

August 7, 2023

The Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

Re: *PJM Interconnection, L.L.C., Docket No. ER23-1874-000*
Response to July 7, 2023 Deficiency Notice

Dear Secretary Bose:

Pursuant to the Deficiency Notice of the Federal Energy Regulatory Commission (“Commission” or “FERC”) Office of Energy Market Regulation issued on July 7, 2023, in the above-referenced proceeding¹ seeking additional information concerning PJM Interconnection, L.L.C.’s (“PJM”) May 12, 2023 filing in the above referenced docket,² PJM hereby submits the following responses to the questions presented.

As directed in the Deficiency Notice, PJM includes an eTariff record with this filing, with an effective date of July 11, 2023, i.e., the same effective date that PJM

¹ *PJM Interconnection, L.L.C., Deficiency Letter, Black Start Service Revisions to Enhance Fuel Assurance, Docket No. ER23-1874-000 (July 7, 2023) (“Deficiency Notice”).*

² *PJM Interconnection, L.L.C., Black Start Service Revisions to Enhance Fuel Assurance, Docket No. ER23-1874-000, (May 12, 2023) (“May 12 Filing”).*

requested in the May 12 Filing,³ to help remove any doubt regarding PJM's ongoing Black Start Request for Proposals process.⁴

I. RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

1. *Please explain the criteria PJM will use to determine if Distributed Energy Resources qualify as Fuel Assured Black Start Units and if there are any limitations on Distributed Energy Resource participation outside of section 2 of Schedule 6A.*

PJM Response:

As Mr. Bennett explains in his affidavit attached to the May 12 Filing, “(u)nder the adopted approach, Fuel Assured Black Start Units can be thermal, hydro, energy storage, intermittent, hybrid, or distributed energy/demand resources with on-site generator resources, if they can meet PJM’s Black Start Service requirements in the Tariff and manuals.”⁵ PJM’s fuel assured black start service proposal in the May 12 Filing does not have separate criteria for distributed energy resources. Rather, distributed energy resources interconnected to distribution facilities may qualify as Black Start Units under PJM Tariff, Schedule 6A under the criteria that applies to all Black Start Units. For example, when they are needed during a widespread outage, Black Start Units are brought online without outside power from the system. Once a Black Start Unit is running, it can be used to help bring up “critical load” generation—which is well situated

³ See, e.g., *Duke Energy Carolinas, LLC*, 160 FERC ¶ 61,122, at P 24 (2017) (“The Commission has previously allowed applicants that have responded to deficiency letters to retain the original requested effective date”); *PJM Interconnection, L.L.C.*, 164 FERC ¶ 61,170, at P 40 n.131 (2018) (Although submitting response to a deficiency letter resets the clock “it does not determine when an entity’s filing can be made effective, as the Commission has the ability to allow an effective date earlier [than] after sixty days’ notice.” (citing and quoting, *Central Maine Power Co.*, 128 FERC ¶ 61,143, at P 89 (2009))).

⁴ To be clear, PJM will not require compliance with any proposed Tariff change pending in this proceeding unless and until it is accepted by the Commission.

⁵ May 12 Filing, Attachment B (Affidavit of Daniel Bennett on Behalf of PJM Interconnection, L.L.C.) ¶ 12 (“Initial Bennett Aff.”).

to start the process of establishing generation and load “islands.” This process relies on developing cranking paths from the Black Start Unit to the critical load, but also may entail other steps, such as bringing on load blocks and other generation, as needed to stabilize the cranking path and the island.⁶

At the distribution level, PJM works with the Transmission Owner to provide a cranking path to critical load to satisfy the need for resources without outside power sources to come on-line and help start critical loads, and to ensure all other technical and procedural requirements applicable to Black Start Units apply to distributed energy resources. In the same way, the requirements applicable to Fuel Assured Black Start Units will apply to distributed energy resources under PJM’s May 12 Filing proposal.

2. *PJM asserts that it adopts the proposed 90% confidence value for intermittent and hybrid resources because it corresponds with the historical Equivalent Availability Factor for combustion turbine generators in the PJM Region. PJM also states that the “90% confidence MW value is calculated using Black Start Unit historical data to determine the hourly MW value the resource can provide each day in each month for 16 hours. The hourly MW value is then iterated until the confidence level of the unit providing the MW value on a monthly basis for 16 hours is 90.”*
 - a. *Please describe in detail the process PJM will use to calculate the 90% confidence interval for intermittent and hybrid resources and how that process ensures that the resource can operate for 16 consecutive hours.*

PJM Response:

In his Supplemental Affidavit submitted with this filing, PJM’s Senior Consultant for Performance Compliance, Mr. Thomas Hauske, describes in detail PJM’s process for “calculate[ing] the Fuel Assured Black Start megawatt (“MW”) capability of intermittent,

⁶ Initial Bennett Aff. ¶ 19.

run of river hydro, and hybrid resources using historical data and a 90% confidence level.”⁷ Mr. Hauske explains that the process “analyzes whether a given MW output level satisfies the 90% confidence standard,” and “is therefore iterative.”⁸ In particular, “if a given MW level fails the standard, PJM inserts a lower MW value and runs the test again.”⁹ Conversely, “PJM will also rerun the test if the result is above 90%, to assess if the resource may qualify for a higher MW level of fuel assurance.”¹⁰

Mr. Hauske details the following steps in the process:

- i) Assume an initial hourly MW value;
- ii) Input the actual or estimated MWh produced by the resource for each hour of each day in a given year;
- iii) Sum for each day the number of hours in that day in which the MWhs produced in the hour equal or exceed the target MW level assumed in step (i);
- iv) Assign a value of 1 to each day for which there are 16 or more hours identified in step (iii), and assign a value of 0 to each day for which there are fewer than 16 hours identified in step (iii);
- v) For the given year, calculate the simple average of the 1 and 0 values determined for each day of that year in step (iv), and use the resulting decimal value as the confidence level for that year;
- vi) Repeat steps (ii) through (v) for each other year in the analysis, using the same target hourly MW value as was assumed for the first year in step (i);
- vii) Average the confidence levels found for each year of the analysis, using an Equivalent Load Carrying Capability (“ELCC”) weather weighted average, which accounts for the likelihood that the weather experienced in each historic year of the analysis will recur;
- viii) Set the average resulting from step (vii) as the calculated confidence interval of the subject resource; and
- ix) Increase or decrease the MW value initially assumed in step (i), and repeat the analysis as often as necessary, to determine the input

⁷ Supplemental Affidavit of Thomas Hauske on Behalf of PJM Interconnection, L.L.C. (Attachment A) ¶ 3 (“Hauske Supp. Aff.”).

⁸ *Id.*

⁹ *Id.*

¹⁰ *Id.*

MW level that is the lowest necessary to result in a confidence interval of at least 90%.¹¹

Mr. Hauske also clarifies that “the test is assessing whether the resource is at least 90% likely to produce the target level of MWs in 16 of the 24 hours of [each] day,” and thus “the 16 hours used in step (iv) *do not* need to be consecutive.”¹² Mr. Hauske explains that “PJM does not expect a Black Start resource to operate at full load continuously for 16 hours during a restoration event,” but rather “relies on Black Start Units to be capable of conducting multiple attempts to start one or more critical loads.”¹³ Consequently, “the actual output of a Black Start Unit is expected to vary from minimum load to some fraction of full load as critical loads are started.”¹⁴ Indeed, to avoid Black Start Units tripping offline as a result of potentially large load swings (especially at the beginning of the restoration process), Black Start Units “are typically operated with some headroom from the unit’s full load capability.”¹⁵ To be clear, PJM’s proposed requirement “that Fuel-Assured Black Start Units are capable of operating at full load for 16 hours” is needed to “ensure[] that the Black Start Unit has sufficient fuel or capability for PJM to complete the restoration process.”¹⁶ Given the exigencies of the Black Start restoration process, that operation will occur within “a compressed period,” represented by 24 hours in this testing, just not 16 consecutive hours.¹⁷

¹¹ *Id.* ¶ 4.

¹² *Id.* ¶ 5 (emphasis in original).

¹³ *Id.*

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*

As Mr. Hauske notes, the described process uses an annual iteration at a 90% confidence level to determine the MW capabilities that PJM will use during the Black Start RFP process when selecting intermittent, run of river, or hybrid resource as Fuel Assured Black Start Units to meet Minimum Critical Black Start Requirements.¹⁸ He explains that “PJM will use the same process, except iterating for monthly values, to calculate the Black Start Unit Capacity of such resources after they are selected and are providing Black Start Service, as provided in the proposed revision to the Black Start Unit Capacity definition in Tariff, Schedule 6A, section 18.”¹⁹ For this purpose, “PJM will follow the same steps” Mr. Hauske outlines in Paragraph 4 of his affidavit, “but will perform the analysis separately for each calendar month of the year, using the resource’s actual or estimated MWhs for that calendar month.”²⁰ In particular, PJM will focus that process on a monthly iteration by:

- using the resource data for the subject month;
- calculating the simple average for the days in the month;
- using the ELCC weather weighted average to weight the monthly (rather than full year) values; and
- iterating the monthly values to determine the value that meets a 90% confidence standard based on the monthly data.²¹

Mr. Hauske explains why the annual and monthly iterations are appropriate for their separate purposes. “[T]he annual iteration” he notes, “provides a conservative value appropriate for use for planning purposes when selecting a portfolio of resources that has a high degree of assurance of meeting Minimum Critical Black Start Requirements.”²²

¹⁸ *Id.* ¶ 7.

¹⁹ *Id.*

²⁰ *Id.*

²¹ *Id.*

²² *Id.*

Distinctly, “the monthly iteration provides values that reflect the monthly service levels an individual resource has a high degree of assurance of meeting as a Fuel Assured Black Start Unit.”²³ This approach is reasonable, given that “[d]uring an actual black start event, an intermittent, run-of-river, or hybrid resource may be able (based on its history) to provide 16 hours of service at a significantly higher level in some months than in other months”²⁴ which warrants recognition of these differences in the proposed revision to the Black Start Unit Capacity definition.

- b. Please provide an example of how PJM will impute a 90% confidence values for an intermittent resource and a hybrid resource participating as Fuel Assured Black Start Units.*

PJM Response:

As explained by Mr. Hauske, PJM has prepared a simplified Microsoft Excel spreadsheet to illustrate the 90% confidence testing process Mr. Hauske describes in his Supplemental Affidavit, as applied to a hypothetical run-of-river hydro resource.²⁵ Mr. Hauske provides two copies of that spreadsheet with his Supplemental Affidavit.²⁶ In Exhibit 2, Mr. Hauske sets the initial target MW level of Fuel Assured Black Start Service at 20 MW, and finds that it does not meet the 90% standard.²⁷ In Exhibit 3, Mr. Hauske reduces the assumed Fuel Assured Black Start Service level to 15 MWs, and

²³ *Id.*

²⁴ *Id.*

²⁵ *Id.* As Mr. Hauske notes, “The calculation process illustrated in [the spreadsheet] would be the same for an intermittent or hybrid resource—only the input data would change.”

²⁶ Hauske Supp. Aff. ¶ 7, Exhibits 2 and 3. The simplified example assumes each “year” is 15 days, and uses simulated historical MW data from 2012 through 2020.

²⁷ Hauske Supp. Aff. ¶ 7.

finds that the resource passes the 90% test at that level.²⁸ Exhibits 2 and 3 show how the individual day calculations are performed to determine if the resource can provide the defined number of MWs for 16 hours in each day; they also illustrate how the ELCC weighting is applied to each year's confidence value result.²⁹

3. *Please explain how the 90% confidence value for intermittent and hybrid resources compares to the Black Start requirement in Attachment A of Manual 36 (Minimum Critical Black Start Requirement), and explain whether or not the 90% confidence value is less stringent than the Manual 36 requirement.*

PJM Response:

PJM assumes that when the Deficiency Notice asks “whether or not the 90% confidence value is less stringent than the Manual 36 requirement,”³⁰ it is referring to the 110% factor used in Manual 36, Attachment A to set the Minimum Critical Black Start Requirement.³¹ As Mr. Bennett explains in his Supplemental Affidavit, “the 90% confidence level is neither more stringent nor less stringent than the 110% factor because the two percentages are being used in two different calculations that serve two different purposes.”³² In particular, the 110% factor in Manual 36 “is being used to help set the target MW level of Black Start Service needed in the aggregate for a Transmission Owner Zone,” whereas “the 90% confidence interval is being used to set the MW level of

²⁸ Hauske Supp. Aff. ¶ 7. As Mr. Hauske notes, both spreadsheets are active. Recipients of this filing can iterate the MW level shown in red on the first tab of either copy to see the results of changing the assumed service level.

²⁹ Hauske Supp. Aff. ¶ 7. Individual year results can be seen by choosing the respective workbook tab.

³⁰ Deficiency Notice at Request No. 3.

³¹ See System Operations Division, *PJM Manual 36: System Restoration*, PJM Interconnection, L.L.C., Attachment A, section A.1.2 (June 15, 2023), <https://pjm.com/-/media/documents/manuals/m36.ashx>.

³² Supplemental Affidavit of Daniel Bennett on Behalf of PJM Interconnection, L.L.C. (Attachment B) ¶ 3 (“Bennett Supp. Aff.”).

Fuel Assured Black Start Service that an individual intermittent, hybrid, or run-of-river hydro resource can be counted upon to provide.”³³

After discussing the Manual 36 provisions related to the 110% factor and referencing the detailed explanations of the 90% confidence interval in both the May 12 Filing and Mr. Hauske’s Supplemental Affidavit, Mr Bennett summarizes that “the 110% factor in Manual 36 provides a prudent increase in the MW level of Black Start Service PJM should seek to obtain in aggregate for a zone,” while the 90% figure proposed here “is a confidence interval for identifying the MW level of fuel assured service an individual intermittent or run-of-river resource can provide with a high degree of certainty.”³⁴ As Mr. Bennett notes, “that confidence interval cannot be set higher than 100%,” and if that interval were raised above 90%, that increase “would not greatly increase the statistical certainty, but it would reduce the MW level that PJM could then treat as fuel assured from any individual intermittent or run-of-river resource.”³⁵

4. *PJM proposes to require a natural gas unit without dual fuel capability seeking to be a fuel assured Black Start Resource to demonstrate that either (1) it can operate independently on two or more interstate pipelines, or (2) is directly connected to a natural gas gathering system.*
 - a. *Please explain whether a unit located behind a local distribution company (LDC) city-gate would be able to satisfy the requirements to be a Fuel Assured Unit and,*

³³ Bennett Supp. Aff. ¶ 4.

³⁴ Bennett Supp. Aff. ¶ 7.

³⁵ *Id.* To the extent the Deficiency Notice is addressing only the five percent forced outage assumption used in Manual 36 as a partial explanation for the 110% factor, PJM notes that the overall factor used in the manual is a 10% increase; that the overall outage rate for gas-fired generators (for outages of all types) is more on the order of 10%, see May 12 Filing at 21; and that Manual 36 also uses other considerations to add conservatism to the matching of zonal black start needs with available resources, see *id.* ¶ 5 (citing and quoting Manual 36) (“PJM will make this determination based not only on Critical Load requirements, but also on “available Black Start resources;” the “minimum number of Black Start resources allocated to a zone;” and the “possible cross zonal coordination opportunities.”).

if so, how?

PJM Response:

As Mr. Bennett explains, generating units located behind a local distribution company (“LDC”) city-gate may satisfy the requirements to be a Fuel Assured Black Start Unit by being a dual fueled unit with onsite fuel storage.³⁶

Indeed, when Mr. Bennett “reviewed the existing PJM Region Black Start Units that are located behind an LDC city-gate,” he “found that 65 percent of them are dual-fueled with some manner of on-site fuel oil storage.”³⁷ Consequently, “[t]o the extent these units have at least 16 hours of on-site storage, they already may qualify as Fuel Assured Black Start Units.”³⁸

5. *Please explain why it is not unduly discriminatory to require natural gas resources to either operate independently on two or more interstate pipelines or be directly connected to a natural gas gathering system to meet the eligibility requirements to be a Fuel Assured Unit, even if a natural gas resource is available 90% of the time (thereby meeting the eligibility requirements for non-hydro intermittent and hybrid units).*

PJM Response:

As the courts have instructed, “differences in rates are justified where they are predicated upon factual differences between customers,”³⁹ and there is no undue discrimination when “a rational, non-discriminatory basis exist[s] for the difference in situation, [such as] operational constraint[s].”⁴⁰ Here, as Mr. Bennett explains, “there are

³⁶ Bennett Supp. Aff. ¶ 10.

³⁷ *Id.*

³⁸ *Id.*

³⁹ *Cities of Newark v. FERC*, 763 F.2d 533, 546 (3d Cir. 1985).

⁴⁰ *Complex Consol. Edison Co. v. FERC*, 165 F.3d 992 (D.C. Cir. 1999).

good reasons” for using different methods for different resource types to demonstrate satisfaction of the common requirement of providing 16 hours of fuel-assured Black Start Service, “based on inherent differences in those resource types.”⁴¹ In particular, while intermittent and hybrid resources are significantly dependent on uncontrollable, nearly random factors (which are primarily weather driven), natural gas resources, particularly those connected to more than one pipeline, have more options such as purchasing firm service, making arrangements to access gas storage services and other strategies each of which is more controllable than being subject to the vagaries of the weather. Thus, natural gas resources’ availability can be improved based on economic decisions and can be mitigated with other strategies not equally available to renewable resources.

Mr. Bennett makes this clear: “because gas generation resources *can* make investments and arrangements to meet the objective of 16 hours of fuel assurance, and intermittent and run-of-river resources essentially *cannot* do so, the proposed differing approaches to fuel assurance qualifications are reasonable.”⁴² PJM’s proposed fuel assurance standards for gas generators are a natural application of the fact that “gas fueled generators have a long-standing practice of securing firm fuel delivery options, or investing in on-site fuel storage, in order to enhance and ensure resource performance,” making it “reasonable to require reliance on those options to demonstrate fuel assurance.”⁴³

For background, Mr. Bennett notes that “[g]iven the reliance of natural gas-fired generators on pipeline deliveries, PJM approached its black start fuel assurance initiative

⁴¹ Bennett Supp. Aff. ¶ 12.

⁴² Bennett Supp. Aff. ¶ 17.

⁴³ *Id.*

in part on an assumed scenario of a black start event combined with the loss of an interstate pipeline.”⁴⁴ As he points out, “PJM’s proposed qualification criteria for a fuel-assured gas-fired generator directly address this vulnerability, requiring either: (i) a second interstate pipeline connection; or (ii) a gas gathering system connection, which avoids reliance on an interstate pipeline; or (iii) dual-fuel capability with on-site fuel-oil storage.”⁴⁵

Intermittent resources are in a very different position than gas-fueled generators, which required PJM to develop a very different approach to allow such resources to qualify—at some level—to offer fuel-assured black start service. As Mr. Bennett elaborates, “intermittent resources cannot control the timing or intensity of their fuel source (i.e., solar radiance or wind speed) and run-of-river hydro resources may be able to control their fuel source (i.e., usable water levels) only within a narrow range.”⁴⁶ Their variable output “poses an inherent challenge to service as a Fuel-Assured Black Start Unit.”⁴⁷

To address these fundamental resource differences, PJM developed the iterative approach proposed in this proceeding. Rather than ask “what arrangements and investments are needed to ensure that the resource’s intended output (such as [a gas-fueled generator’s Installed Capacity]) can be provided with a high degree of certainty for 16 hours,” PJM asked, for variable-output resources, “what level of output, based on operating history, can the resource provide with a high degree of certainty for 16

⁴⁴ *Id.* ¶ 13.

⁴⁵ *Id.*

⁴⁶ *Id.* ¶ 15.

⁴⁷ *Id.*

hours.”⁴⁸ Importantly, as Mr. Bennett points out, “[d]eriving that output level from historic data requires a statistical confidence assumption; PJM’s proposed 90% confidence interval meets that need.”⁴⁹ And, “[n]o one has suggested that gas resources should have their fuel assurance level set by statistical analysis of their resource operating history; the 90% confidence interval only arises in that sort of analysis.”⁵⁰

Accordingly, it is not unduly discriminatory to require natural gas resources to either operate independently on two or more interstate pipelines or be directly connected to a natural gas gathering system to meet the Fuel Assured Black Start Unit eligibility requirements.

II. CORRESPONDENCE AND COMMUNICATIONS

Correspondence and communications regarding this filing should be sent to the following individuals:

Steven R. Pincus
Managing Counsel, Sr. Director
PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403
(610) 666-4370
steven.pincus@pjm.com

Paul M. Flynn
Wright & Talisman, P.C.
1200 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 393-1200
flynn@wrightlaw.com

Craig Glazer
Vice President – Federal Government Policy
PJM Interconnection, L.L.C. 1200 G
Street, N.W. Suite 600
Washington, DC 20005
(202) 423-4743
craig.glazer@pjm.com

⁴⁸ *Id.* ¶ 16.

⁴⁹ *Id.*

⁵⁰ *Id.* ¶ 17.

III. DOCUMENTS ENCLOSED

This filing consists of the following:

1. This transmittal letter;
2. Supplemental Affidavit of Thomas Hauske on Behalf of PJM Interconnection, L.L.C. (Attachment A);
3. Hauske Exhibit 1;
4. Hauske Exhibit 2;
5. Hauske Exhibit 3; and
6. Supplemental Affidavit of Daniel Bennett on Behalf of PJM Interconnection, L.L.C. (Attachment B).

IV. SERVICE

PJM has served a copy of this filing on all PJM Members and on all state utility regulatory commissions in the PJM Region by posting this filing electronically. In accordance with the Commission's regulations,⁵¹ PJM will post a copy of this filing to the FERC filings section of its internet site, located at the following link: <https://www.pjm.com/library/filing-order> with a specific link to the newly-filed document, and will send an e-mail on the same date as this filing to all PJM Members and all state utility regulatory commissions in the PJM Region⁵² alerting them that this filing has been made by PJM and is available by following such link. If the document is not immediately available by using the referenced link, the document will be available through the referenced link within 24 hours of the filing. Also, a copy of this filing will be available on FERC's eLibrary website located at the following link:

⁵¹ See 18 C.F.R §§ 35.2(e) and 385.2010(f)(3).

⁵² PJM already maintains, updates, and regularly uses e-mail lists for all PJM Members and affected state commissions.

<http://www.ferc.gov/docs-filing/elibrary.asp> in accordance with the Commission's regulations and Order No. 714. PJM also served this on each person designated on the official service list maintained by the Commission for this proceeding.

V. CONCLUSION

PJM respectfully requests that the Commission accept this response to the Commission's Deficiency Notice and accept the May 12 Filing, effective July 11, 2023.

Respectfully submitted,

Steven R. Pincus
Managing Counsel, Sr. Director
PJM Interconnection, L.L.C.
2750 Monroe Blvd.
Audubon, PA 19403
(610) 666-4370
steven.pincus@pjm.com

/s/ Paul M. Flynn
Paul M. Flynn
Wright & Talisman, P.C.
1200 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 393-1200
flynn@wrightlaw.com

Craig Glazer
Vice President–Federal Gov't Policy
PJM Interconnection, L.L.C.
1200 G Street, N.W.
Suite 600
Washington, D.C. 20005
(202) 423-4743
craig.glazer@pjm.com

***Attorneys for
PJM Interconnection, L.L.C.***

cc: Eric.Icart@ferc.gov

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 Washington, D.C., this 7th day of August 2023.

/s/ Paul M. Flynn

Paul M. Flynn