RTO-Wide Five-Year Selection Process
Request for Proposal
for Black Start Service

PJM Interconnection
July 1, 2013
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1.0: **Purpose / Statement**

1.1. **Purpose**

PJM is initiating the first RTO-wide black start selection process, as part of recent revisions to PJM’s approach to Black Start Service and system restoration. Therefore, PJM is seeking bids for new black start capability in accordance with the Five-Year Black Start Selection Process as documented in [PJM Manual M14D](#), Generator Operational Requirements, Section 10.

Black Start Units must have the minimum capabilities listed below. These capabilities must be demonstrated in accordance with the criteria set forth in the PJM Tariff and Manuals and will remain in effect for the duration of the commitment to provide Black Start Service.

- A Black Start Unit must have the ability to start without an outside electrical supply.
- A Black Start Unit must be able to close its output circuit breaker to a dead (de-energized) bus within 180 minutes (or less based on the characteristics of the specific critical load) of a request from the Transmission Owner or PJM.
- A Black Start Unit must be capable of maintaining frequency and voltage under varying load.
- A Black Start Unit must be able to maintain rated output for a period of time identified by each Transmission Owner’s system restoration requirements (typically 16 hours).

Key strategy components from the recent PJM stakeholder group “System Restoration Strategy Task Force” included revised definitions for Black Start Units and critical load to be served by Black Start Units, thereby broadening the pool of potentially viable black start resources. PJM is requesting that all interested and eligible parties respond to this RFP. The purpose of the RFP is to investigate other black start options beyond what is currently being provided in order to optimize black start resources across the RTO, particularly in advance of the significant number of Black Start Units that are retiring due to EPA regulations by April 2015.

In order to be deemed feasible, designated potential Black Start Units must be physically located within the PJM RTO footprint (i.e. within one of PJM’s transmission zones). However, PJM internal transmission zone borders are not an exclusionary factor to be considered eligible for consideration. Therefore, a Black Start Unit in one zone may be considered to serve in the restoration of another zone or a Black Start Unit can be shared across more than one transmission zone. Black Start Units outside PJM RTO footprint would be considered only on an exception basis based on complexity of cranking path details. Within these geographic constraints, examples of acceptable responses include:

- Existing Black Start Capable Units not currently providing Black Start Service.
- Conversion of existing generation unit(s) to become black start capable
- New (or interconnection queue) generation under development or construction that can become black start capable.
• Existing industrial, manufacturing, or cogeneration facilities capable of converting to black start to support system restoration.

• Refurbishment of existing black start generators that otherwise would retire from Black Start and other services without the refurbishment.

Potential bidders should be aware that if accepted, the proposed Black Start Unit will have to be included in the NERC Compliance Registry as a Generation Owner and Generation Operator, and as such, will be required to comply with all applicable NERC Reliability Standards. It is the sole responsibility of the Black Start Unit owner to ensure that its proposed Black Start Unit meets all applicable NERC Reliability Standards as necessary to support the provision of Black Start Service, including those that may be applicable if the designated Black Start Unit is deemed a critical asset. PJM makes no representations or warranties regarding the ability of a Black Start Unit Owner to meet all applicable NERC Reliability Standards with regard to a specific proposed Black Start Unit upon acceptance of a submitted proposal.

See Section 7.0 “Black Start Generator Reference Guide for NERC Reliability Standards.

1.2. Black Start Service Availability Date

Offers should be for resources capable of providing Black Start Service by April 1, 2015. This includes completion of a successful black start test prior to providing Black Start Service. In addition, there is also time associated with updating of restoration plans (by Transmission Owners), so PJM would prefer to have black start resources available and providing Black Start Service well in advance of the April 1, 2015 milestone. In certain cases, due to the time required to perform unit modifications, PJM will also consider proposals for Black Start Service later than the 4/1/2015 milestone date depending on location and black start need.

1.3. Market Window

The market window for this RFP is from 7/1/2013 through 9/30/2013. RFP proposals are due to be submitted to PJM no later than September 30, 2013.

1.4. Existing Black Start Resources

Existing Black Start Service providers do not need to respond to this RFP as they are expected to provide continuing Black Start Service in accordance with the provisions of the PJM Tariff and applicable Manuals.

In the event that an existing Black Start Unit owner desires to terminate its existing Black Start Service commitment, it must submit a black start termination notice in accordance with the black start incremental RFP process outlined in PJM Tariff Schedule 6A.

1.5. Pre-Bid Webex Meeting

PJM will conduct a Pre-Bid Webex Meeting on Tuesday July 9, 2013 from 9:00 a.m. -12 noon EDT. The purpose of this webex meeting is to review the RFP document and address questions. PJM will provide
responses to questions asked during this Webex meeting and post these responses on the Black Start Services link on the PJM Website.

1.6. Notification of Intent to Bid

PJM is requesting that parties interested in submitting a proposal in response to this Request for Proposal provide a non-binding notification to PJM by email by August 30, 2013. The email notification should be sent to: BlackStart@pjm.com. The notification should indicate (at a minimum) the name and location of the proposed Black Start Unit and a confirmation of intent to provide a proposal by September 30, 2013.

2.0: Company Background

2.1. Statement

PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.

PJM’s role as a federally regulated RTO means that it acts independently and impartially in managing the regional transmission system and the wholesale electricity market. PJM ensures the reliability of the largest centrally dispatched grid in North America.

PJM’s members, totaling more than 800, include power generators, transmission owners, electricity distributors, power marketers and large consumers. The company is headquartered in Valley Forge, Pa.

PJM’s Operations

PJM’s staff monitors the high-voltage transmission grid 24 hours a day, seven days a week. PJM keeps the electricity supply and demand in balance by telling power producers how much energy should be generated and by adjusting import and export transactions.

In managing the grid, the company dispatches about 183,604 megawatts (MW) of generating capacity over 62,556 miles of transmission lines. More than 61 million people live in the PJM region.

PJM’s experts study hundreds of “what if” scenarios and prepare to deal with virtually any event. Each variable that might affect supply and demand for electricity is carefully considered – from extreme weather conditions, emergency situations and equipment failures to the more easily anticipated cycles of hours, days, weeks and seasons.

PJM exercises a broader reliability role than that of a local electric utility. PJM system operators conduct dispatch operations and monitor the status of the grid over a wide area, using an enormous amount of telemetered data from nearly 74,000 points on the grid. This gives PJM a big-picture view of regional conditions and reliability issues, including those in neighboring systems.

PJM’s Market

The Company coordinates the continuous buying, selling and delivery of wholesale electricity through robust,
open and competitive spot markets. In operating the markets, PJM balances the needs of suppliers, wholesale customers and other market participants and continuously monitors market behavior.

PJM’s wholesale electricity market is similar to a stock exchange. It establishes a market price for electricity by matching supply with demand. Online Tools make trading easy for members/customers by enabling them to submit bids and offers and providing them with continuous real-time data.

Market participants can follow market fluctuations as they happen and make informed decisions rapidly, responding to high prices and bringing supply resources to the region when demand is high.

PJM has administered more than $103 billion in energy and energy-service trades since the regional markets opened in 1997.

**PJM’s Planning**
PJM manages a sophisticated regional planning process for generation and transmission expansion to ensure the continued reliability of the electric system.

PJM is responsible for maintaining the integrity of the regional power grid and for managing changes and additions to the grid to accommodate new generating plants, substations and transmission lines. In addition, PJM analyzes and forecasts the future electricity needs of the region. Its planning process ensures that the growth of the electric system takes place efficiently, in an orderly fashion, and that reliability is maintained. PJM also develops innovative programs, such as demand-response initiatives and efforts to support renewable energy, to help expand supply options and keep prices competitive.

More than 70 nations have sent delegates to PJM to learn about its market model and its operation of the electric grid. PJM has cooperative agreements with several other large international grid operators – Electricité de France, Tokyo Electric Power Co. and North China Grid Co.

Founded in 1927, PJM was the world's first continuing power pool. Today, it operates the world's largest centrally dispatched power grid.

### 3.0: General Terms

By submitting a proposal to this RFP you are agreeing to be bound by the rates, terms and conditions of service as set forth in PJM’s Open Access Transmission Tariff, (“Tariff”), the Amended and Restated Operating Agreement of PJM Interconnection, L.L.C. (“Operating Agreement”), and/or all other applicable PJM Manuals or other governing agreements (collectively, the “Governing Agreements”).

Acceptance of RFP proposals by PJM will be in the form of a notification letter. There will be no separate agreement for Black Start Service between the Black Start Unit Owner and PJM since all the terms and conditions are covered by the Governing Agreements referenced above.
PJM explicitly states that any discrepancies between this RFP document and the Governing Agreements shall be resolved in favor of those Governing Agreements.

### 3.1. Offer in Effect

A proposal may not be modified, withdrawn or canceled by the respondent between 10/1/2013 and 4/1/2014 as defined in the RFP Timeline, and respondent so agrees in submitting the proposal.

### 3.2. Acceptance of Proposal

PJM reserves the right to reject any and all submitted proposals, and any portion of a specific proposal, as well as the right to waive any informality or irregularity in any proposal received by PJM. PJM also reserves the right to award an agreement to a respondent based on factors other than price. PJM assumes no obligation under this RFP, and is not bound to procure goods or services from any respondent to this RFP. PJM assumes no obligation to provide a reason for rejection of a respondent's proposal. PJM reserves the right to amend or withdraw this RFP at any time. Respondents assume the risk that PJM may reject Proposals for any reason, may reject all Proposals, may make no award, and may withdraw the RFP without incurring any liability.

### 3.3. Retention of Respondent Material

PJM reserves the right to retain all proposals, including proprietary documentation regardless of which response is selected.

### 3.4. Confidential Matters - PJM Data

All data and information gathered by the respondent and its agents, including this RFP shall be treated by the respondent and its agents as confidential. The respondent and its agents shall not disclose or communicate the aforementioned matters to a third party, or use them in advertising, publicity, propaganda, and/or in another job or jobs, unless written consent is obtained from PJM.

### 4.0: Proposal Guidelines

#### 4.1. Notification of Intent to Bid

PJM is requesting that parties interested in submitting a proposal in response to this Request for Proposal provide a non-binding notification to PJM by email by August 30, 2013. The email notification should be sent to: BlackStart@pjm.com. The notification should indicate (at a minimum) the name and location of the proposed Black Start Unit and a confirmation of intent to provide a proposal by September 30, 2013.

#### 4.2. RFP Proposal Submission

RFP Proposals shall be submitted to PJM by September 30, 2013. The RFP Timeline (Section 4.5) outlines other relevant dates related to RFP Proposal submission and evaluation.
Delivery of Proposals

Proposals shall be submitted electronically using PJM's SmartSource electronic tool. Respondents to Notification of Intent to Bid will receive additional instructions on access to PJM's SmartSource electronic tool.

Each proposal will consist of answers to ALL questions as indicated in Section 5 “RFP Proposals”. Most questions are indicated as MANDATORY and the system will not allow you to submit your response until ALL mandatory questions are answered.

PJM’s preference is for delivery of proposals via PJM’s SmartSource electronic tool referenced above; however, PJM will also accept emailed proposals with advance notification provided by the bidder at the time of Notification of Intent to Bid.

4.3. Evaluation and Acceptance of Proposals

PJM will work with its Transmission Owners (“TOs”) to evaluate proposals and select viable black start solutions based on the basis of Critical Load requirements, location, cost and operational considerations (amount, start time, etc.).

Existing Black Start Units with a remaining term of commitment tied to a cost recovery rate would automatically be selected for the length of the recovery period. Existing Black Start Units on bilateral contracts with TOs would be automatically selected for use in those zones.

PJM will work in collaboration with the TOs to select black start solutions for each zone based on the following criteria:

Required criteria shall include:

1. Meet critical load requirements in accordance with Manual M36 Attachment A.
2. Minimum of two Black Start Units allocated to each zone with a critical load requirement.
3. Ability to supply critical loads within targeted timeframes (i.e. required nuclear loads within 4 hours).
4. Technical Feasibility:
   a. Maintain voltages along cranking path within limits.
   b. Maintain transmission flows along cranking path within thermal limits.
   c. Maintain dynamic stability along cranking path.

Preferred options considered:

1. Operational Considerations:
   a. Length of cranking path
   b. Geographic diversity
   c. Redundancy
2. Electrical proximity to critical loads
3. Timing requirements to serve critical load.
4. Performance history of black start resource
5. Diversity and firmness of fuel source
6. Complexity considerations (i.e. amount of switching to establish cranking path)
7. Black Start costs
8. Timing of black start resource availability

**Opportunity for cross zonal coordination**

PJM will work with the TOs to identify areas to identify cross-zonal opportunities as detailed in PJM Manual M36.

### 4.4. PJM Contact Information

ALL communication regarding this RFP should be sent electronically to only the contact email address below.

**PJM Contact for all RFP communications:**
[BlackStart@pjm.com](mailto:BlackStart@pjm.com)

### 4.5. RFP Timeline

<table>
<thead>
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<tbody>
<tr>
<td>PJM posts RFP</td>
<td>7/1/2013</td>
</tr>
<tr>
<td>PJM conducts Pre-Bid Webex Meeting</td>
<td>7/9/2013</td>
</tr>
<tr>
<td>RFP interested parties submit “Notification of Intent to Bid” to PJM</td>
<td>8/30/2013</td>
</tr>
<tr>
<td>Bidders submit RFP proposals to PJM</td>
<td>9/30/2013</td>
</tr>
<tr>
<td>PJM evaluation and award of viable Black Start solutions</td>
<td>10/1/2013 – 4/1/2014</td>
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5.0:  RFP Proposals

RFP Proposals at a minimum will include responses to all questions in Section 5.0. For questions that do not apply please indicate “Not Applicable”.

5.1. Purpose and Scope

5.1.1. Facility

5.1.1.1. Name of facility:

5.1.1.2. Indicate owner of facility:

5.1.1.3. Geographic details: Indicate the physical location of the generator including: city/town, county, state, latitude and longitude

5.1.1.4. Indicate age of facility:

5.1.2. Black Start Unit

5.1.2.1. Indicate the type of generation (ie. CT, Combined Cycle, Hydro, Diesel, etc.)

5.1.2.2. Indicate the manufacturer (ie. GE, Siemens, etc.), and the model/unit type (ie. 7FA, etc.) for each of the Black Start unit(s) proposed. For configurations involving a diesel cranking the Black Start Unit, include this information for the diesel and the Black Start Unit. See Section 6.5 “Black Start Unit Configurations”.

5.1.2.3. Indicate the MW capability of the intended Black Start Unit and the full plant (if applicable). Indicate whether MW capability is in terms of ICAP, maximum dependable capability or nameplate MW rating.

5.1.2.4. Indicate the Black Start Unit fuel type(s).

5.1.2.5. For a plant with multiple units identify which units are being proposed as black start resources.

5.1.3. Interconnection

5.1.3.1. Identify the station name and voltage level of the interconnecting station, and Transmission Owner zone.

5.1.4. Necessary Upgrade(s) for BS Capability
5.1.4.1. Briefly describe the modifications that are required to convert the facility to black start. If adding a diesel, please indicate the manufacturer, model, and rating of the unit as well as which unit it will be cranking.

5.2. Generator Operational Details

5.2.1. One-Line Diagram

5.2.1.1. Provide a one-line diagram for the black start facility. The one-line diagram should include the proposed RFP response unit(s), all associated auxiliary loads, and transmission and distribution level equipment. Formal drawings are not required. Legible hand-written mark-ups of existing diagrams are sufficient. Visio diagrams with adequate detail are also sufficient.

5.2.2. Start-Up Sequence Description

5.2.2.1. If known, list the steps that the plant would follow immediately following a full or partial black out to get the Black Start Unit started, close to a dead bus, and any anticipated GO/TO coordination for load pickup from the Black Start Units minimum load to economic maximum load. The description should include clear references to the one-line diagram.

5.2.3. MVAR Capability

5.2.3.1. Include a MVAR capability curve (MW, Min. MVAR, Max. MVAR), and a table including up to 8 MW points (if possible) with associated minimum and maximum MVAR points. Include the maximum sustained leading and lagging (MVAR absorption) capability, and any anticipated operational restrictions to the MVAR capability curve.

5.2.4. Start-Up Time

5.2.4.1. Indicate the time to close to a dead bus, the time to ramp to minimum load, and the time to ramp to economic max load.

5.2.5. Duration

5.2.5.1. Indicate the amount of time the Black Start Unit can run on its own fuel supply. Please note that PJM rules typically require at least 16 hours of continuous output using on-site fuel supplies for oil fired units.

5.2.6. Fuel Supply / Onsite Storage

5.2.6.1. Indicate primary and secondary (if available) fuel type(s). If a primary or secondary fuel is natural gas, indicate gas transportation and supply arrangements. Indicate if these arrangements are firm or non-firm as well as any alternate pipeline feeds. Indicate any arrangements for the unit to secure additional fuel.
5.2.6.2. Indicate the on-site fuel storage by type, volume, and number of hours of output assuming sustained economic maximum output of the black start unit. If there is a difference between the current volume in storage tanks and the maximum storage capability, please indicate the details.

5.2.7. Applicable minimum load, environmental, and black start testing restrictions

5.2.7.1. Does the unit require an external stabilizing load? If so, provide the size of external stabilizing loads required. These become requirements of the Transmission Owner.

5.2.7.2. Minimum output restrictions at various stages of the startup sequence.

5.2.7.3. Maximum time at minimum load. Preference is placed on those units that are able to ‘idle’ for the longest time serving only house load with no net output to the transmission grid because this reduces the complexity of GO/TO load pickup coordination. Plants that have multiple units should consider the potential of cranking auxiliaries of other units as additional ‘house load’.

5.2.7.4. What is the unit’s minimum load under the current emissions permit?

5.2.7.5. What is the lowest load the unit can operate in a stable steady state configuration if there were no emission permit restrictions?

5.2.7.6. Is it possible to get an emissions permit modification to allow the unit to operate at the lowest possible load for restoration and black start testing?

5.2.7.7. Include the ramp rate and any variations in ramp rates that may apply.

5.2.7.8. Can the unit perform an annual Black start Test where it operates isolated from the grid in isochronous mode carrying only station auxiliary load for at least thirty minutes?

5.2.7.9. For Combined Cycle units – can the Combustion turbines be operated in simple cycle mode?

5.2.7.9.1. If not, does the unit have steam bypass capability?

5.2.7.10. What is the minimum and maximum load the combustion turbine can operate in Steam bypass mode? Indicate any time limitations for operating in either mode.

5.2.7.11. Is the station’s auxiliary load greater than the combustion turbine’s lowest possible minimum load? If not greater, then provide MW difference.

5.2.8. Evaluation of Generator Existing Condition
5.2.8.1. Is the existing unit black start capable in accordance with the requirements stated in PJM Open Access Transmission Tariff - Schedule 6A Black Start Service and PJM Manual 12 – Balancing Operations.

5.2.8.2. If not, what modifications are required?

5.2.8.3. For existing black start capable units that would otherwise retire, identify any equipment overhauls or refurbishment work that would be required for continued reliable Black Start Service.

5.3. Project Schedule

5.3.1. Estimated In-Service Date
Indicate the estimated in-service date as a black start capable unit. For the purpose of this RFP proposal, assume a project start date of 4/1/2014. Dates will be adjusted based on actual award date (ie. if black start solution is awarded in late 2013, estimated in-service date would be adjusted accordingly).

5.3.2. Project Schedule
Detail the project milestones in tabular and/or graphical form. Include the milestone description and projected start/finish dates.

5.3.3. Procurement Plan
Detail any work that is planned with vendors.

5.4. Total Estimated Capital and Annual Black Start Service Costs

5.4.1. Total Estimated Upgrade Capital Cost
In addition to any details provided, include a tabular summary of the estimated upgrade capital costs.

Costs in RFP Proposal are to consist of an estimate of projected actual costs, including contingency as appropriate. Cost recovery is based on actual costs. Actual project costs with supporting documentation will be submitted to Independent Market Monitor (IMM) for review and final approval upon completion of project in accordance with PJM Tariff Schedule 6A. All capital cost estimates including contingencies will be evaluated by the Independent Market Monitor and PJM for consistency with the rates and terms set forth in PJM Tariff Schedule 6A. Proposals with cost estimates deemed by PJM to be inconsistent with those rates and/or terms may be rejected.

See RFP Section 6.1.1 for additional details on how to estimate a Black Start Unit's Annual Black Start Revenue Requirements.

5.4.2. Estimated Annual Fixed Black Start Service Cost
Proposals shall include an indication of the desired cost recovery method for the unit’s Fixed Black Start Service Costs (Fixed BSSC) (Capital). Only one of the following rates should be selected:
1. Proposed Black Start Units electing to not document Black Start Capital Costs or not requiring additional Black Start Capital Costs should select the Base Formula Rate.

2. Proposed Black Start Units that choose to recover documented Black Start Capital Costs (including capital costs for NERC Standard Compliance) should select the Capital Cost Recovery Rate (CRF). For units that select the Capital Cost Recovery Rate, the Levelized CRF and Black Start Service Term of Commitment are based on the Age of the Black Start unit as of the In-Service Date.

3. Proposed Black Start Units electing to recover only the Black Start Capital Costs associated with compliance with applicable mandatory NERC CIP Reliability Standards should select the Capital Cost Recovery Rate - NERC-CIP Specific Recovery. For units that select the Capital Cost Recovery Rate – NERC-CIP Specific Recovery the Levelized CRF and Black Start Service Term of Commitment are based on the Age of the Black Start Unit as of the In-Service Date or the Capital Improvement Lifespan.

4. Proposed Black Start Units electing to recover Black Start Capital Costs outside the Tariff guidelines will need FERC to approve the desired cost recovery. Black Start Units requesting cost recovery in accordance with a FERC-approved rate are required to file, and receive approval of, their cost recovery method with FERC upon acceptance for Black Start Service.

5.4.3. Estimated Black Start Service Annual O&M Cost
Proposals shall include the unit’s projected annual Variable Black Start Service Costs (Variable BSSC) (Black Start O&M including the cost to maintain compliance with NERC Reliability Standards) to provide the Service. Provide a tabular summary of any estimated annual O&M costs to provide Black Start Service from the unit(s).

5.4.4. Estimated Black Start Service Annual Fuel Storage Cost
Proposal for units that use oil fuel shall include an estimate of the annual Fuel Storage Costs. Estimates should be based on a 16 hour run period and a Bond Rate of 4.39 percent.
5.5. **Black Start Unit Owner Contact Information**

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Company</th>
<th>Phone Number</th>
<th>Email Address</th>
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<tbody>
<tr>
<td>Primary Contact</td>
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<td>Alternate Contact</td>
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6.0: **Black Start Business Rules Summary**

6.1. **Black Start Service Compensation**

6.1.1. **Black Start Service Annual Revenue Requirements**

Selected Unit’s Black Start Annual Revenue Requirements will be calculated based upon actual costs submitted to and approved by the PJM Independent Market Monitor and/or PJM.

Details of the PJM Black Start Annual Revenue Rates available are contained in the PJM Tariff - Schedule 6A Black Start Service Section 18. Black Start Annual Revenue Requirements are calculated using the following equation:

\[
(\text{Fixed BSSC}) + (\text{Variable BSSC}) + (\text{Training Costs}) + (\text{Fuel Storage Costs}) \times (1 + Z)
\]

6.1.2. **Black Start Service Annual Revenue Components**

Only one of the following rates should be selected for the unit’s Fixed Black Start Service Costs (Fixed BSSC) (Capital):

1. Proposed Black Start Units electing to not document Black Start Capital Costs or not requiring additional Black Start Capital Costs should select the Base Formula Rate.

2. Proposed Black Start Units that choose to recover documented Black Start Capital Costs (including capital costs for NERC Standard Compliance) should select the Capital Cost Recovery Rate (CRF). For units that select the Capital Cost Recovery Rate, the Levelized CRF and Black Start Service Term of Commitment are based on the Age of the Black Start unit as of the In-Service Date.

3. Proposed Black Start Units electing to recover only the Black Start Capital Costs associated with compliance with applicable mandatory NERC CIP Reliability Standards should select the Capital
Cost Recovery Rate – NERC-CIP Specific Recovery. For units that select the Capital Cost Recovery Rate – NERC-CIP Specific Recovery the Levelized CRF and Black Start Service Term of Commitment are based on the Age of the Black Start Unit as of the In-Service Date or the Capital Improvement Lifespan.

4. Proposed Black Start Units electing to recover Black Start Capital Costs outside the Tariff guidelines will need FERC to approve the desired cost recovery. Unit’s requesting cost recovery in accordance with a FERC-approved rate are required to file, and receive approval of, their cost recovery method with FERC upon acceptance for Black Start Service.

The unit’s projected annual Variable Black Start Service Costs (Variable BSSC) should include Black Start O&M and the cost to maintain compliance with NERC Reliability Standards necessary to provide the Service.

Black Start Unit’s will be compensated for Training Costs at the level of $3,750 per year per plant.

Units that use Oil Fuel shall estimate the annual Fuel Storage Costs based on a 16 hour run period and a Bond Rate of 4.39 percent.

Units using the Base Formula Rate for Fixed Black Start Service Costs will be able to use an Incentive Factor (Z) of 10. For all other Fixed Black Start Service Rates the incentive Factor (Z) will be 0 percent.

Additional guidance on the calculation of a Unit’s Annual Black Start Service Revenue Requirements may be found in the Black Start Cost Submittal Forms in the link http://pjm.com/markets-and-operations/ancillary-services/black-start-service.aspx

Please select the tab associated with the Fixed Black Start Service Cost Rate chosen.

6.1.3. Upgrade Estimated Capital Cost Actual Cost Determination

6.1.3.1. Evidence of upgrade Cost

If selected, submittal of data supporting actual cost to the PJM Independent Market Monitor (IMM) in accordance with Paragraph 17 of Schedule 6A of the Tariff is required.

6.1.3.2. Timing of review and final determination of actual costs:

A selected Black Start Unit owner can submit supporting data to the IMM on a monthly basis as incurred or as a single submittal at the completion of the work. The IMM will provide feedback within a reasonable time after submittal. Payment of actual upgrade costs for recovery will begin after the Black Start Unit’s in-service date.

6.1.3.3. Supporting Documentation

Supporting data will include but not be limited to the following:
1) actual invoices from third parties;
2) internal invoices for work performed on the project;
3) payroll report of all hours of the Black Start Unit owner employees that have worked on the project including benefits;
4) invoices for overhead, project development cost and project development fee documented by internal invoice from the Black Start Unit owner.

The Black Start Unit owner and the IMM will agree on the total capital cost to be reimbursed after the Black start Unit’s in-service date.

Payments to begin the month following the agreed upon final capital cost between the Black Start Unit owner and IMM.

6.1.3.4. Cost evidence disputes

If the IMM and the Black Start Unit owner are unable to come to an agreement on the project upgrade costs to be reimbursed to the Black Start Unit owner, then Black Start Unit owner will notify PJM that it disagrees with the IMM’s determination of costs and submit the costs that Black Start Unit owner believes to be accurate. PJM will review such costs submitted by Black Start Unit owner, and determine the upgrade costs to be reimbursed to Black Start Unit owner within 90 days after the Black Start Unit owner submits such costs. If the Black Start Unit owner and PJM are unable to reach agreement on the costs to be reimbursed, then the Black Start Unit owner may file its own proposed costs for reimbursement with the Federal Energy Regulatory Commission for approval.

6.1.3.5. Changes to revenue requirement

If a Black Start Unit owner incurs additional costs after the initial in-service date to maintain the Black Start Unit’s black start-capability, the Black Start Unit owner can submit data evidencing those costs to the IMM pursuant to Paragraph 17 of Schedule 6A and adjust its revenue requirement going forward to recover such costs, along with an applicable extension to the black start commitment term. However, the existing revenue requirement must be effective at least for 12 months prior to making such change. To paraphrase Paragraph 17 of Schedule 6A: “...no change to a Black Start Service revenue requirement shall become effective until the existing revenue requirement has been effective for at least 12 months.”

6.1.4. Compensation for Energy Output

6.1.4.1. Testing

The Black Start Unit will be tested annually and must have a successful annual test on record within the preceding 13 months in order to receive Black Start Service revenues in accordance with paragraphs.
12 and 14 of Schedule 6A of the Tariff. Compensation for the energy output delivered by the Black Start Unit during annual testing will be provided at the higher of the Black Start Unit’s cost-capped offer or real-time LMP in accordance with paragraph 13 of Schedule 6A of the Tariff and Manual 28 Section 5.2.7. Typically, Black Start Units close to a dead bus during the test and do not provide energy to the grid. Test compensation for such a unit consists of the unit’s start cost plus one hour of no-load.

6.1.4.2. Emergency black start dispatch

In the event of emergency black start dispatch, a Black Start Unit owner shall be compensated for the Black Start Unit’s energy output at the unit’s cost-capped offer, until such time that PJM is able to reestablish the energy markets and calculate a LMP.

6.1.4.3. Cost-capped offer

The unit’s Cost based offer will be developed in accordance with the guidelines provided in Manual 15 “Cost Development Guidelines”.

6.1.5. Service after Initial Commitment Term & Termination of Service

6.1.5.1. Service after Initial Commitment Term

After the Black Start Unit has provided Black Start Service for the initial term of its applicable commitment period (as prescribed by its selected method of revenue recovery) after the in-service date, then Black Start Unit owner may, at its option, elect the service commitment term set forth in Paragraph 5 of Schedule 6A of the Tariff and will receive the compensation set forth in the Tariff for units establishing a service commitment under such Paragraph 5.

As set forth in Paragraph 18 of Schedule 6A of the Tariff, for purposes of such compensation for a Black Start Unit’s with a term of commitment under Paragraph 5, “Black Start Unit Capacity” means the entire installed capacity of the current delivery year of Black Start Unit

6.1.5.2. Termination by Black Start Unit

Pursuant to Paragraph 6 of Schedule 6A of the Tariff, a Black Start Unit owner may terminate provision of Black Start Service with one year advance notice to PJM, provided that it will forgo any existing entitlement to future black start revenues.

6.1.5.3. Termination by PJM

Pursuant to of Schedule 6A of the Tariff, PJM may terminate provision of Black Start Service with one year advance notice to Black Start Unit owner (before or after actual in-service of the Black Start Unit), but the Black Start Unit owner will be reimbursed for any amount of unrecovered Fixed BSSC (as defined in the Tariff) for a period not to exceed five years.
If PJM terminates the contract before in-service date, the Black Start Unit owner will cease work on the project and submit all costs expended up to the date of termination to PJM [for reimbursement in accordance with the Tariff]. Such costs will include but not be limited to payment for equipment completed (both received and completed but not shipped), cancellation payments and non-refundable advance payment.

If PJM cancels or terminates any portion of its Tariff and such cancellation or termination would affect the existing rights of the Black Start Unit owner to receive compensation for Black Start Service, then PJM shall nonetheless be required to reimburse the Black Start Unit owner for any amount of unrecovered Black Start Service revenues to which the Black Start Unit owner has an existing entitlement.

### 6.2. Testing

#### 6.2.1. Annual Test

To receive Black Start Service revenues, the Black Start Unit must have a successful annual test on record with PJM within the preceding 13 months in accordance with Schedule 6A of the Tariff.

#### 6.2.2. Failed Annual Test

If the Black Start Unit fails the annual test, it may be re-tested within a ten-day period without financial penalty. If the Black Start Unit does not successfully re-test within that ten-day period, monthly Black Start Service revenues will be forfeited by the Black Start Unit owner from the time of the first unsuccessful test until such time as the unit passes an annual test in accordance with Schedule 6A of the Tariff.

### 6.3. Black Start Unit /Transmission Owner Coordination

Black Start Unit and TO will coordinate the modification to the electrical protection system (transmission system and Black Start Unit Facility) to protect the Black Start Unit and grid during black start startup and operation. Each party will be responsible for the cost of any upgrades to its portion of the system (i.e., Black Start Unit owner will be responsible for upgrades to the Black Start Unit, TO will be responsible for upgrades to the Transmission System).

The Black Start Unit owner and TO will develop the communication protocol between TO and Black Start Unit to meet black start dispatch requirements.

The Black Start Unit owner and TO will develop the TO System Restoration Plan to include the Black Start Unit operational limitations.

The Black Start Unit owner and PJM will develop procedures for both the Black Start Unit acceptance test and annual test.

### 6.4. In-Service Date Delays
The Black Start Unit owner will make every reasonable effort to make the estimated in-service date indicated in their RFP proposal. Should the project be delayed, The Black Start Unit owner will immediately notify PJM of the delay and make every effort to minimize the impact. The Black Start Unit owner will not be required to pay any penalty for any such delays.

6.5. **Black Start Unit Configurations**

Note that configurations where the cranking unit offers into PJM’s Energy Markets and cranks another unit that offers into the Energy Markets are unacceptable. In that case if the cranking diesel offers into PJM’s Energy Markets, then the cranking diesel is the Black Start Unit and the cranked unit is critical load.

7.0: **Black Start Generator Reference Guide**

7.1. **Index of Documents and Manuals**

**PJM Open Access Transmission Tariff Schedule 6A – Black Start Service -existing version and proposed future revisions**
Provides the PJM Tariff requirements for black start generators.

**Manual M-01, Rev 23 – Control Center and Data Exchange Requirements**
Describes the control center and telecommunication requirements between PJM and its members.

**Manual M-10, Rev 27 – Pre-Scheduling Operations**
Describes the Pre-scheduling process and information required from generation resources.

**Manual M-12, Rev 27 – Balancing Operations - existing version and proposed future revisions**
Describes the real time operations process.

**Manual M-14D, Rev 23 – Generator Operational Requirements**
Provides a general overview of generator operational requirements.

**Manual M-27, Rev 80 – Open Access Transmission Tariff Accounting**
Describes the accounting for transmission services within the PJM Open Access Transmission Tariff.

**Manual M-36, Rev 19 – System Restoration**
Describes how PJM and the PJM Members are expected to respond to system disturbance conditions or system blackout.

**NERC Reliability Standards**

7.2. **PJM Open Access Transmission Tariff Schedule 6A – Black Start Service**
Existing version

Proposed future revisions to Schedule 6A

http://pjm.com/~media/committees-groups/task-forces/srstf/postings/tariff-language.ashx

- Black Start Service Provisions
- Performance Standards and Outage Restrictions
- Testing Requirements
- Revenue Requirements and Recovery Rates
- Credits
- Charges

7.3. Manual M-01, Rev 23 – Control Center and Data Exchange Requirements

http://pjm.com/~media/documents/manuals/m01.ashx

- Member Control Center Requirements
  - Data and voice communications
  - Staffing
  - Facility requirements
  - Periodic testing of telecommunications

7.4. Manual M-10, Rev 27 – Pre-Scheduling Operations

http://pjm.com/~media/documents/manuals/m10.ashx

Planned Outage Restrictions for Black Start Units

7.5. Manual M-12, Rev 27 – Balancing Operations

Existing version

http://pjm.com/~media/documents/manuals/m12.ashx

Proposed future revisions to M12

http://pjm.com/~media/committees-groups/task-forces/srstf/20130315/20130315-srstf-draft-manual-language.ashx

- Black Start Service
- Definitions
- Minimum Critical Unit Requirements
- Product Description
  - Generator Owner’s Commitment
  - Performance Standards
  - Testing
  - Training Standards and Records
  - Non-performance
  - Termination of Black Start Service
- Attachment C: PJM Black Start Report Forms for:
- Black Start Tests Generation and Transmission
- Automatic Load Rejection Tests
- Formulaic Cost Data
- Actual Cost Data

7.6. **Manual M-14D, Rev 23 – Generator Operational Requirements**

[http://pjm.com/~/media/documents/manuals/m14d.ashx](http://pjm.com/~/media/documents/manuals/m14d.ashx)

- Black Start Generation Procurement
  - Black Start Selection Process
  - Black Start Incremental RFP Process
  - Generator reactive capability testing requirements for Black Start Units.


[http://pjm.com/~/media/documents/manuals/m27.ashx](http://pjm.com/~/media/documents/manuals/m27.ashx)

- Black Start Service Accounting
- Black Start Service Credits and Charges

7.8. **Manual M-36, Rev 19 – System Restoration**

[http://pjm.com/~/media/documents/manuals/m36.ashx](http://pjm.com/~/media/documents/manuals/m36.ashx)

- Generation
  - Communications
  - Governor & Frequency Control
  - Cranking Paths
  - Cranking Power
- Transmission
  - Voltage Regulation and Control
  - Energization Guidelines
- System Restoration Plan Guidelines
- Cross Zonal Coordination
- Minimum Critical Black Start Requirement

7.9. **NERC Reliability Standards**

[http://www.nerc.com/pa/Stand/Pages/default.aspx](http://www.nerc.com/pa/Stand/Pages/default.aspx)