is a 10 percent incentive factor
- Training costs are calculated as 50 staff hours per plant per year multiplied by \$75 per staff hour = \$3,750 per plant per delivery year

For ALR units, the total annual compensation from black start is \$4,125 per plant per delivery year.

⁵ <https://agreements.pjm.com/oatt/3897>

Fixed Black Start Service Cost (FBSSC)

Fixed Black Start Service Cost 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 Paragraph 5⁶ or Paragraph 6⁷ of Schedule 6A 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.

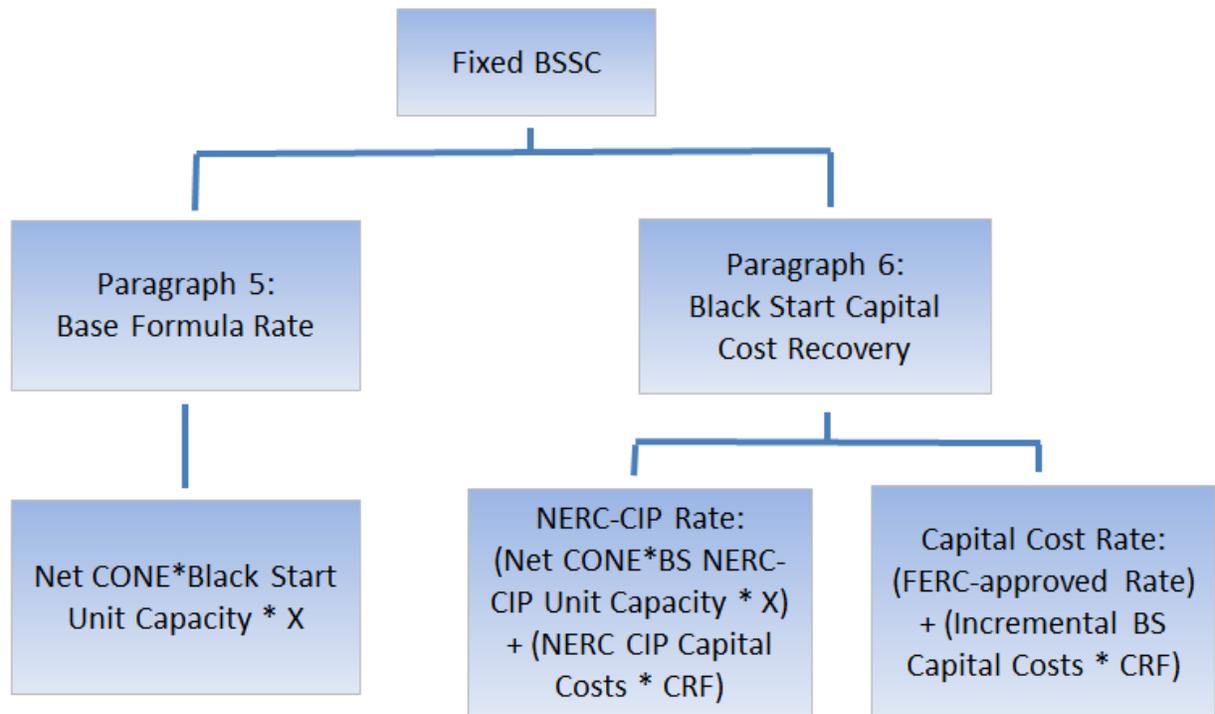


Figure 1: Three methods to recover fixed black start costs per Schedule 6A

⁶ Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 of this Schedule 6A and electing to forego any recovery of new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for an initial term of no less than two years and authorize the Transmission Provider to resell Black Start Service from its Black Start Units. The term commitment shall continue to extend until the Black Start Unit owner, or the Transmission Provider provides written, one-year advance notice of its intention to terminate the commitment or the commitment is involuntarily terminated pursuant to section 15 of this Schedule 6A.

⁷ Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 of this Schedule 6A and electing to recover new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for a term based upon the age of the Black Start Unit or the longest expected life of the Incremental Black Start Capital Cost, as set forth in the applicable CRF Tables in section 18 of this Schedule 6A. For those Black Start Units that elect to recover new or additional Black Start Capital Costs in addition to a prior, FERC-approved cost recovery rate, the applicable commitment period shall be the longer of the FERC-approved recovery period or the applicable term of commitment as set forth in the CRF Tables in section 18 of this Schedule 6A. The Transmission Provider may terminate the commitment with one year advance notice of its intention to the Black Start Unit owner, but the Black Start Unit owner shall be eligible to recover any amount of unrecovered Fixed Black Start Service Costs over a period not to exceed five years. A Black Start Unit owner may terminate the provision of Black Start Service with one year advance notice and consent of the Transmission Provider (or its commitment period may be involuntarily terminated pursuant to the section 15 below). Such Black Start Unit shall forego any otherwise existing entitlement to future revenues collected pursuant to this Schedule 6A and fully refund any amount of the Black Start Capital Costs recovered under a FERC-approved rate (recovered on an accelerated basis pursuant to the provisions of section 17(i) of this Schedule 6A) in excess of the amount that would have been recovered pursuant to section 18 of this Schedule 6A during the same period. At the conclusion of the term of commitment established under this section 6 of this Schedule 6A, a Black Start Unit shall commence a new term of commitment under either section 5 or 6 of this Schedule 6A, as applicable.

If units recover Fixed BSSC through Paragraph 5, they are electing to forgo any recovery of black start capital costs and fall into the lower left-hand box in Figure 1. If units prefer to recover through Paragraph 6, then they do submit capital costs for recovery and fall into the lower two right-hand boxes in Figure 1. Units recovering 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 hand box in Figure 1.

Paragraph 5 Fixed Black Start Service Cost for Units not requesting Capital Cost Recovery

For units recovering costs under Paragraph 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”. The CONE areas are:

CONE Area 1: AE, DPL, JCPL, PECO, PS, RECO
CONE Area 2: BGE, PEPCO
CONE Area 3: AEP, APS, ATSI, ComEd, Dayton, DEOK, Dominion, Duquesne (DLCo), EKPC, OVEC
CONE Area 4: MetEd, Penelec, PPL

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 “the Black Start Unit’s installed capacity, expressed in MW.”

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 paragraph 5, X shall be .01 for Hydro units, .02 for Diesel or CT units.”

Paragraph 6 Fixed Black Start Service Cost for Units requesting Capital Cost Recovery

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

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

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 paragraph 5, X shall be .01 for Hydro units, .02 for Diesel or CT 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 “.*

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

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

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

“FERC-approved rate” is *“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 paragraph 18. 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.”*

“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, as present in the CRF Table below:”*

Age of Black Start Unit	Years of Remaining Life of Black Start Unit	Levelized CRF
1 to 5	20	0.125
6 to 10	15	0.146
11 to 15	10	0.198
16+	5	0.363

The CRF table has several different assumptions such as: the Capital Recovery Factor based on a levelized proforma for a 100MW Combustion Turbine for \$1M, 2.5 percent inflation, 36 percent federal tax rate, 9 percent state tax rate, income tax rate 41 percent, 50 percent equity and 50 percent debt with a 7 percent interest rate, and a 12percent internal rate of return on equity.

Optionally, a Black Start unit owner may elect to apply an alternative Capital Recovery Factor (CRF), in lieu of the age-based CRF table listed on page 7, which is based upon the expected capital Improvement Lifespan of the new or additional capital improvements (as determined by the applicable depreciation period of the capital improvement, as published from time to time by the US Internal Revenue Service). The Applicable Recovery Period and the term of Black Start Service Commitment shall be the same and determined by the expected Capital Improvement Lifespan. In the event that the Black Start unit seeks recovery of capital improvements that are included in more than one category of Capital Improvement Lifespan (as set forth below), its Applicable Recovery period and term of commitment to provide black start service for such Black Start unit shall be the longest expected life of those new or additional capital improvements.

Capital Improvement Lifespan (years)	Applicable Recovery Period/Term of Commitment (years)	Levelized CRF
16-20	20	0.125
11-15	15	0.146
6-10	10	0.198
1-5	5	0.363

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 Tables above. 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: Paragraph 6, the Black Start Unit shall be committed to providing black start in accordance with Paragraph 5 of Schedule 6A and calculate its Fixed BSSC in accordance with the Base Formula rate.

A. *Variable Black Start Service Cost (VBSSC)*

$$\text{Variable Black Start Service Cost} = \text{Black Start Unit O\&M} * Y$$

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”*

For unit qualifying as Black Start Units on the basis of a demonstrated ability to operate at reduced levels when automatically disconnected from the grid (ALR), there are no variable costs associated with providing Black Start Service and the value for Variable BSSC shall be zero.

B. Training Cost

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

C. Fuel Storage Cost

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:

$$\begin{aligned} \text{Fuel Storage Costs} = & \\ & (\text{Minimum Tank Suction Level} + (\# \text{ of Run Hours Required} * \text{Fuel Burn Rate})) \\ & * (12 \text{ month forward strip} + \text{basis}) * \text{Bond Rate} \end{aligned}$$

Where Minimum Tank Suction Level is *“and shall apply where no direct current pumps are available for the black Start Unit”*.

Number of Run Hours are *“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 *“the average of forward prices for the fuel burned in the Black Start unit traded the first business day on or following May 1”*.

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

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

D. Z Factor

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

Request for Proposal (RFP) since 2014

April 11, 2014: Black Start Incremental Request for Proposal for AEP Zone. PJM requested bids for additional black start capability within the AEP transmission zone.

November 24, 2014: Black Start Incremental Request for Proposal for Northeast Ohio and Western Pennsylvania. PJM requested additional black start capability within Northeastern Ohio and Western Pennsylvania.

July 28, 2015: Second Incremental Request for Proposal for Northeast Ohio and Western Pennsylvania. PJM determined the need for additional black start capability within Northeastern Ohio and Western Pennsylvania.

February 01, 2018: PJM 2018 RTO Wide Black Start Request for Proposal. This was the second PJM RTO-wide black start Request for Proposal process and requested bids for new black start capability in accordance with the Five-Year Black Start Selection Process as documented in PJM Manual 14D.

February 01, 2019: Black Start Incremental Request for Proposal for BGE/PEPCO Zones. PJM requested bids for additional black start capability within the BGE transmission zone.

Conclusion

PJM Manual 14D: 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 are compensated under Schedule 6A of the Tariff, with the associated formula and its cost components documented in this paper. 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.

Attachment B

Review of Black Start Formula and Cost Components

Laura Walter, PJM

June 2011



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Black Start: Executive Summary

Black Start Service is the ability of generating units to start without an outside electrical supply or the demonstrated ability of a generating unit with a high operating factor (subject to Transmission Provider concurrence) to automatically remain operating at reduced levels when disconnected from the grid.

PJM's Open Access Transmission Tariff, relating to Black Start Service, requires PJM to review the formula and cost components utilized to compensate Black Start Service providers at least every two years. Specifically, Schedule 6A: Section 18 states:

At least every two years, PJM shall review the formula and its costs components set forth in this section, and report on the results of that review to stakeholders.ⁱ

This paper is the report required by the tariff, a review of the components and formulas in the current approved version of Schedule 6A: Section 18. **This report is not a review of the annual revenue requirements calculated by the tariff and whether the compensation black start units receive is adequate to keep the unit in black start service and maintain it reliably.**

Areas that require further consideration in this report include; possible update to the CRF table, the Fixed Black Start Service Cost (FBSSC) for units not requesting capital recovery costs under Section 5, more specific definitions to clarify and provide guidance when calculating cost for units requesting capital recovery costs under section 6 and the clarification of fuel storage cost to remove any interpretation from the tariff.

Black Start: Total Revenue Requirements

Black start service supplies electricity for system restoration in the unlikely event that the entire PJM Interconnection grid would lose power. In the event that power would be lost across the entire grid, black start service is used to supply electricity to help restore the system. Black start service is provided by generating units that have the ability to start up and deliver power to the grid without an outside source of power – or units that can remain in operation at reduced output levels when disconnected from the grid. Such units must be able to reconnect to the grid within 90 minutes after a request from PJM. They also must be able to maintain frequency and voltage under varying loads. To be designated as a black start resource, a generating facility must pass a series of performance tests every 13 months. In a system-restoration situation, black start units can be used to reestablish the regional electric system. Once connected, they supply power to other generating units and help restore load. This must be a careful, deliberate process that keeps generation in balance with load in order to avoid the possibility of another loss of service.

The owners of black start units receive cost-based payments for providing the service to the grid. Schedule 6A section 18 outlines the formulas used to calculate the revenue requirements. The primary formula is 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 *\$75 per staff hour)
- Fuel Storage Cost is the cost defined in the tariff for oil units with onsite storage (discussed below)
- Z= the incentive factor of 10%

The total revenue requirements are the amount of compensation a black start unit receives per delivery year if it fulfills all the black start requirements under the tariff. This amount is allotted monthly, and may change every delivery year (June 1 – May 31). 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.

Automatic Load Rejection Units (ALR) or Units with a High Operating Factor

Automatic Load Rejection Units are generating units with a high operating factor that have demonstrated the ability (subject to Transmission Provider concurrence) to automatically remain operating at reduced levels when disconnected from the grid. These units can be considered black start where appropriate, but they do not receive the same black start payments as black start units that start without an outside electrical supply. The revenue requirements for ALR units are as followsⁱⁱ:

$$\text{ALR Generator's Annual Black Start Service Revenue Requirement} = \text{Training Costs} * (1 + Z)$$

- Where Z is a 10% incentive factor
- Training costs are calculated as 50 staff hours per plant per year *\$75 per staff hour = \$3,750 per plant per delivery year

For ALR units, the total annual compensation from black start is \$4,125 per plant per delivery year.

Fixed Black Start Service Cost (FBSSC)

Fixed Black Start Service Cost are calculated in two possible ways depending on whether the unit is recovering costs under section 5ⁱⁱⁱ or Section 6^{iv} of Schedule 6A with the central difference being whether the black start unit owner seeks to recover new or additional capital costs through application of the Schedule 6A formula rate. The following figure shows the 2 methods for recovery of Fixed BSSC.

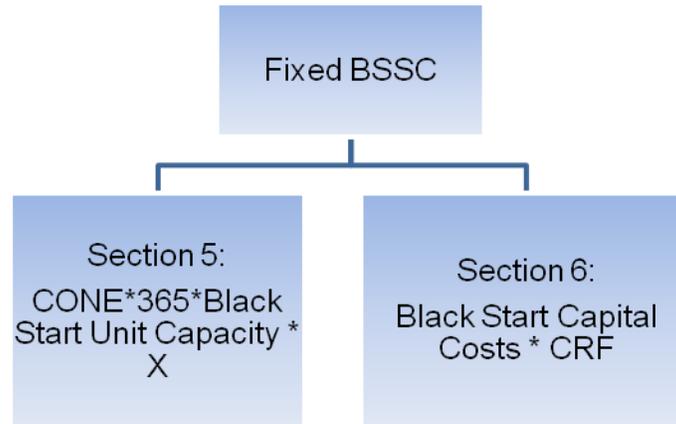


Figure 1: Two methods to recover fixed black start costs per Schedule 6A

If units recover Fixed BSSC through Schedule 6A, section 5, they are electing to forgo any recovery of black start capital costs and fall into the lower left-hand box above. If units prefer to recover through Schedule 6A, Section 6, then they do submit capital costs for recovery and fall into the lower right-hand box above.

Section 5 Fixed Black Start Service Cost for Units not requesting Capital Cost Recovery

For units recovering costs under Section 5 and not recovering black start capital costs, Fixed Black Start Service Costs are defined below:

Where CONE is equal to “then current net Cost of New Entry for the CONE Area where the Black Start Unit is located as set forth in Section 5.10 of Attachment DD”. These are the CONE areas set forth in Attachment DD:

Geographic Location Within the PJM Region Encompassing These Zones	Cost of New Entry in \$/MW-Year
PS, JCP&L, AE, PECO, DPL, RECO (“CONE Area 1”)	122,040
BGE, PEPSCO (“CONE Area 2”)	112,868
AEP, Dayton, ComEd, APS, DQL (“CONE Area 3”)	115,479
PPL, MetEd, Penelec (“CONE Area 4”)	112,868
Dominion (“CONE Area 5”)	112,868

The formula refers to a table with gross CONE in \$-MW-year, but is referring only to the five CONE areas in the 2013-2014 delivery year. The use of UCAP CONE or ICAP CONE is not specified. Cost of New Entry is a Reliability Pricing Model (RPM) parameter and is related to the cost to build a GE Frame 7F in an area specified above. As CONE values used in planning parameters are calculated before Base Residual Auctions (BRA), the CONE values are three years old during the “current” delivery year in which the black start units are paid. The five CONE areas listed here are not applicable to every delivery year.

The net CONE is then multiplied by 365 so as to convert the \$/MW-day net CONE value to a \$/MW-year value. It is PJM staff opinion that units of measurements should be explicit in this formula to avoid confusion.

The Black start unit capacity is defined, as the installed capacity (ICAP).

The term X is:

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.

PJM staff would recommend changing “Hydro” to include “Storage Units”.

Section 6 Fixed Black Start Service Cost for Units requesting Capital Cost Recovery

Black Start Capital Cost Recovery =

Capital Costs for incremental equipment solely necessary for Black Start * CRF

For units recovering black start capital costs under Section 6, Fixed Black Start Service Costs are defined below:

“Black Start Capital Costs” is the 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.

This section (Black Start Capital Costs) should be well defined to clarify what is meant by the statement, “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”.

This statement could be interpreted in different ways – for example it could refer to s to only the equipment required to allow the unit to be black start capable, such as a diesel generator, air starter, batteries, or specific control functions. This section could also imply that the entire generating unit could be replaced or repaired through Schedule 6A. This ambiguity needs to be clarified.

“CRF” or “Capital Recovery Factor” includes age and years of remaining life, but the tariff specifies that the CRF is based on “the age of the unit.”

Age of Black Start Unit	Years of Remaining Life of Black Start Unit	Levelized CRF
1 to 5	20	0.125
6 to 10	15	0.146
11 to 15	10	0.198
16+	5	0.363

The CRF table has several different assumptions such as: the Capital Recovery Factor based on a levelized proforma for a 100MW Combustion Turbine for \$1M, 2.5% inflation, 36% federal tax rate, 9% state tax rate, income tax rate 41%, 50% equity and 50% debt with a 7% interest rate, and a 12% internal rate of return on equity.

This CRF table was originally taken from the capacity market, and the capacity market CRF table has since been updated to the following:

Age of Existing Units (Years)	Remaining Life of Plant (Years)	Levelized CRF
1 to 5	30	0.107
6 to 10	25	0.114
11 to 15	20	0.125
16 to 20	15	0.146
21 to 25	10	0.198
25 Plus	5	0.363
Mandatory CapEx	4	0.450
40 Plus Alternative	1	1.100

Whether this is a more appropriate fit for the CRF table for Black Start should be explored.

Variable Black Start Service Cost (VBSSC)

$$\text{Variable Black Start Service Cost} = \text{Black Start Unit O\&M} * Y$$

O&M is the Operating and Maintenance Cost that is calculated for all cost offers through following Manual 15: Cost Development Guidelines. Y is 1% of the total annual O&M.

Training Cost

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

\$75 is a fixed rate written into the tariff that does not change with inflation or other economic indicators. This currently does not seem to be an inadequate amount. This cost is independent of the number of people trained, how many do restoration drills, and the cost of training to determine the true cost for training.

Fuel Storage Cost

Fuel Storage Costs =

$$\begin{aligned} & (\text{Minimum Tank Suction Level} + (\# \text{ of Run Hours Required} * \text{Fuel Burn Rate})) \\ & * (12 \text{ month forward strip} + \text{basis}) * \text{Bond Rate} \end{aligned}$$

PJM staff believes units of measure in this component should be explicit. For the 12 month forward strip and bond rate, the value from May 1 every year should be used to keep recovery consistent across resources. Determination of basis should also be defined.

Conclusion

The areas that require further consideration include; possible update to CRF table, the Fixed Black Start Service Cost (FBSSC) for units not requesting capital recovery costs under Section 5, more specific definitions to clarify and provide guidance when calculating cost for units requesting capital recovery costs under Section 6 and the clarification of fuel storage cost definitions should be clarified to remove any interpretation from the tariff.

Potential Parking Lot Items

- Fixed Black Start Service Cost (FBSSC) Formula Clarifications
- Evaluation of CRF table
- Fuel Storage Cost Clarifications

ⁱ <http://www.pjm.com/documents/~media/documents/agreements/tariff.ashx> page 512

ⁱⁱ <http://www.pjm.com/documents/~media/documents/agreements/tariff.ashx> page 509

ⁱⁱⁱ Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to forego any recovery of new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for an initial term of no less than two years and authorize the Transmission Provider to resell Black Start Service from its Black Start Units. The term commitment shall continue to extend until the Black Start Unit owner, or the Transmission Owner, with the consent of the Transmission Provider, or the Transmission Provider, with the consent of the Transmission Owner, provides written, one-year advance notice of its intention to terminate the commitment.

^{iv} Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to recover new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for a term based upon a reasonable estimate of the expected life of the Black Start Unit, as set forth in the CRF Factor Table in section 18, and authorize the Transmission Provider to resell Black Start Service from its Black Start Units. Either the Transmission Provider, with the consent of the Transmission Owner, or the Transmission Owner, with the consent of the Transmission Provider, may terminate the commitment with one year advance notice of its intention to the Black Start Unit owner, but the Transmission Owner shall reimburse the Black Start Unit owner for any amount of unrecovered Fixed Black Start Service Costs over a period not to exceed five years. A Black Start Unit owner may terminate the provision of Black Start Service with one year advance notice (or its commitment period may be involuntarily terminated pursuant to the section 15 below). Such Black Start Unit shall forego any otherwise existing entitlement to future revenues collected pursuant to this Schedule 6A and fully refund any amount of the Black Start Capital Costs recovered under a FERC-approved rate (recovered on an accelerated basis pursuant to the provisions of section 17(i)) in excess of the amount that would have been recovered pursuant to section 18 during the same period. At the conclusion of the term of commitment established under this section 6, a Black Start Unit shall commence a new term of commitment under either section 5 or 6, as applicable.

^v <http://www.pjm.com/documents/~media/documents/agreements/tariff.ashx> Page 2267

Attachment C

Review of Black Start Formula and Cost Components

Thomas Hauske, PJM

December 2014



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Black Start: 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. Traditional black start is the ability of generating units to start without an outside electrical supply. Another type of black start unit is an Automated Load Rejection (ALR) unit that is a generator with a high operating factor and the demonstrated ability ¹to automatically remain operating at reduced levels when disconnected from the grid.

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 two years. Specifically, Schedule 6A: Section 18 states:

At least every two years, PJM shall review the formula and its costs components set forth in this section, and report on the results of that review to stakeholders.³

This paper describes in document form the report given on Black Start Compensation at the May 7, 2013 System Restoration Strategy Senior Task Force⁴ that is required by the tariff with a review of the components and formulas for black start compensation. This report also documents the System Restoration Strategy Task Force's (SRSTF) review of black start compensation modifications that were discussed from February 2013 to September 2014, with submittals of minor compensation changes to the Federal Energy Regulatory Commission (FERC) for approval. The FERC approved the recommended compensation changes on November 14, 2014.

¹ Subject to Transmission Provider concurrence

² <http://www.pjm.com/~media/documents/agreements/tariff.ashx>

³ The most recent Tariff changes approved by FERC on November 14, 2014 changed the review cycle to five (5) years.

⁴ <http://www.pjm.com/~media/committees-groups/task-forces/srstf/20140522/20140522-item-02-bs-compensation-changes.ashx>

Black Start: Current Total Revenue Requirements

Black start service supplies electricity for system restoration in the unlikely event that the entire PJM Interconnection grid would lose power. In the event that power would be lost across the entire grid, black start service is used to supply electricity to help restore the system. Black start service is provided by generating units that have the ability to start up and deliver power to the grid without an outside source of power – or units that can remain in operation at reduced output levels when disconnected from the grid. Such units must be able to reconnect to the grid within 180 minutes after a request from PJM. They also must be able to maintain frequency and voltage under varying loads. To be designated as a black start resource, a generating facility must pass a series of performance tests every 13 months. In a system-restoration situation, black start units can be used to reestablish the regional electric system. Once connected, they supply power to other generating units and help restore load. This must be a careful, deliberate process that keeps generation in balance with load in order to avoid the possibility of another loss of service.

The owners of black start units receive cost-based 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 requirements under the tariff. The PJM tariff outlines the formulas used to calculate the revenue requirements.

Traditional Black Start Units

The primary formula to calculate a traditional black start generator's Annual Black Start Service Revenue Requirement can be found in the tariff, Section 18 of Schedule 6A is 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= the incentive factor of 10 percent

The Annual Black Start Service Revenue Requirements is allotted monthly, and may change every delivery year (June 1 – May 31). 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.

Automatic Load Rejection Units (ALR) or Units with a High Operating Factor

Automatic Load Rejection Units are generating units with a high operating factor that have demonstrated the ability (subject to Transmission Provider concurrence) to automatically remain operating at reduced levels when disconnected from the grid. These units can be considered black start where appropriate, but they do not receive the

same black start payments as black start units that start without an outside electrical supply. The revenue requirements for ALR units are as follows⁵:

$$\text{ALR Generator's Annual Black Start Service Revenue Requirement} = \text{Training Costs} * (1 + Z)$$

- Where Z is a 10 percent incentive factor
- Training costs are calculated as 50 staff hours per plant per year multiplied by \$75 per staff hour = \$3,750 per plant per delivery year

For ALR units, the total annual compensation from black start is \$4,125 per plant per delivery year.

Fixed Black Start Service Cost (FBSSC)

Fixed Black Start Service Cost 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 Paragraph 5⁶ or Paragraph 6⁷ of Schedule 6A 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.

⁵ <http://www.pjm.com/documents/~media/documents/agreements/tariff.ashx> page 509

⁶ Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to forego any recovery of new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for an initial term of no less than two years and authorize the Transmission Provider to resell Black Start Service from its Black Start Units. The term commitment shall continue to extend until the Black Start Unit owner, or the Transmission Owner, with the consent of the Transmission Provider, or the Transmission Provider, with the consent of the Transmission Owner, provides written, one-year advance notice of its intention to terminate the commitment.

⁷ Owners of Black Start Units selected to provide Black Start Service in accordance with section 4 and electing to recover new or additional Black Start Capital Costs shall commit to provide Black Start Service from such Black Start Units for a term based upon a reasonable estimate of the expected life of the Black Start Unit, as set forth in the CRF Factor Table in section 18, and authorize the Transmission Provider to resell Black Start Service from its Black Start Units. Either the Transmission Provider, with the consent of the Transmission Owner, or the Transmission Owner, with the consent of the Transmission Provider, may terminate the commitment with one year advance notice of its intention to the Black Start Unit owner, but the Transmission Owner shall reimburse the Black Start Unit owner for any amount of unrecovered Fixed Black Start Service Costs over a period not to exceed five years. A Black Start Unit owner may terminate the provision of Black Start Service with one year advance notice (or its commitment period may be involuntarily terminated pursuant to the section 15 below). Such Black Start Unit shall forego any otherwise existing entitlement to future revenues collected pursuant to this Schedule 6A and fully refund any amount of the Black Start Capital Costs recovered under a FERC-approved rate (recovered on an accelerated basis pursuant to the provisions of section 17(ii)) in excess of the amount that would have been recovered pursuant to section 18 during the same period. At the conclusion of the term of commitment established under this section 6, a Black Start Unit shall commence a new term of commitment under either section 5 or 6, as applicable.

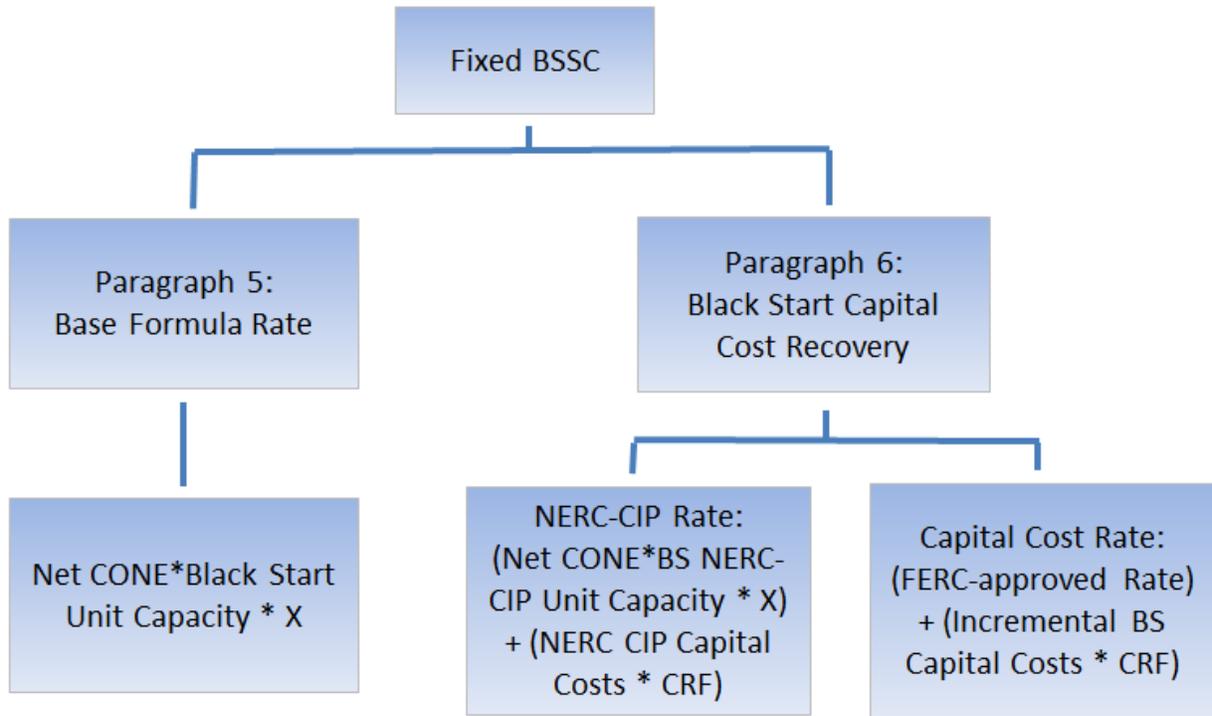


Figure 1: Three methods to recover fixed black start costs per Schedule 6A

If units recover Fixed BSSC through Paragraph 5, they are electing to forgo any recovery of black start capital costs and fall into the lower left-hand box above. If units prefer to recover through Paragraph 6, then they do submit capital costs for recovery and fall into the lower two right-hand boxes above. Units recovering 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 hand box.

Paragraph 5 Fixed Black Start Service Cost for Units not requesting Capital Cost Recovery

For units recovering costs under Paragraph 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”. The CONE areas and values for the 2014-2015 delivery year are:

	TO Zones within Cone Area	2014-2015 Cost of New Entry in \$/MW - Year
CONE Area 1	PS, JCP&L, AE, PECO, DPL, RECO	94,108
CONE Area 2	BGE, PEPCO	82,778
CONE Area 3	AEP, Dayton, ComEd, APS, DQL, ATSI, DEOK, EKPC	123,655
CONE Area 4	PPL, MetEd, Penelec	97,455
CONE Area 5	Dominion	90,487

Black Start Unit Capacity is defined, as “the Black Start Unit’s installed capacity, expressed in MW.”

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 paragraph 5, X shall be .01 for Hydro units, .02 for Diesel or CT units.”

Paragraph 6 Fixed Black Start Service Cost for Units requesting Capital Cost Recovery

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

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

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 paragraph 5, X shall be .01 for Hydro units, .02 for Diesel or CT 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).

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

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

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

“FERC-approved rate” is “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 paragraph 18. 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.”

“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, as present in the CRF Table below:”

Age of Black Start Unit	Years of Remaining Life of Black Start Unit	Levelized CRF
1 to 5	20	0.125
6 to 10	15	0.146
11 to 15	10	0.198
16+	5	0.363

The CRF table has several different assumptions such as: the Capital Recovery Factor based on a levelized proforma for a 100MW Combustion Turbine for \$1M, 2.5 percent inflation, 36 percent federal tax rate, 9 percent state tax rate, income tax rate 41 percent, 50 percent equity and 50 percent debt with a 7 percent interest rate, and a 12percent internal rate of return on equity.

Optionally, a Black Start unit owner may elect to apply an alternative Capital Recovery Factor (CRF), in lieu of the age-based CRF table listed above, which is based upon the expected capital Improvement Lifespan of the new or additional capital improvements (as determined by the applicable depreciation period of the capital improvement, as published from time to time by the US Internal Revenue Service).The Applicable Recovery Period and the term of

Black Start Service Commitment shall be the same and determined by the expected Capital Improvement Lifespan. In the event that the Black Start unit seeks recovery of capital improvements that are included in more than one category of Capital Improvement Lifespan (as set forth below), its Applicable Recovery period and term of commitment to provide black start service for such Black Start unit shall be the longest expected life of those new or additional capital improvements.

Capital Improvement Lifespan (years)	Applicable Recovery Period/Term of Commitment (years)	Levelized CRF
16-20	20	0.125
11-15	15	0.146
6-10	10	0.198
1-5	5	0.363

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 Tables above.

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: Paragraph 6, the Black Start Unit shall be committed to providing black start in accordance with Paragraph 5 of Schedule 6A and calculate its Fixed BSSC in accordance with the Base Formula rate.

Variable Black Start Service Cost (VBSSC)

$$\text{Variable Black Start Service Cost} = \text{Black Start Unit O\&M} * Y$$

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 "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"

For unit qualifying as Black Start Units on the basis of a demonstrated ability to operate at reduced levels when automatically disconnected from the grid (ALR), there are no variable costs associated with providing Black Start Service and the value for Variable BSSC shall be zero.

Training Cost

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

Fuel Storage Cost

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:

$$\begin{aligned} \text{Fuel Storage Costs} = & \\ & (\text{Minimum Tank Suction Level} + (\# \text{ of Run Hours Required} * \text{Fuel Burn Rate})) \\ & * (12 \text{ month forward strip} + \text{basis}) * \text{Bond Rate} \end{aligned}$$

Where Minimum Tank Suction Level is *“and shall apply where no direct current pumps are available for the black Start Unit”*.

Number of Run Hours are *“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 *“the average of forward prices for the fuel burned in the Black Start unit traded the first business day on or following May 1”*.

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

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

Z Factor

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

SRSTF Black Start Proposed Revenue Requirements Changes

Black Start: System Restoration Strategy Task Force (SRSTF)

The PJM System Restoration Strategy Task Force was created to analyze and evaluate PJM's System Restoration plan and utilization of Black Start generation during a System Restoration as directed by the Markets and Reliability Committee.⁸

The SRSTF reviewed the existing black start compensation methods contained in PJM's tariff on May 7, 2013⁹ and considered four different black start compensation proposals:¹⁰

- A. Modified Status Quo + Revised Incentives
- B. Proxy for Formula Replacement
- C. Cost Allocation
- D. Minimum Incentive

The Minimum Incentive (D) became the primary and the Proxy for Formula Replacement (B) became the secondary. Both proposals were forwarded to the Markets and Reliability Committee (MRC) and proposals failed a sector weighted vote at the February 27, 2014 meeting.¹¹

The SRSTF then considered several minor changes to Black Start unit compensation. These changes impact a small number of Black Start units and are seen more as "clean-up" or "equity" issues as opposed to any major changes to the method of compensation for Black Start units. The task force also looked at potential changes to cost allocation, but is not recommending any changes to the existing Black Start cost allocation methodology. The Minor Compensation Proposal was forward to the MRC and approved July 31, 2014¹² and submitted to FERC for approval

⁸ The System Restoration Strategy Senior Task force (SRSTF) charge:

Due to industry developments such as new environmental regulations, NERC CIP (Critical Infrastructure Protection) standards and increasing cost of Black Start generation, PJM foresees a potential future reliability issue with the current method of System Restoration Planning. This Task Force will examine the current System Restoration Planning process to determine its viability and efficiency moving forward and recommend any changes to the System Restoration strategy and associated procurement, cost allocation, and compensation methods, inclusive of back stop options to the MRC for approval. - <http://www.pjm.com/~media/committees-groups/task-forces/srstf/postings/charter.ashx>

⁹ <http://www.pjm.com/~media/committees-groups/task-forces/srstf/20130507/20130507-black-start-compensation.ashx>

¹⁰ <http://www.pjm.com/~media/committees-groups/task-forces/srstf/20131122/20131122-compensation-back-stop-matrix.ashx>

¹¹ <http://www.pjm.com/~media/committees-groups/committees/mrc/20140327/20140327-item-01-draft-20140227-meeting-minutes.ashx>

¹² <http://www.pjm.com/~media/committees-groups/committees/mrc/20140821/20140821-item-01-draft-minutes-mrc-20140731.ashx>

on September 15, 2014¹³. One of the changes included in the proposal extended the Schedule 6A review period from two years to five years to align with the RTO Wide Black Start RFP.

Main Proposal – Minimum Incentive Compensation Proposal

This proposal received 66 percent support from the SRSTF. The significant change in this proposal would be to change the incentive factor in the Black Start Base Formula Rate from 10 percent to the greater of 10 percent or \$25,000. The existing Capital Recovery Rate and NERC CIP Capital Recovery Rates would not change. Other more minor changes included in this proposal include:

- The Black Start Capacity MW amount would be based on the offered Black Start MW for energy only units and the ICAP for capacity units
- ALR units would be permitted to recover NERC Compliance costs as documented to the Independent Market Monitor
- Would allow compensation for fuel storage to include fuels other than oil
- Would provide for a five year PJM internal review of revenue formulas

Alternate Proposal – Proxy for Formula Replacement

This proposal received 63 percent support from the SRSTF. The significant change in this proposal would be to replace the Black Start Base Formula Rate and components with a Proxy formulation. This proxy was developed based on the average of the responses received from the RTO-wide and Incremental Request for Proposal (RFP) submittals. The Proxy rate would replace the Base Formula Rate, Variable Operating and Maintenance (VOM) Costs, Fuel Storage and Training Costs. The existing Capital Recovery Rate and NERC CIP Capital Recovery Rates would not change. The Proxy rates are shown in the table below:

Black Start Resource Size	Initial Capital Payment to add Black Start (from RFP Responses)	Additional Black Start Resource Capital Payment (From RFP Responses)	Annual Black Start Capital Payment (using 0.125 CRF)	Additional Resource Annual Black Start Capital Payment	Annual Black Start O&M Payment (from RFP Responses)	Annual Black Start Fuel Storage Payment (from RFP Responses)	Unit Total Annual Black Start Payment (including Training)
MW <= 10*	\$275,798	\$105,871	\$34,475	\$13,234	\$3,351	\$6,280	\$47,855
10 > MW <= 60	\$1,930,588	\$741,097	\$241,323	\$92,637	\$23,456	\$43,957	\$312,486
60 > MW <= 90	\$5,069,227	\$1,258,927	\$633,653	\$157,366	\$37,572	\$64,152	\$739,127
90 > MW <=300 Small Starting requirement	\$6,861,848	\$1,953,800	\$857,731	\$244,225	\$182,896	\$87,700	\$1,132,077
90 > MW <=300 Medium Starting Requirement	\$16,918,852	\$1,953,800	\$2,114,856	\$244,225	\$182,896	\$87,700	\$2,389,202
90 > MW <=300 Large Starting Requirement	\$24,552,399	\$1,953,800	\$3,069,050	\$244,225	\$182,896	\$87,700	\$3,343,395
* No Data from RFP Responses. Assumed 5/35 of 10 > MW <= 60 MW Values							

The proposal would also provide for a five year PJM internal review of this formulation.

Comparative Summary

The objective of both proposals is to provide more incentive for the existing Black Start resources (which are currently on the Base Formula Rate) to continue to provide this service. This provides for continuity and flexibility in Restoration Planning and provides more assurance of an adequate supply of Black Start generation to meet critical load needs.

¹³ <http://www.pjm.com/~media/documents/ferc/2014-filings/20140915-er14-2883-000.ashx>

Neither proposal changes the Capital Recovery Factors which are used for new capital investments for Black Start units as there was general agreement on the task force that the Capital Recovery Factors provides sufficient incentive to attract new Black Start resources.

Both proposals would increase the cost of Black Start Service in the RTO. The Proxy for Formula Replacement would increase costs more significantly than the Minimum Incentive proposal. Estimated cost impact for each proposal over existing rates is shown below:

Transmission Zone	Revenue Requirement 9/1/2011	Revenue Requirement 9/1/2012	Revenue Requirement 9/1/2013	Minimum Incentive	RTO & Incremental RFP Proxy Cost
AECO	\$587,375.76	\$612,749.80	\$659,039.18	\$849,126.54	\$2,210,244.00
AEP	\$641,304.41	\$1,065,072.31	\$713,841.68	\$1,100,196.98	\$1,955,964.00
APS	\$163,108.11	\$263,640.01	\$293,618.98	\$391,926.34	\$885,337.00
ATSI	\$110,933.66	\$170,352.21	\$121,530.86	\$160,482.60	\$624,972.00
BGE	\$3,258,715.57	\$8,220,357.01	\$5,212,388.17	\$5,299,327.26	\$6,894,242.76
COMED	\$3,607,130.48	\$5,175,988.79	\$4,394,846.18	\$4,558,736.61	\$5,233,355.84
DAY	\$166,374.93	\$245,123.31	\$259,735.15	\$436,122.86	\$1,061,523.00
DEOK		\$331,699.42	\$1,211,017.72	\$1,216,925.45	\$1,674,002.69
DOM			\$1,069,397.17	\$1,069,397.17	\$1,069,397.17
DPL	\$534,124.05	\$543,207.62	\$587,724.57	\$1,009,295.07	\$2,938,570.00
DUQ	\$40,729.08	\$53,404.09	\$61,788.81	\$61,788.81	\$61,788.81
EKPC			\$387,247.88	\$402,043.52	\$869,913.00
JCPL	\$541,191.23	\$328,467.96	\$608,508.56	\$626,403.28	\$1,726,848.68
METED	\$541,937.33	\$478,493.70	\$897,429.93	\$897,617.32	\$897,617.32
PECO	\$1,266,963.40	\$1,379,460.78	\$1,548,942.76	\$2,108,129.78	\$7,316,155.00
PENELEC	\$367,061.09	\$573,457.48	\$525,051.98	\$535,152.14	\$1,557,651.75
PEPCO	\$462,700.00	\$212,074.47	\$325,972.27	\$325,972.27	\$325,972.27
PPL	\$157,515.64	\$152,847.12	\$251,989.60	\$569,078.44	\$1,814,081.00
PSEG	\$3,858,641.94	\$2,673,261.66	\$1,867,588.19	\$2,806,728.73	\$3,533,143.00
PJM TOTAL	\$16,305,806.68	\$22,479,657.74	\$20,997,659.64	\$24,424,451.18	\$42,650,779.31

Note – Values in the table above applied the two proposals to the existing Black Start costs as September 1, 2013. These costs will vary in the future as some existing Black Start units retire and new Black Start units are selected through the RTO-wide Black Start RFP process.

Markets and Reliability Committee Actions

Both proposals failed a sector weighted vote at the Markets and Reliability Committee (MRC) meeting on February 27, 2014¹⁴. The SRSTF continued to work on abridged compensation proposal and forwarded the Minor Compensation Changes with Limited Fuel Storage to the MRC for approval. This proposal was endorsed in the July 31, 2014 MRC meeting¹⁵.

Minor Compensation Changes with Limited Fuel Storage Proposal

The SRSTF looked at several minor changes to Black Start unit compensation. The Minor Compensation Changes with Limited Fuel Storage Proposal impacts a small number of Black Start units and are seen more as “clean-up” or “equity” issues as opposed to any major changes to the method of compensation for Black Start units. The task force also looked at potential changes to cost allocation, but did not recommend any changes to the existing Black Start cost allocation methodology.

¹⁴ <http://www.pjm.com/~media/committees-groups/committees/mrc/20140327/20140327-item-01-draft-20140227-meeting-minutes.ashx>

¹⁵ <http://www.pjm.com/~media/committees-groups/committees/mrc/20140821/20140821-item-01-draft-minutes-mrc-20140731.ashx>

The Compensation proposal described below received 58 percent support at the SRSTF. No other compensation proposal received the required 50 percent approval at the SRSTF to move it forward to the MRC for consideration.

The changes include:

- Allowing Energy Only Black Start units to be compensated using the offered Black Start MW.
 - Justification: Currently Black Start units on the base formula rate are compensated based on ICAP values. There is no mechanism to compensate Energy Only Black Start units on the base formula rate for providing this service.
- Allow Automatic Load Rejection (ALR) units to recover NERC Compliance costs as documented to the IMM.
 - Justification: This would allow ALR units to recover NERC Compliance costs and be comparable with traditional Black Start units in the ability to recover these costs.
- Allow for fuel storage compensation for liquefied natural gas (LNG), propane and oil per the existing formula for fuel storage.
 - Justification: Currently only oil storage is specified in the tariff. This would allow units that use LNG or propane to comparably recover fuel storage costs associated with providing Black Start.
- In the case where Black Start units share a common fuel tank, only one Black Start unit will be eligible for recovery of Minimum Tank Suction Level (MTSL).
 - Justification: This is to close a loophole in the current fuel storage compensation which allows for multiple Black Start units using the same fuel tank to recover the fuel storage costs related to the minimum tank suction level.
- Provide for a five year PJM internal review of compensation formula.
 - Justification: This would align the formula review with the RTO-wide RFP process and reduce PJM staff administrative burden. Currently this review is performed every 2 years. Results of the review will be reviewed with PJM Stakeholders (either MRC or MC Webinar).

Conclusion

The SRSTF performed a thorough review of the current black start compensation in Schedule 6A of the PJM Open Access Transmission Tariff starting in February 2013. Only the minor compensation changes proposal was approved by the MRC in July 2014 and forwarded to the FERC for approval on September 15, 2014¹⁶. The FERC approved the minor compensation proposal on November 14, 2015.

¹⁶ <http://www.pjm.com/~media/documents/ferc/2014-filings/20140915-er14-2883-000.ashx>