

black start service, incorporating PJM's latest information on risk modeling and associated lessons learned.

I. COMMENTS

A. 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.

The August 7th Filing states (at 2): "PJM's fuel assured black start service proposal in the May 12 Filing does not have separate criteria for distributed energy resources." PJM admits that there are no criteria and no limitations specific to distributed energy resources (DERs). The absence of such criteria is a significant omission. PJM has never used distribution level black start resources. The simple and unsupported assertion that such resources can provide black start in a manner directly comparable to grid connected resources has not been demonstrated. PJM should be required to provide such demonstration prior to including DERs as a potential source of black start capability. This component of the May 12th Filing could be deleted while maintaining PJM's objective of reliable black start service. Including this component conflicts with PJM's objective and weakens the proposal.

B. 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.

As described in PJM's response to the Deficiency Letter, PJM's calculation of its 90 percent "confidence interval" is a simple process of reviewing unit performance for the last nine years and determining the minimum MWh output level maintained by each unit for at least 16 hours in a day for 90 percent of the days in each year. The results of each year are weighted based on PJM's estimate of the probability of the weather in each year occurring.

PJM's "confidence level" is actually the expected value or mean of the distribution of the weighted percent of days (column E in PJM Exhibit 3) and does not provide an accurate statement about the probability that a year with at least 16 hours of operation will occur. In PJM Exhibit 3, the PJM "confidence level" is 96.09 percent but this number is actually a

weighted average of the number of days with more than 16 hours of operation.⁴ But the probability that the unit will be available for at least 16 hours at the designated MW for 90 percent of the days in the year is actually 0.855.⁵ The mean of the distribution cannot be used to make confidence statements. For example, PJM Exhibit 3 actually shows that PJM's 90 percent criterion would be met if the resources are available more than 80 percent of the time.⁶ This is below PJM's stated target. Table 1 further illustrates the problem with making confidence statements based on the mean of a distribution. The values in Table 1 are identical to PJM Exhibit 3 except that the percent of days for year 2014 has been changed from 100 percent to 80 percent. The change to that value reduced the mean to 90.65 percent, which would still satisfy PJM's proposed test. But the probability that the black start unit will be available for at least 16 hours for 90 percent of the days in a year is now only 0.583.

⁴ See Exhibit 3, "Response to July 7, 2023 Deficiency Notice," PJM Interconnection, L.L.C., Docket ER23-1874-000 (August 7, 2023).

⁵ Simply the sum of the probabilities in PJM Exhibit 3 (i.e. weather weights) where the percent available is greater than or equal to 90 percent.

⁶ The probability the unit will be available for at least 16 hours at the designated MW for 80 percent of the days in the year is actually 1.000. For any number higher than 80 percent, the probability falls below 0.900.

Table 1 Mean versus probability

| Delivery Year | ELCC Weather Weight | Percentage of Days >= 16 | Weighted Average |
|---|---------------------|--------------------------|------------------|
| 2012 | 0.088 | 80% | 7.04% |
| 2013 | 0.094 | 93% | 8.77% |
| 2014 | 0.272 | 80% | 21.76% |
| 2015 | 0.208 | 100% | 20.80% |
| 2016 | 0.088 | 100% | 8.80% |
| 2017 | 0.057 | 80% | 4.56% |
| 2018 | 0.057 | 93% | 5.32% |
| 2019 | 0.068 | 100% | 6.80% |
| 2020 | 0.068 | 100% | 6.80% |
| Mean (PJM Confidence Level) | | | 90.65% |
| Probability {Percent of Days with at least 16 hours of availability >= 90%} | | | 0.583 |

PJM’s analysis does not require that the resources produce output at the target level for 16 consecutive hours, despite the clear requirement that black start resources need to be able to produce for 16 consecutive hours.⁷ Despite reference to irrelevant conditions about changes in load, PJM never explains why it is appropriate that the intermittent resources not be held to the defined standard of 16 consecutive hours.

In addition, by treating every hour as equivalent to every other hour, PJM ignores its own position in the CIFP stakeholder process that high risk hours are the only hours that matter.⁸ High risk hours are the most likely to have a black start event, yet that issue is entirely ignored in PJM’s 90 percent analysis.

The May 12th Filing and August 7th Filing effectively assert that the reliability standard for black start resources is lower than the reliability standard for all capacity resources. That

⁷ OATT Schedule 6A para. 18 (“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.”).

⁸ PJM’s proposed accreditation for capacity resources is solely based on PJM’s estimated resource’s contribution during the hours of high risk. See “Capacity Market Reform: PJM’s Proposal,” presented at June 14, 2023 meeting of Critical Issue Fast Path - Resource Adequacy Stage 3. <<https://pjm.com/-/media/committees-groups/cifp-ra/2023/20230614/20230614-item-02---pjm-cifp-stage-3-proposal.ashx>>.

is not a reasonable or a supportable position and it is not consistent with the provision of reliable black start service.

C. 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.

The example illustrates the steps defined in the prior answer. While the example walks through the defined steps, neither the logic nor the example address the fatal flaws in PJM's proposed approach.

PJM proposes to include intermittent resources as fuel assured black start resources. This proposal, to include what are clearly less reliable resources as black start, is completely inconsistent with the stated purpose of the May 12th Filing which is to increase the reliability of black start resources by focusing on the reliability of fuel supply. PJM has provided no evidence to support the assertion that the inclusion of intermittent resources is reasonable. In fact, PJM's assertions in the PJM response to the Deficiency Letter lead to the opposite conclusion. PJM has demonstrated that intermittent resources should not be included as sources of fuel assured black start service without substantial additional analysis and support and requirements. It is unlikely that such additional analysis would support the inclusion of intermittent resources as a source of black start.

PJM states the obvious: The August 7th Filing states (at 12): "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."

But that is not the end of the story. PJM ignores the equally obvious fact that intermittent resources could invest in storage, for example, to increase their reliability. An investment in storage would be directly analogous to a dual fuel resource investing in on site oil storage.

The response in the August 7th Filing is not reasonable and is contradicted by PJM's own assertions presented in the PJM stakeholder CIFP process. For example, PJM asserted

that the availability of solar fixed panel resources to meet load on critical hours in the winter is 1.0 percent.⁹ PJM’s fuel assured black start analysis entirely ignores PJM’s recent statements about the significance of winter risk. PJM’s approach in this response entirely ignores PJM’s focus on high risk hours presented in the PJM stakeholder CIFP process. The 90 percent analysis, in addition to its other failings, treats every hour in the year as if they are comparable from a risk perspective while PJM’s CIFP approach directly contradicts that. PJM interpreted the CIFP analysis to mean that intermittent fixed panel solar resources are only expected to provide a 1.0 percent contribution to reliability in the winter and 18.0 percent in the summer, while onshore wind resources are expected to provide a 36.0 percent contribution to reliability in the winter and 9.0 percent in the summer.¹⁰

D. 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.¹¹

PJM’s response is to assert that the 110 percent zonal requirement in Manual 36 is different than the 90 percent confidence level for intermittents, but PJM fails to address the substance of the question. PJM uses the 110 percent multiplier to increase the zonal black start

⁹ PJM calculated that an incremental addition of 100 MW of a fixed panel solar resource would reduce 1.0 percent of expected unserved energy in winter season relative to a hypothetical 100 MW of perfect thermal resource with zero outage rate. PJM interpreted this to mean that a fixed panel solar resource’s contribution to reducing the unserved energy during the critical hours of winter as 1.0 percent.

¹⁰ See “Capacity Market Reform: PJM’s Proposal,” presented at July 27, 2023 meeting of Critical Issue Fast Path - Resource Adequacy Stage 3. <<https://pjm.com/-/media/committees-groups/cifp-ra/2023/20230727/20230727-item-02a---cifp---pjm-proposal-update---july-27.ashx>>.

¹¹ PJM Manual 36 states, in part, that required black start equals 110% of the Critical Load on a locational basis to “account for an *average forced outage rate* (5%) plus an allowance for additional unexpected Critical Load (5%).” See System Operations Division, *PJM Manual 36: System Restoration, PJM Interconnection, L.L.C.*, 69 (June 15, 2023), <<https://www.pjm.com/-/media/documents/manuals/m36.ashx>> (Manual 36). See also Bennett Aff. ¶ 13.

requirement to a “prudent” level.¹² These are two different metrics, but PJM ignores the obvious relationship between them. The use of a 90 percent availability metric for intermittent resources degrades the likely response of black start resources, while the 110 percent requirement offsets that degradation, although PJM provides no analysis to support the exact relationship or the ability of the 110 percent to offset the impact of intermittent resources.

E. 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, if so, how?

The only way in which a gas fired black start unit behind an LDC citygate should be considered fuel assured is if it meets PJM’s criteria for 16 hours of onsite fuel storage. None of the other criteria related to gas supply should be included in cases where the LDC has the authority to cut the gas supply to the black start resource based on its own state jurisdictional tariff.

F. 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).

The August 7th Filing (at 10) makes the point that discrimination is not unjust if based on differences in the situations of the relevant parties.¹³

But PJM’s reliance on this principle is misplaced because this matter concerns resources that are paid to provide exactly the same black start service. All the resources are

¹² See PJM. “Manual 36: System Restoration,” Rev. 32 (June 15, 2023)

¹³ See *Market-Based Rates For Wholesale Sales Of Electric Energy, Capacity And Ancillary Services By Public Utilities*, Order No. 697, [119 FERC ¶ 61,295 at P 963](#) (2007) (“The standard for judging undue discrimination or preference remains what it has always been: disparate rates or service for similarly situated customers.”).

similarly situated. The discrimination in this case is undue and unsupported. But the issue is not with the requirements for gas resources to have a higher level of fuel assurance. The issue is with the weaker standard applied to intermittent resources. The same availability criteria should be applied to all resources.

In addition, PJM failed to support its requirements for gas fired units to have two pipelines or be connected to a natural gas gathering system as a reasonable basis for the reliable provision of black start. While the requirement seems plausible, PJM's new, more analytical approach to reliability presented by PJM in the CIFP process should be applied to black start. PJM and the Market Monitor have learned, in the process of attempting to define firm fuel requirements for gas fired capacity resources, that the reality is complex and that there are no simple answers, including the proposal in the May 12th Filing. PJM's proposal in the May 12th Filing opts for the simple answer over detailed analysis. Fuel assurance is not the primary issue for defining the units that can provide reliable black start service. Focusing solely on fuel assurance risks missing the more important factors.

II. SUMMARY

It would be reasonable for the Commission to reject the May 12th Filing in its entirety. The inadequacy of PJM's responses to the Commission's Deficiency Letter are only part of the problem. Even more importantly, PJM's analysis of risk as developed in the CIFP stakeholder process has demonstrated significant flaws with the way PJM has approached risk, and particularly winter risk. Even gas fired resources have winter outage rates that are correlated with high demand and gas supply issues. These define what PJM regards as the high risk winter hours. But the May 12th Filing was developed prior to the availability of PJM's new risk analysis that applies to gas fired units and even more so to intermittent resources. PJM's approach does not account for the fact that the probability of black start resources failing is highest when they are most likely to be needed. PJM should be directed to rethink the black start risk analysis in light of PJM's new approach to risk in the interests of a more reliable system. PJM should use a broader approach to the evaluation of the risk

associated with the provision of black start service. Fuel assurance is only one part of the approach, as PJM's CIFP analysis demonstrates. The Market Monitor strongly supports the provision of reliable black start service by PJM. The only goal of the Market Monitor's filings in this matter is to ensure that black start reliability is correctly defined and implemented.

III. CONCLUSION

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

Respectfully submitted,



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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 28th day of August, 2023.



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