



Special OC/MIC: Fuel Requirements for Black Start Resources Final Report

September 21, 2022

Issue Creation

The [Problem Statement](#) and [Issue Charge](#) for Fuel Requirements for Black Start Resources was brought forward by PJM and was endorsed at the August 23, 2018 MRC. This issue had a dual-committee assignment: Operating Committee (OC) for fuel assurance requirement, testing requirements, transition process, and Markets Implementation Committee (MIC) for compensation issues. All posted materials are on the [Issues Tracking Page](#).

Issue Summary

The purpose of this issue was to develop fuel assurance business rules to mitigate the impact of non-fuel assured Black Start resources being unavailable during a restoration event due to fuel unavailability. Special sessions of the OC/MIC started in January 2019 and continued through early 2020. The effort was put on hiatus in March 2020, and resumed in February 2022. The stakeholder process produced two packages for consideration for the MIC and OC, and one package for recommendation to the MRC. New fuel assurance business rules would be included in next RTO wide RFP, which will be issued in April 2023 for new black start resources to be available by Spring 2025.

Key work since resuming in 2022:

- February 1, 2022 - Review of the status of work prior to the hiatus as well as the analysis completed during the hiatus.
- March 10, 2022 - Review of the analysis completed during the hiatus continued. An updated hydro proposal was presented. CBIR process was re-initiated.
- April 1, 2022 - PJM provided updates on its financial analysis presentation from the March 10 meeting and presented the updated PJM package. Additional solution options and packages were discussed. An update was provided on the hydro proposal, which was then integrated into the matrix and to continue being worked through CBIR.
- April 21, 2022 – Stakeholders discussed updates to solution packages, and reviewed draft questions for a first round of polling on packages.
- May 12, 2022 – Stakeholders reviewed results from the first round of polling on packages that was open April 26 through May 3, and discussed additional updates to solution packages.
- June 1, 2022 - Stakeholder discussed updates to solution packages, and reviewed draft questions for a second round of polling on packages.
- June 24, 2022 – Stakeholders reviewed results from the second round of polling on packages that was open June 2 through June 13, and will discussed additional updates to solution packages.



- July 14, 2022 – Stakeholders reviewed and winnowed solution packages down to Package B (IMM) and Package H (PJM / Brookfield / DCOPC). Stakeholders determined that with two packages remaining, a third round of polling was not needed.
- August 10-11, 2022 – Package B (IMM) and Package H (PJM / Brookfield / DCOPC) were brought to the MIC and OC for first reads. The procedure for a consolidated offline vote for this unique dual committee assignment was also reviewed with stakeholders.
- August 25, 2022 – Stakeholders reviewed packages and discussed clarifying questions between the first and second reads at the MIC and OC.
- September 7-8, 2022 - Package B (IMM) and Package H (PJM / Brookfield / DCOPC) were brought to the MIC and OC for second reads. After the OC stakeholders were asked to vote on packages via a consolidated offline vote, opened from September 8 through September 13.
- September 16, 2022 – Stakeholders reviewed vote results and had a page turn of governing document and manual language changes associated with the recommended proposal ahead of the first read at the September 21 MRC.

Consensus-Based Issue Resolution Process

Number of Meetings

- Phase 1 (January 2019 – March 2020): 13 special sessions
- Phase 2 Hiatus (March 2020 – January 2022): periodic updates to parent committees
- Phase 3 (March 2020 – January 2022): 10 special sessions

Non-Binding Poll Results (Phase 3):

- [Round 1 \(April 2022\)](#)
- [Round 2 \(June 2022\)](#)
- Stakeholders determined not to move forward with a third round of polling after the number of packages was winnowed from three to two after the second round of polling.

Materials presented ahead of endorsement vote at September MIC/OC:

- [Package B \(IMM\) Summary](#)
- [Package H \(PJM / Brookfield / DCOPC\) Summary](#)
- [Matrix](#)

Consolidated MIC/OC Vote Results:

Question	Yes Count	No Count	Abstentions	Tally	Pass/Fail
Can you support Package B (IMM)?	19	187	0	9%	FAIL
Can you support Package H (PJM/Brookfield/DCOPC)?	126	39	41	76%	PASS
Do you prefer Package B over Status Quo?	20	164	22	11%	FAIL
Do you prefer Package H over Status Quo?	126	80	0	61%	PASS



1. Recommended Proposal

Package H, sponsored by PJM, Brookfield Renewables, and the DC Office of the People’s Counsel, is the recommended proposal after receiving a simple majority vote from the MIC and OC.

Package Highlights

1. Level of Fuel Assurance
 - Each transmission owner zone is required to be fuel assured in accordance with the following:
 - Minimum criteria: One fuel-assured black start site per zone
 - Additional black start solutions beyond minimum fuel-assurance criteria: Based on reliability criteria that identifies high-impact black start sites

2. Key Fuel Assurance Enhancements:
 - 16 hour run hour requirement
 - Fuel assurance requirements by primary fuel type
 - Testing and verification requirements
 - Implementation through RTO wide RFP process / reliability backstop
 - Compensation for black start resources on Base Formula Rate:
 - For fuel assured resources selected via RFP Z factor = 20%
 - For all other resources, Z factor = 10% (Status Quo)
 - BS monthly revenues foregone where onsite fuel, water level, stored energy, etc. is not maintained for run hour requirement

Package Details

	Thermal, Pumped Storage Hydro, Energy Storage, and DER / DR Resources		Run of River Hydro, Intermittent Resources, and Hybrid Resources	
	Non-Fuel Assured (Status Quo)	Fuel Assured	Non-Fuel Assured (Status Quo)	Fuel Assured
Revenue Black Start MW	ICAP	ICAP	ICAP	Monthly MW amount based on 90% confidence level (calculated by PJM every five years)
Restoration Plan MW	ICAP	ICAP	ICAP * % of year unit can provide ICAP for the 16 hours	Annual MW amount based on 90% confidence level (calculated by PJM every five years)
Run Hour Requirement	Thermal: 16 Hours PSH / ESR: Determined by TO Restoration Plan	16 Hours at ICAP	Determined by TO Restoration Plan	16 Hours at 90% Confidence MW
X Factor	Thermal: 0.02 PSH / ESR: 0.01	0.02	0.01	0.02 (Same as CT)
Z Factor	10%	20%	10%	20%
Fuel Assurance Penalties	None	Monthly revenues forgone in months where onsite fuel, water level, stored energy, etc. is not maintained for run hour requirements	None	No penalties because Revenue Calculation MW is determined by PJM calculation of confidence level



Projected Cost Impact

Minimum One Fuel-Assured Black Start Site Per Zone

The majority of TO zones currently meet the minimum criteria and there is no current projected capital cost impact to meet this minimum.

Additional Black Start Z Factor Incentive ¹	20% Z Factor (Single Site Per Zone Cost Range)	20% Z Factor (All Sites)
Total Cost	\$174,000 - \$272,000	\$436,000
Cost Per MWh	\$0.0002 - \$0.0003 / MWh	\$0.0006 / MWh

Additional Black Start Solutions Beyond Minimum Criteria

Mitigation of 8 high-impact BS sites in 5 TO zones is estimated to increase the RTO BS Annual Revenue Requirement by \$28,175,000 per year (\$0.036 per MWh based on RTO load); see Appendix for projected zonal cost increases on \$ / MWh basis). ^{2, 3}

Note 1: Z Factor increase only impacts Black Start units on the Base Formula Rate and that currently meet fuel assurance requirements
 Note 2: For reference, the 2021 RTO BS Annual Revenue Requirement is \$68,230,718 per year (\$0.087 / MWh)
 Note 3: See Appendix slides for cost estimate assumptions and for projected cost increases on \$ / MWh basis

Appendix I: Supplemental Documents

[Committee Page](#)
[Issue Tracking](#)

Appendix II: PJM Participation

Facilitator: Janell Fabiano

Secretary: Natalie Tacka Furtaw

Advocates: David Schweizer, Glen Boyle

Subject Matter Experts: Dan Bennett, Tom Hauske, Ray Lee, Vince Stefanowicz, Darrell Frogg, Brian Fitzpatrick, Dave Kimmel, David Hauske

PJM Legal: Steve Pincus

Appendix III: Stakeholder Participation

Last Name	First Name	Company	Sector
Anders	David	PJM Interconnection	None
Barker	Jason	Constellation	None
Barmer	Mike	Dominion Virginia Power (EDC)	Generation Owner
Beblo	Olivia	Duquesne Light Company	Transmission Owner
Benckek	James	American Transmission Systems, Inc.	Transmission Owner
Bennett	Daniel	PJM Interconnection	None
Bernabeu	Emanuel	PJM Interconnection	None
Berton	Tyler	AEP Appalachian Transmission Company, Inc.	None
Bowring	Joe	Monitoring Analytics	None



Boyle	Glen	PJM Interconnection	None
Brodbeck	John	EDP Renewables North America LLC	None
Bryson	Mike	PJM Interconnection	None
Bryson	Michael	PJM Interconnection	None
Callen	Zachary	Illinois Commerce Commission	None
Cao	Roger	PJM Interconnection	None
Carmean	Gregory	Organization of PJM States, Inc.	None
Carroll	Rebecca	PJM Interconnection	None
Cerchio	Gerard	Monitoring Analytics	None
Cerchio	Jerry	Monitoring Analytics	None
Chen	Yang	PJM Interconnection	None
Christopher	Mahila	Public Utilities Commission of Ohio	None
Corash	Richard	PSEG Energy Resources and Trade LLC	None
Croop	Danielle	PJM Interconnection	None
Currier	Jeff	Dominion Virginia Power	Transmission Owner
Curtis	Kenneth	Drilling Info, Inc.	None
D'Antonio	Phil	PJM Interconnection	None
D'Antonio	Philip	PJM Interconnection	None
Daugherty	Danielle	ReliabilityFirst	None
Davis	Jim	Dominion Virginia Power	Transmission Owner
DiDonato	Anthony	PJM Interconnection	None
Downs	Jere	PJM Interconnection	None
Dugan	Chuck	East Kentucky Power Cooperative, Inc.	Transmission Owner
Elkins	Rachel	FirstEnergy Corporation	Transmission Owner
Fabiano	Janell	PJM Interconnection	None
Filomena	Guy	Customized Energy Solutions, Ltd.	None
Fitzpatrick	Brian	PJM Interconnection	None
Foladare	Kenneth	Geenex Solar LLC	Other Supplier
Forcum	David	Duke Energy Ohio, Inc.	None
Ford	Adrien	Old Dominion Electric Cooperative	Electric Distributor
Franks	Christine	PJM Interconnection	None
Frogg	Darrell	PJM Interconnection	None
Gates	Terry	American Electric Power	Transmission Owner
Gilani	Rehan	ConEdison Energy, Inc.	Other Supplier
Glazer	Craig	PJM Interconnection	None
Gorman	Bradley	FirstEnergy Corporation	Transmission Owner
Graham	Sophie	Adapt2 Solutions	None
Guntle	Vince	American PowerNet Management, L.P.	Transmission Owner
Hauske	Thomas	PJM Interconnection	None
Hauske	David	PJM Interconnection	None
Heinle	Erik	Office of the Peoples Counsel for DC	End-Use Customer
Heisey	Brad	Wolf Hills Energy, LLC	Generation Owner
Helm	Gary	PJM Interconnection	None
Helms	Joe	Tyr Energy, LLC	Other Supplier
Hicks	Colleen	PJM Interconnection	None
Hoatson	Tom	West Deptford Energy, LLC	Transmission Owner
Horger	Tim	PJM Interconnection	None
Horning	Lynn Marie	Customized Energy Solutions, Ltd.	None



Hornberg	Lynn	Customized Energy Solutions, Ltd.	None
Hull	Gerit	American Municipal Power, Inc.	Electric Distributor
Hyzinski	Tom	GT Power Group, LLC	None
Johnson	Carl	Customized Energy Solutions, Ltd.	None
Johnston	David	Indiana Utility Regulatory Commission	None
Keenan	Matthew	Elwood Energy, LLC	Generation Owner
Kelly	Stephen	Brookfield Renewable Trading and Marketing LP (BSMH)	Other Supplier
Kelly	Ross	PJM Interconnection	None
Kim	Sung	PJM Interconnection	None
Kimmel	David	PJM Interconnection	None
Kogut	George	New York Power Authority	None
Kogut	George	New York Power Authority	None
Lake	David	American Transmission Systems, Inc.	Other Supplier
Lee	Ray	PJM Interconnection	None
Lee	Ray	PJM Interconnection	None
Lynn	Brian	PJM Interconnection	None
Mabry	David	McNees Wallace & Nurick LLC	None
Mariam	Yohannes	Office of the Peoples Counsel for DC	End-Use Customer
McGlynn	Paul	PJM Interconnection	None
McLaughlin	Jeffrey	PJM Interconnection	None
McNeil	Justin	Office of the Attorney General, Kentucky	End-Use Customer
Midgley	Sharon	Exelon Business Services Company, LLC	Generation Owner
Mooney	Jeffrey	FirstEnergy Corporation	Transmission Owner
Moye	Bob	Tyr Energy, LLC	Other Supplier
Mroz	David	PJM Interconnection	Generation Owner
Mulhern	Molly	PJM Interconnection	None
Nichols	Mark	Dominion Virginia Power	Transmission Owner
Norton	Chris	American Municipal Power, Inc.	Electric Distributor
Okenfuss	James	Savion, LLC	None
Olinger	Robert	Keystone Projects	None
Ondayko	Brock	AEP Energy Partners, Inc. (AEP Gen Resources)	None
Patel	Keyur	PJM Interconnection	Electric Distributor
Phillips	Darlene	PJM Interconnection	None
Pilong	Christopher	PJM Interconnection	None
Pincus	Steven	PJM Interconnection	None
Poulos	Greg	CAPS	None
Price	Ruth	Delaware Division of the Public Advocate	None
Proconiar	Jason	Buckeye Power, Inc.	Electric Distributor
Pungaliya	Rajat	Pine Gate Mid-Atlantic, LLC	Other Supplier
Rodriguez	Tomás	Organization of PJM States, Inc.	None
Rogers	Aaron	East Kentucky Power Cooperative, Inc.	Transmission Owner
Rutledge	Craig	Appalachian Power Company (APCO Dedicated)	None
Sasser	Jonathan	Customized Energy Solutions, Ltd.	None
Schmitt	David	New Jersey Board Of Public Utilities	None
Schreim	Morris	Maryland Public Service Commission	Other Supplier
Schroeder	Connie	Dominion Virginia Power	Transmission Owner
Schweizer	David	PJM Interconnection	None



Samble	Kelly	FirstEnergy Corporation	Transmission Owner
Sloan	Ben	OPSI	None
Sorrels	Jim	AEP Appalachian Transmission Company, Inc.	End-Use Customer
Sorrels	James	AEP Appalachian Transmission Company, Inc.	End-Use Customer
Sotkiewicz	Paul	E-Cubed Policy Associates	None
Stefanowicz	Vincent	PJM Interconnection	None
Stefanowicz	Vince	PJM Interconnection	None
Stemetzki	Michael	PJM Interconnection	None
Strella	Lauren	PJM Interconnection	None
Wahba			
Sturgeon	John	Duke Energy Business Services LLC	Transmission Owner
Sweeney	Rory	GT Power Group, LLC	None
Tacka	Natalie	PJM Interconnection	None
Thomas	Jack	PJM Interconnection	None
Tribulski	Jennifer	PJM Interconnection	None
Walters	Jodi	Jersey Green Energy LLC	Transmission Owner
Waweru	James	PJM Interconnection	End-Use Customer
Whitehead	Jeffrey	GT Power Group	None
Yoder	Michael	RTO Insider	None