

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

PJM Interconnection, L.L.C.	)	
	)	Docket No. ER24-99-000
	)	

**COMMENTS ON RESPONSE TO DEFICIENCY NOTICE,  
ANSWER AND MOTION FOR LEAVE TO ANSWER,  
OF THE INDEPENDENT MARKET MONITOR FOR PJM**

Pursuant to Rules 211, 212 and 213 of the Commission’s Rules and Regulations,<sup>1</sup> Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor (“Market Monitor”) for PJM Interconnection, L.L.C. (“PJM”),<sup>2</sup> submits this pleading. The Market Monitor comments on PJM’s response, filed December 1, 2023 (“Deficiency Response”), to the notice of deficiency issued in this proceeding, November 17, 2023 (“Deficiency Notice”) related to PJM’s filing submitted October 13, 2023 (“PJM Filing”).

**I. SUMMARY**

PJM (at 2) has failed to make the case that the proposal in Docket ER24-99 “will help to strengthen the capacity market’s ability to send market signals that incentivize resource adequacy in PJM.” Ensuring that market signals reflect the underlying supply and demand conditions in the markets is essential. But PJM’s proposal is an effort to change the signals rather than to allow the market to send signals. PJM continues to assert its unique ability to administratively define the value of assets three years prior to a delivery year, based on a

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<sup>1</sup> 18 CFR §§ 385.211, 385.212 & 385.213 (2023).

<sup>2</sup> Capitalized terms used herein and not otherwise defined have the meaning used in the PJM Open Access Transmission Tariff (“OATT”), the PJM Operating Agreement (“OA”) or the PJM Reliability Assurance Agreement (“RAA”).

black box method that is not founded on market principles and does not allow market forces, including actual resource performance, to define asset values. (The black box method is PJM's ELCC approach, also known as capacity accreditation in PJM terminology). That initial definition of asset values would be updated by PJM prior to the delivery year using the same black box method, putting resource owners at risk of unpredictable capacity shortfalls just prior to the delivery year. PJM's ELCC approach is based on incorrect input data that significantly affects the value of market assets including both thermal and renewable resources. PJM's ELCC approach fails to determine the reliability of the actual portfolio of resources that clear in the auction, meaning that PJM's approach would not and cannot correctly define either the asset value of resources or the expected reliability for the delivery year. All of these issues mean that PJM has not demonstrated that its filing is just and reasonable.

The incorrect input data results from the fact that PJM's winter capacity availability data is understated for combustion turbine based thermal resources. The correct representation of that winter availability would have a significant effect on PJM's ELCC values, reducing or potentially eliminating the significance of winter in all the ELCC class ratings. PJM's modeling ignores the increased winter output of such combustion turbine based thermal resources and the increased deliverability of such output in modeling the risk of loss of load in the winter. It is premature for PJM to run a capacity auction without addressing these critical issues. PJM cannot reasonably assert that its proposal is just and reasonable without answers to these questions. A lack of sufficient PJM resources to complete all the required analyses is a reason to wait, per the Market Monitor's complaint, rather than to rush forward.

PJM's ELCC calculations introduce more artificial risk into the capacity market because PJM continues to change its approach. PJM's calculated values for various asset classes have changed significantly over a relatively short recent period and PJM's filing includes only preliminary (indicative) and not final asset values. This volatility in PJM's calculated asset values and PJM's failure to provide final values contributes to the existing

climate of uncertainty and undermines rather than strengthens the ability of the market to reflect actual supply and demand conditions. PJM effectively promises more such volatility when they explain that the filed ELCC values are only preliminary (indicative) and will change again which further contributes to the existing climate of uncertainty. This does exactly the opposite of “incentivize resource adequacy in PJM.”

PJM does not check or verify the reliability characteristics of the portfolio of resources that actually clear in an auction, but bases its reliability conclusions on the entire portfolio of available resources identified prior to the auctions. PJM’s ex ante administrative ELCCs will be wrong both as a result of the difference between the portfolio of total available resources and the cleared resources, and as a result of the interactive effects of changes in class ELCCs. As a result, PJM’s administratively defined ELCC asset values will be incorrect and PJM’s actual reliability position will not be what PJM assumes because the reliability assessment is based on incorrect, ex ante ELCC ratings.

PJM plans to recalculate class ELCC values between the time of the auction and the delivery year and apply the final ELCC value to each offer. This adds more uncertainty as the final asset value of the resources will not be known until just prior to the delivery year and resources may suddenly be short and required to purchase additional capacity. This is very different than the current process which uses updated EFORd values because unit owners have the ability to calculate their own EFORd values and therefore know what to expect from PJM’s final calculation of EFORd values, but unit owners cannot calculate their own ELCC values because the model is a black box.

PJM has failed to calculate the expected impact of all its proposed changes on capacity market prices. PJM’s one rough calculation shared with stakeholders showed that, even without recognizing the locational markets, that price impacts could be large. That rough calculation did not address high locational prices, the full impact of redefining CPQR, the impact of eliminating the net revenue offset proposed by PJM in Docket No. ER24-98-000, or the full impact of changing asset values from current levels as a result of ELCC.

The Commission should reject the filings in both Docket Nos. ER24-98 and ER24-99 because the proposed changes do not have a logical economic basis and will negatively affect the competitiveness of the capacity market and negatively affect reliability.

In addition to the substantive deficiencies of PJM's filings, the filings are not ready for prime time even on their own terms, as they include multiple vague and incompletely defined elements and defer many important elements of the stated rate to PJM for inclusion in manuals that should be included in the tariff. The level of uncertainty that would be created by accepting PJM's filings would be inconsistent with efficient and competitive markets both because key elements of the filings are not final and because even if the proposal works as intended it will create significant and unnecessary levels of uncertainty for all market participants.

PJM has not supported the claim that the proposed changes are just and reasonable and PJM's responses to the Commission's deficiency notice does not change that conclusion. PJM has not explained the urgency of its appeals to the Commission for expedited action on its filings. PJM already has the authority to improve its testing, risk modeling, load forecasting and reserve margins without further Commission action.

The PJM Market Rules that define the prices in PJM markets and that define the products bought and sold in PJM markets must be in the filed tariff rules (i.e., OATT, OA and/or RAA) that are subject to Commission approval. These are the formal documents that define the market rules, that define prices, and that define the stated rate. The proposed definitions "significantly affect" market prices, are "realistically susceptible of specification," and are therefore subject to Commission review.<sup>3</sup> PJM's repeated efforts in this filing (ER24-

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<sup>3</sup> The rule of reason requires that "all practices that significantly affect rates, terms and conditions fall within the purview of section 205(c) of the FPA, and, therefore, must be included in a tariff filed with the Commission." *See, e.g., Energy Storage Ass'n v. PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,296, 62538 (2018) ("PJM's December 2015 adjustments to the benefits factor curve, including PJM's actions to implement through its manuals an entirely different curve that capped RegD participation in certain hours, illustrate how the methodology for establishing the benefits factor is not a mere

99) and the related filing (ER24-98) to move key elements of the market design from the formal tariff documents to the manuals that are under PJM's unilateral control constitutes a tacit admission that key elements of PJM's proposals are not ready, are not clear, are subject to excessive PJM discretion, and therefore have not been shown to be just and reasonable.<sup>4 5</sup> The definitions of key parameters essential to the performance of the PJM Capacity Market should not be and cannot reasonably be provided only in the manuals. These are not implementation details. PJM's response to the Commission's deficiency notice further

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implementation detail, but instead significantly impacts RegD resources' participation in the Regulation market and, ultimately, Regulation market clearing. Although we find that PJM must include the methodology for calculating the benefits factor curve in its Tariff, we agree with PJM that it must retain the operational flexibility to effectively control ACE without unnecessary delay. Requiring PJM to maintain the benefits factor calculation methodology in its Tariff permits PJM to set forth implementation and operational details, which may vary over time and may not be reasonably susceptible to specification, in PJM manuals."); *Cal. Indep. Sys. Operator Corp.*, 119 FERC ¶ 61,076, at P 656 (2007) ("Our policy is that all practices that significantly affect rates, terms and conditions fall within the purview of section 205(c) of the FPA, and, therefore, must be included in a tariff filed with the Commission. Further, we have found that our 'rule of reason' test requires a case-by-case analysis...."); *see also Prior Notice and Filing Requirements Under Part II of the Federal Power Act*, 64 FERC ¶ 61,139 (1993), citing *City of Cleveland v. FERC*, 773 F.2d 1368, 1376 (D.C. Cir. 1985) ("[There] is an infinitude of practices affecting rates and service. The statutory directive must reasonably be read to require the recitation of only those practices that affect rates and service significantly, that are realistically susceptible of specification, and that are not so generally understood in any contractual arrangement as to render recitation superfluous. It is obviously left to the Commission, within broad bounds of discretion, to give concrete application to this amorphous directive."); *Public Service Commission of New York, et al. v. FERC*, 813 F.2d 448, 454 (D.C. Cir. 1987) (held that the Commission properly excused utilities from filing policies or practices that dealt only with matters of "practical insignificance" to serving customers).

<sup>4</sup> See PJM Filing Docket No. ER24-99, Attachment B, Proposed Revised OATT Article 1, Definitions of "Gas Combined Cycle Dual Fuel Class" and "Gas Combustion Turbine Dual Fuel Class;" OATT Attachment M-Appendix § II.C.3, Review of eFORD/Accredited UCAP Factor; and RAA Schedule 9.1 §§ H, I, Schedule 9.2 § H, definition of "winter deliverability." PJM Filing Docket No. ER24-98, Attachment B, OATT Attachment DD § 10A(c), Review of "Performance Shortfall;" OATT Attachment DD § 6.8(a), Definition of "CPQR."

<sup>5</sup> See OA Schedule 1 § 1.7.14 ("The Office of the Interconnection shall be responsible for maintaining, updating, and promulgating the PJM Manuals as they relate to the operation of the PJM Interchange Energy Market.").

confirms that PJM continues to pursue this approach that would leave key parts of the stated rate within PJM's unilateral control and there not subject to regulatory oversight.

The Commission should accept the Market Monitor's Complaint in Docket No. EL24-12, which is designed to provide more time to everyone to more carefully consider the issues and define clear, market based, and implementable solutions that are well defined within the tariff and do not include vague definitions that can be filled in later by PJM at its discretion and without substantive review, via manual changes. The Market Monitor's Complaint would also eliminate the possibility of dramatic financial consequences associated with 24 hours of cold weather by making capacity market penalties commensurate with the market defined value of capacity during the proposed period for further review.

## II. COMMENTS

### A. [I.] Definition of Installed Capacity

1. PJM proposes RAA revisions stating that “[t]he installed capacity of an Unlimited Resource and Variable Resource shall be determined in accordance with the PJM Manuals.” In its transmittal letter, PJM specifically references PJM Manual 21, section 1.2.1.

*a. PJM Manual 21, section 1.2.1 does not appear to define the installed capacity of any Variable Resource type other than run of river hydroelectric units without pooling capability. However, PJM Manual 21, Appendix B defines various terms for wind and solar units such as “Capacity Value,” “Net Maximum Capacity,” etc.*

*i. Please identify the language in PJM Manual 21 that defines the installed capacity of Variable Resources as referenced in proposed RAA, Schedule 9.2, § G.*

*ii. Please explain how PJM will define installed capacity for each of the Variable Resource Effective Load Carrying Capability (ELCC) Classes defined in proposed RAA, Schedule 9.2, section B.*

*iii. PJM proposes to define the installed capacity of a Combination Resource “based on the lesser of the Maximum Facility Output or the sum of the equivalent Effective Nameplate Capacity values of the resource’s constituent components considered on a stand-alone basis.”*

*1. Please explain whether the installed capacity of a stand-alone Variable Resource is equivalent to its Effective Nameplate Capacity.*

*2. If the two terms (installed capacity and Effective Nameplate Capacity) are not equivalent, please support the proposal to define the installed capacity of a standalone Variable Resource on a*

*different basis than the installed capacity of a Combination Resource with a Variable Resource component.*

- b. PJM Manual 21, section 1.2.1 defines the installed capacity of Unlimited Resources as their generating capability under summer conditions. However, PJM also refers to installed capacity in the context of winter conditions.*
  - i. Please clarify how PJM will define the installed capacity of an Unlimited Resource.*
  - ii. PJM proposes to calculate the Generation Resource Rating Test Failure Charge on a Generation Capacity Resource based in part on “the installed capacity committed for such day of the Delivery Year,” and assess the charge “for each day of the Delivery Year in which the seasonal rating test for such resource fails to certify full delivery of the megawatt amount of installed capacity committed for such day.” Please explain how PJM will determine the amount of installed capacity committed on a given day for an Unlimited Resource, and to what extent this value varies over the year on a seasonal basis.*
- c. PJM proposes to calculate the Accredited Unforced Capacity (UCAP) of an Unlimited Resource as the product of its “(i) installed capacity; (ii) the applicable ELCC Class Rating; and (iii) the ELCC Resource Performance Adjustment.” PJM also proposes to define the Accredited UCAP Factor for all Generation Capacity Resources as “the ratio of the resource’s Accredited UCAP to the resource’s installed capacity.” Further, PJM proposes to calculate the Forecast Pool Requirement based in part on the Pool-wide Average Accredited UCAP Factor, which PJM proposes to define as “the ratio of the total Accredited UCAP to the total installed capacity of all resources.”*
  - i. Please clarify how PJM will define the installed capacity of Variable Resources and Unlimited Resources for the purposes of these formulas.*

The Market Monitor’s response to questions I.1.a.i., I.1.a.ii, I.1.a.iii.1, I.1.a.iii.2, I.1.b.i, I.1.b.ii, I.1.c.i.:



In the response to the Commission's deficiency notice (at 5), PJM agrees that the ICAP for Variable Resources is not defined but that PJM plans to define it in a manual in the future: "As part of this broader proposal and contingent upon Commission approval, PJM will update its manuals to provide a more precise definition of ICAP for Variable Resources." Effectively, PJM states that it plans to define the ICAP for Variable Resources as the maximum output of such resources, subject to CIRs, and accounting for transitional ICAP caps. This definition is not based on a specific season but represents the maximum output available from the facility, regardless of season or ambient conditions. This PJM statement also ignores the fact that PJM's proposal changes the definition of winter deliverability from "winter deliverability" to "assessed deliverability." Both terms are defined only in the PJM Manuals and PJM does not include the actual definition of assessed deliverability in the filing. An extensive restructuring of the PJM Capacity Market without clearly defining the essential elements that affect the performance of that capacity market is not supported as just and reasonable.

In the response to the Commission's deficiency notice (at 9), PJM stated that the installed capacity of an Unlimited Resource will continue to be based on summer operating conditions limited by the CIRs of the resource. PJM fails to provide an unambiguous definition of installed capacity of Unlimited Resources or a definition consistent with the proposed definition of ICAP for Variable Resources. The definition of ICAP should be the same for all resource types. PJM has not explained why the ICAP of Unlimited Resources should be capped at the summer test level when some such resources have maximum facility outputs (MFO) significantly greater than that level and given that PJM now recognizes the significance of winter conditions. This artificial capping of the ICAP of Unlimited Resources means that PJM's ELCC analysis is fatally flawed and cannot be supported as just and reasonable. MFO as used in this document means exactly that, the maximum output achievable and achieved by the facility and is not limited to PJM's definition.

The definition of installed capacity must be in the filed tariff rules. These are the only formal documents that define the market rules, that define prices, and that define the stated

rate. Any changes to this definition in the future should be subject to Commission's review and approval. The fact that PJM has not previously defined ICAP in the tariff is not a reason to compound that error. The failure to include key definitions in the tariff means that PJM has not supported its proposal as just and reasonable.

## **B. [II.] Capacity Resource Testing**

- 2. PJM proposes to "require the generator capacity capability test to be conducted in both the summer and winter seasons during the Delivery Year for any Generation Capacity Resource, excluding Variable Resources, that is committed through the RPM Auctions or in an FRR Plan."**

- a. Please identify the proposed tariff revisions in OATT, Attachment DD, section 7.1(a) that effectuate the requirement that the generator capacity capability test be conducted in both the summer and winter seasons.*

- 3. PJM proposes to exempt Variable Resources from the Generation Resource Rating Test Failure Charge, because "the varying nature of the resource's capability as a function of its energy source, along with the fact that the capacity accreditation of these resources largely relies upon such Variable Resource's historical output rather than a claimed installed capacity level that may be committed." PJM also proposes a new, separate, Generation Capacity Operational Test to determine whether a resource can synchronize to the grid within the start-up times specified in the schedule that PJM tests the unit on and operates for its minimum run time. PJM states that its "selection of resources for operational testing and the timing of such tests will be based on a number of factors, including the period of time since a unit last operated, the system conditions under which the unit has recently operated, the expected system conditions during the operational test, and the recent performance of units with respect to successfully starting and operating within the specified parameters."**

- a. Please clarify whether PJM is proposing to apply the Generation Capacity Operational Test to Variable Resources. Please identify the proposed tariff revisions that define the applicability of this test.*

Market Monitor's response to questions II.2.a and II.3.a:

PJM's response to these questions continues the theme of putting key elements of the stated rate in the manuals rather than the tariff documents. These details are essential to the performance of the capacity market and must be in the filed tariff rules. These are the only formal documents that define the market rules, that define prices, and that define the stated rate. PJM states that the tariff includes a provision that requires "Generation Capacity Resources [to] have their capability assessed in both the summer and winter season." The details of this requirement, including how generators can adjust their summer testing results to calculate their winter capability, are only stated in the PJM Manuals. All the capability testing requirements should be included in the tariff.

PJM does not explain how its proposed approach to winter testing would actually help ensure that resources are available under the extreme weather conditions that are most likely to result in a reliability issue. Average winter conditions do not reflect those extreme conditions.

Under PJM's approach to manual changes, PJM could have improved and could improve testing at any time without further Commission action. Under PJM's preferred approach to including rules in manuals, the testing approaches proposed by PJM in this filing could have been included by PJM in a manual and do not require this filing. Under the PJM tariff, manual changes are not subject to Commission review and approval.

The basic rules governing testing must be in the filed tariff rules.<sup>6</sup> These are the only formal documents that define the market rules, that define prices, and that define the stated rate.

PJM's proposal to exempt Variable Resources from the Generation Resource Rating Test Failure Charge also emphasizes that PJM relies on its own model, using historical data, to determine asset values (ELCC derating factors) for Variable Resources (intermittent

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<sup>6</sup> See, e.g., *Energy Storage Ass'n v. PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,296, 62538 (2018).

generation). While PJM proposes to test thermal resources for other parameters, PJM does not address the need for any testing of intermittent resources.

PJM's explanation of its proposal to exempt Variable Resources from the Generation Resource Rating Test Failure Charge ignores the fact that such resources' ELCC values are based on a maximum output which is also equal to the required CIR level for the resources. PJM has not explained why it should not test, or evaluate based on actual operations (a form of testing), the maximum output of the resources and impose the Charge if resources fail to perform to that level. More generally, PJM has not explained why it should not test, or evaluate based on actual operations, the output profile of the resources compared to the assumed output profile and impose the Charge if resources fail to perform to that level. This evaluation requires formal rules.

In general, PJM's approach to operational testing is not clearly defined in the tariff and confers complete discretion on PJM about which resources to test. It is essential to have tariff defined criteria in order to avoid any uncertainty on the part of generators about the nature and extent and subjects of such testing and to ensure that testing requirements are enforceable.

### **C. [III.] Capacity Accreditation and ELCC**

#### **4. PJM proposes to define a Gas Combined Cycle Dual Fuel Class and a Gas Combustion Turbine Dual Fuel Class as:**

**[A]n ELCC Class consisting of Unlimited Resources of the [corresponding] technology type that is primarily fueled by natural gas, and that attests that it has the capability to start and operate independently on an alternate, onsite fuel source up to its maximum capacity level during the winter season of the applicable Delivery Year in which it is providing capacity, and capable of operating on the alternate fuel for two 16-hour periods over two consecutive days at its maximum capacity level.**

*a. Please describe what mechanisms PJM will use to enforce each of these proposed requirements.*

Market Monitor's response to questions III.4.a:

PJM provides no rationale or evidence for the assumption that the ability to offer on an alternate fuel for two 16 hour periods over two consecutive days creates a different reliability class. PJM did not include a requirement for firm fuel as a basis to be a capacity resource because in reality it is not possible to precisely define the relative firmness of fuel supplies. For example, interruptible gas on one pipeline may be equivalent in firmness to firm gas on another pipeline. On site oil may be more or less firm than gas supply depending on storage levels and the logistical ability to refuel with oil in real time consistent with the actual fuel burn rate. Two pipelines may be as firm or more firm than on site oil. Location in a shale field may make gas supply more reliable and for a longer duration than on site oil. The creation of ex ante classes again illustrates that PJM is administratively defining the asset value of resources rather than allowing actual unit by unit performance to determine the payment for capacity. PJM again provides only preliminary (indicative) ELCC class ratings for dual fuel combined cycles (almost identical to single fuel CCs) and for dual fuel combustion turbines (very different from single fuel CTs). There is no explanation for the differences between the CC and CT results or for the differences within the CT class and no basis for the implied assertion that the differences are a result of dual fuel capability rather than other factors, including environmental regulations or unit efficiency.

Unlike all other ELCC classes defined by PJM, the dual fuel classes are not based on a specific technology. PJM's definition of the classes does not address inventory levels. PJM does not even require a minimum inventory level but instead requires the capability to have inventory. The stated requirement is unclear and therefore unenforceable. For example, a generation owner could keep inventory levels below 32 hours and argue that replenishment, if needed, can occur in less than 16 hours. PJM never explains why less than two days of firm fuel would be adequate for a week long period of cold weather.

In addition, PJM provides no mechanism to enforce the proposed requirements and no consequences for failure to meet the proposed requirements. PJM proposes to rely solely on generation owners' statements that they meet the requirement rather than creating an enforceable requirement.

PJM states (at 18) that intentional misrepresentation of units' capability could result in a referral to the Commission for misrepresentation. PJM also states (at 18) that failure to mark the energy schedule (i.e. energy offer) of the alternative fuel as available or failure to operate on the alternative fuel due to reasons that would have prevented the owner from qualifying as dual fuel could also result in a referral. Referrals to the Office of Enforcement are not a substitute for clear rules with clear consequences, particularly when intent must be demonstrated in a referral. Specific guidance should be provided to market participants wherever possible.

PJM does not state these conditions in the tariff, does not state or define the process to evaluate the assertions made by generation owners, does not define a process or a metric to identify when generation owners are not meeting the requirement, and does not define the consequences for not meeting the requirement.

The lack of factual support for this rule, the lack of clarity of this rule, the lack of tariff provisions and the lack of a formal review process make any enforcement action, which will likely be initiated by the Market Monitor and not PJM, unlikely to succeed. This is another example of unacceptably vague language in PJM's filing that affects a core element of the capacity market and another reason that the proposal is not just and reasonable.

**5. PJM proposes to evaluate a resource's ELCC Resource Performance Adjustment based on the resource's modeled hourly output on days since June 1, 2012. Please explain how PJM will model hourly output for resources that:**

***a. Enter commercial operation after June 1, 2012;***

Market Monitor's response to questions III.5.a:

The ELCC approach, as proposed by PJM, does not produce resource specific capacity values. Thus PJM has to create an administrative allocation method to determine resource specific capacity values. PJM's method bases the allocation on a small subset of the simulated

hours, hours with a nonzero loss of load probability.<sup>7</sup> PJM's approach is based on the simulated performance of the resources. Any simulation is subject to random error.<sup>8</sup> Using a black box simulation method to define the asset value of resources is a fundamental departure from the current practice of using the most recent performance as measured by the transparent outage rate of the resource to calculate the unforced capacity that could be offered in the Base Residual Auction. PJM's ex ante approach to resource specific ELCC values creates more uncertainty and unexpected year over year volatility than use of the forced outage rate.

PJM proposes an unduly complicated method for creating a data history (putative data) for a new unit, based on the performance of other resources in the same ELCC class. While any approach to calculating the capacity value of a new unit will need to use estimates, PJM's method has more significance because PJM's administrative calculation will determine the value of the resource in the capacity market regardless of its actual performance during the delivery year. PJM has not explained why the result of its method will not be the average for the ELCC class or why the ELCC average class rating should not be the default.

***b. Made a major change to plant design affecting their ELCC Class (for instance adding dual-fuel capability) after June 1, 2012; or***

Market Monitor's response to questions III.5.b:

PJM states (at 22) that if a resource belongs to a different ELCC class since June 1, 2012, PJM will exclude the performance data from the class the resource no longer belongs to. PJM provides no rules and no process for defining major change or defining the new ELCC value. The rules are undefined and therefore unenforceable. PJM's approach to the value of such assets is purely discretionary and creates uncertainty for the asset owner and the market.

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<sup>7</sup> PJM Filing, Attachment A (Redlines), RAA Schedule 9.2 § D(2).

<sup>8</sup> In the PJM's simulation study, weather, load and generation performance are simulated based on historical probabilities. The margin of error is minimized with the number of iterations but not completely eliminated.

*c. Made other resource improvements that affect performance (e.g., fuel contract changes, weatherization, etc.) after June 1, 2012.*

Market Monitor's response to questions III.5.c:

PJM states (at 23) that if a resource makes investments after June 1, 2012, that improve resource performance and the resource remains in the same ELCC class, PJM will continue to include performance data from the period before the improvement. As a result, it could take multiple years for the value of a resource that has made improvements to be calculated correctly under PJM's approach. In addition, PJM's approach will result in discriminatory treatment across resources. For example, if a resource adds a dual fuel, or converts a coal unit to gas or oil, resource performance will be based solely on post improvement data while if a resource makes other investments, e.g. entering into no notice natural gas service or improving weatherization, resource performance will continue to include pre improvement data. For these reasons, PJM has not shown its proposal to be just and reasonable.

**6. PJM's proposed RAA, Schedule 9.2, section I states that:**

**The output of Combination Resources shall be capped in any hour at: (i) the Combination Resource's Capacity Interconnection Rights during the months of June through October and the following May of the Delivery Year, and (ii) the Combination Resource's assessed deliverability, as defined in the PJM Manuals, during the months of November through April of the Delivery Year.**

**PJM's proposed RAA, Schedule 9.2, section H states that:**

**Variable Resource actual output shall be adjusted in the ELCC analysis to reflect historical curtailments, and output shall be capped in any hour at: (i) the greater of the Variable Resource's Capacity Interconnection Rights, or the transitional system capability as limited by the transitional resource MW ceiling as defined in the PJM Manuals, awarded for the applicable Delivery Year, during the months of June through October and the following May of the Delivery Year, and (ii) the Variable Resource's assessed deliverability, as defined in the PJM Manuals, during the months of November through April of the Delivery Year.**



*a. Please support the use of different caps for the modeled outputs of a Combination Resource and a Variable Resource during the months of May through October.*

Market Monitor's response to questions III.6.a:

PJM's transmittal letter (at 52) states that PJM proposes "a slight tweak" to the definition of winter deliverability from Variable Resources. PJM would change the definition from "winter deliverability" to "assessed deliverability." Both terms are defined only in the PJM Manuals and PJM does not include the actual definition of assessed deliverability in the filing. PJM states, without explanation, that winter deliverability "could understate the capacity capability of a wind or solar resource" because it does not include all "measured deliverability." PJM appears to want to define the winter deliverability of wind at a level greater than its CIRs. But the definition of assessed deliverability is never stated and the relationship with winter deliverability is never fully explained.

Assuming that this change would permit the winter capability of intermittent resources to exceed their CIR levels, this change is not a slight tweak but a significant change to the definition of deliverability. This change will change the asset value of Variable Resources, would assign winter deliverability to Variable but not Unlimited Resources, and should be clearly defined in the tariff.

Equally important, this proposed change highlights the unsupported difference in PJM's proposed approach to winter deliverability between Variable Resources and Unlimited Resources. PJM's failure to apply the same logic to all resources means that the approach has not been shown to be just and reasonable. The resultant understatement of the winter capability of thermal resources means that PJM's actual ELCC results reflect discriminatory treatment and are incorrect and unsupported as just and reasonable.

7. **The Affidavit of Dr. Patricio Rocha-Garrido (Garrido Affidavit) provides indicative 2024/2025 ELCC Class Ratings for several ELCC Classes and ELCC Resources that PJM will model on a resource-specific basis. However, the affidavit does not provide separate indicative ELCC Class Ratings for PJM’s proposed Gas Combined Cycle Dual Fuel Class and Gas Combustion Turbine Dual Fuel Class.**

*a. Please provide indicative 2024/2025 ELCC Class Ratings for the Gas Combined Cycle Dual Fuel Class and the Gas Combustion Turbine Dual Fuel Class. Please also clarify whether the indicative ELCC Class Ratings provided in your filing for the “Gas CC” and “Gas CT” classes reflect the ELCC Class Rating of only gas resources without dual-fuel capability or a blended ELCC Class Rating of both dual-fuel and gas-only resources.*

Market Monitor’s response to questions III.7.a:

PJM provides only preliminary or indicative values for the proposed dual fuel and single fuel CC and CT ELCC classes. PJM emphasizes the word preliminary by including it in italics. PJM’s explanation is unclear (at 26 n.44) and emphasizes the lack of certainty and the ongoing changes to these core inputs: “These preliminary 2025/26 BRA ELCC Class Ratings reflect updated assumptions/inputs, as well as changes to the methodology consistent with what was filed with the Commission relative to the preliminary values that were estimated during the stakeholder process and referenced in the Garrido affidavit.”

In addition, the preliminary values do not correspond to the categories used in the original PJM filing (PJM at 27): “In the table, Gas Combined Cycle and Gas Combustion Turbine refer to natural gas-fired, single fuel resources. In the Rocha-Garrido affidavit, Gas Combined Cycle and Gas Combustion Turbine values correspond to a blended ELCC Class Rating of both dual-fuel and single fuel resources natural gas-fired resources.”

PJM’s filing demonstrates how much PJM’s methods and therefore ELCC class ratings have changed since PJM began applying its version of ELCC. The onshore wind rating changed from 15 percent, 16 percent and 15 percent for the 2023/2024, 2024/2025 and 2025/2026 Delivery Years under the existing approach but were reduced from 15 percent to 10 percent for the 2025/2026 BRA under the updated current approach. These ratings would

change to 27 percent under the proposed approach for 2024/2025, an increase of 69 percent in the asset value for that year, to 21 percent for 2025/2026, an increase of 110 percent in the asset value for that year. The rating for a gas fired single fuel combined cycle went from a 100 percent effective ELCC under the existing approach to 84 percent for 2024/2025 and 87 percent for 2025/2026.<sup>9</sup> Under the current approach, thermal resources are not assigned an ELCC value which means that the effective value is 100 percent. The rating for a gas fired single fuel combustion turbine went from 100 percent effective ELCC under the existing approach to 77 percent for 2024/2025 and 74 percent for 2025/2026.<sup>10</sup> PJM changed its method between the filing and the response to the deficiency letter.

Table 1 shows the history of PJM ELCC ratings by technology class beginning with the first use of ELCC ratings in the 2023/2024 BRA and including the recalculated ELCC values under PJM's proposed approach in Docket ER24-99.

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<sup>9</sup> The actual capacity value of thermal resources under PJM's ELCC approach would be a function of both class ELCC ratings and unit forced outage rates. Under the current approach, thermal resources offer UCAP less than 100 percent based on forced outage rates.

<sup>10</sup> The table includes only the explicitly stated ELCC values. The effective ELCC values for all technologies without an explicitly stated ELCC are 100 percent.

**Table 1 Historical ELCC class ratings<sup>11 12 13 14 15</sup>**

ELCC Class	2023/2024		2024/2025			2025/2026			2026/2027
	BRA	Third IA	BRA	Third IA	Proposed	BRA	BRA Update	Proposed	BRA
Onshore Wind	15%	15%	16%	16%	27%	15%	10%	21%	13%
Offshore Wind	40%	42%	37%	37%	51%	40%	21%	39%	31%
Solar Fixed	38%	50%	36%	36%	12%	37%	30%	15%	33%
Solar Tracking	54%	61%	54%	54%	20%	51%	50%	25%	45%
Landfill Intermittent	59%	63%	60%	60%	54%	63%	61%	56%	64%
Hydro Intermittent	42%	37%	46%	46%	42%	37%	34%	41%	37%
4-hr Storage	83%	94%	82%	82%	67%	77%	80%	76%	77%
6-hr Storage	98%	100%	97%	97%	73%	96%	96%	85%	94%
8-hr Storage	100%	100%	100%	100%	79%	100%	100%	89%	100%
10-hr Storage	100%	100%	100%	100%	84%	100%	100%	92%	100%
Solar Hybrid Closed Loop - Storage Component	NA	NA	NA	NA	37%	74%	80%	44%	83%
Solar Hybrid Open Loop - Storage Component	NA	93%	82%	82%	37%	74%	80%	44%	83%
Demand Response	NA	NA	NA	NA	87%	NA	NA	95%	NA
Nuclear	NA	NA	NA	NA	96%	NA	NA	96%	NA
Coal	NA	NA	NA	NA	85%	NA	NA	86%	NA
Gas Combined Cycle	NA	NA	NA	NA	84%	NA	NA	87%	NA
Gas Combined Cycle Dual Fuel	NA	NA	NA	NA	NA	NA	NA	88%	NA
Gas Combustion Turbine	NA	NA	NA	NA	77%	NA	NA	74%	NA
Gas Combustion Turbine Dual Fuel	NA	NA	NA	NA	NA	NA	NA	90%	NA
Diesel Utility	NA	NA	NA	NA	NA	NA	NA	91%	NA
Steam	NA	NA	NA	NA	NA	NA	NA	78%	NA

The ELCC ratings define the value of generation assets, including all asset types. The significant changes in PJMs’ calculated ELCC ratings over a relatively short period demonstrate both that the PJM ELCC method is not well defined and that PJM’s ELCC method creates substantial risk for generators of all types. Under a normal three year forward auction schedule, the ELCC class ratings will be updated several times prior to the delivery

<sup>11</sup> All values except for the two Proposed columns are average ELCC values.

<sup>12</sup> *ELCC Class Ratings for 2023/2024 3IA, 2025/2026 BRA and 2026/2027 BRA*, PJM Interconnection LLC (January 6, 2023) <<https://www.pjm.com/planning/resource-adequacy-planning/effective-load-carrying-capability>>.

<sup>13</sup> The 2024/2025 Current Proposal values are the marginal ELCC class ratings included in the October 13<sup>th</sup> Filing, Attachment E (Affidavit of Dr. Patricio Rocha-Garrido) at 48.

<sup>14</sup> The 2025/2026 BRA update column reflects the impact of excluding energy generation in excess of the CIRs. See *Updated ELCC Class Ratings for the 2025/26 BRA reflecting FERC Order accepting PJM’s ELCC CIR Proposal*, PJM Interconnection LLC (May 15, 2023).

<sup>15</sup> The 2025/2026 Current Proposal values are the marginal ELCC class ratings included in the Deficiency Response at 27.

year. For a resource that clears in the BRA, there is significant uncertainty about the final capacity rating. For example, if a wind resource's ELCC rating drops from 27 percent to 21 percent between the BRA and delivery year, the resource owner's capacity MW value would be reduced by 22.2 percent and the resource owner would have to acquire replacement capacity to cover their capacity obligation. For a 1,000 MW Gas Combined Cycle capacity resource, a three percentage point deviation in accreditation would imply a change of 30 UCAP MW. If the clearing price were \$50 per MW-day, the potential change in capacity revenue for the Gas Combined Cycle capacity resource would be \$547,500 ( $30 \times 50 \times 365$ ). If the clearing price were \$100 or \$150 per MW-day, the potential change in capacity market revenue would be \$1,095,000 or \$1,642,500.<sup>16</sup>

In addition, the reliability impact of the changed ELCC values on the actual cleared resources will not be considered by PJM and negative reliability impacts will not be resolved.

PJM, in asking for an effective date of December 12, 2023, together with PJM's failure to provide final ELCC values, is requiring asset owners to commit to sell an undefined level of capacity in an auction scheduled for June 12, 2024. That alone means that PJM has not supported the PJM Filing as just and reasonable.

***b. For each ELCC Class identified in the Garrido Affidavit, and for the Gas Combined Cycle Dual Fuel Class and Gas Combustion Turbine Dual Fuel Class, please provide the equivalent accreditation factors that apply under PJM's current tariff (e.g., (1 minus class-average Equivalent Demand Forced Outage Rate (EFORD)), ELCC Class Rating, etc.).***

Market Monitor's response to questions III.7.b:

PJM offers explanations for why PJM proposes to significantly modify the asset value of different technology types in the filing. While the asset value of each resource should be affected by its actual performance, this response indicates the dramatic impact of a change in

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<sup>16</sup> The actual impact of the change in price will be affected by the terms under which a resource owner can buy or sell replacement capacity.

PJM's approach to ELCC modeling on all the units in a resource class, regardless of their unit specific performance and regardless of their unit specific performance during the delivery year. See Table 1 for a full comparison of all the ELCC ratings by technology class, including under the current and proposed tariff rules, recognizing that the proposed ELCC values are only preliminary.

8. **PJM's proposed RAA, Schedule 9.2, section H describes the resource mix considered in the marginal ELCC analysis as follows:**

**The quantity of deployed resources studied in the analysis shall be based on resource deployment forecasts and, where applicable, on available information based on Sell Offers submitted in RPM Auctions or Fixed Resource Requirement plans for the applicable Delivery Year, and, where applicable, information provided to the Office of the Interconnection regarding intent to offer in an RPM Auction, pursuant to the requirements in the Tariff, Attachment DD, section 5.5.**

**The model inputs, including the set of ELCC Resources that are expected to offer in a given RPM Auction, or otherwise provide capacity, in the Delivery Year, shall be scaled to meet the annual reliability criteria of the Office of the Interconnection. The resulting expected unserved energy constitutes the Portfolio [Expected Unserved Energy (EUE)] for the Delivery Year.**

**PJM explains that the Portfolio EUE forms the baseline for determining marginal ELCC Class Ratings.**

- a. *While PJM's proposed RAA language states that "the set of ELCC Resources . . . shall be scaled to meet the annual reliability criteria," the Garrido Affidavit states that "PJM is proposing to iteratively adjust the load scenarios until the [Loss of Load Expectation (LOLE)] criterion of 0.1 days per year is achieved" to determine the Solved Load and corresponding Portfolio EUE. Please clarify whether PJM will scale the resource mix, the load, or both to determine the Portfolio EUE corresponding to the LOLE criterion of 0.1 days per year.*

Market Monitor's response to questions III.8.a:

PJM agreed that the inconsistency cited by the Commission in this question existed in the filing and that the load and not the set of resources is scaled in the PJM ELCC approach.

The question and PJM's response are further indications of the issues introduced by the ELCC ex ante approach. As PJM recognizes, it is not possible to scale or choose the ELCC resource portfolio prior to the capacity auction and FRR resource plan designations. Differences between the resource portfolio used for the ELCC analysis and the resources that clear the auction or are included in an FRR plan are inevitable. These differences and PJM's failure to evaluate the reliability of the actual cleared portfolio and include any required adjustments means that PJM's reliability analysis is flawed and PJM's ELCC approach cannot work.

***b. Please explain how differences between the resource mix and load assumed for the Portfolio EUE calculation, and the actual cleared resource mix and forecasted load affect: (1) resources' ELCC Class Ratings, and (2) PJM's compliance with the LOLE criterion of 0.1 days per year.***

Market Monitor's response to questions III.8.b:

1. ELCC Class Ratings.

PJM's response does not resolve the actual question. The question is: does the ELCC approach address the fact that the cleared capacity portfolio is different from the total capacity portfolio offered and considered by PJM? PJM recognizes that fact. The PJM ELCC approach creates but does not and cannot resolve the issue. The differences can be significant. This divergence between the ex ante ELCC analysis and reality in the delivery year based on the resources that actually clear in the auction is a significant reason that PJM's proposal to use ELCC is not just and reasonable. PJM's proposal introduces significant levels of reliability risk because PJM's ex ante ELCC method does not calculate ELCC values or reliability based on the resources that actually clear in an auction.

PJM (at 29) broadly describes the resources included in the ELCC analysis: "The quantity of deployed resources studied in the analysis shall be based on resource deployment forecasts and, where applicable, on available information based on Sell Offers submitted in RPM Auctions or Fixed Resource Requirement plans for the applicable Delivery Year, and, where applicable, information provided to the Office of the Interconnection regarding intent

to offer in an RPM Auction, pursuant to the requirements in the Tariff, Attachment DD, section 5.5.”

PJM (at 31, 33) acknowledges the validity and significance of the Market Monitor’s point that the accredited UCAP estimated based on the assumed total resource mix would be different from the actual accredited UCAP calculated using the cleared resource mix, but PJM has no solution to the actual problem. PJM states (at 31): “Deviations between the resource mix used as input assumption and the resource mix that clears the auction can impact the loss of load risk patterns, and therefore the model outputs. The larger the deviation, the more likely it is that there are differences between the estimated Accredited UCAP values and the actual Accredited UCAP values implied by the cleared resource mix. In an effort to reduce such differences, PJM has proposed as part of this docket to require a Notice of Intent for planning resources so that at the time of running the ELCC/Reserve Requirement Study (“RRS”) model PJM knows the resources that will be offering in the auction and therefore, have a chance of clearing in the auction.”

PJM’s proposed solution is not a solution to the actual problem identified by the Market Monitor and acknowledged by PJM. The problem is that there is no necessary relationship between the characteristics of the total capacity portfolio that may be available, and is the basis for the reliability analysis, and the final capacity portfolio actually cleared in a capacity auction. PJM’s solution does not address the problem because the problem would exist even if all available resources offered but not all resources cleared. As PJM recognizes, the ELCC values based on the cleared resources will differ from the ELCC values based on PJM’s ex ante analysis that includes all resources. PJM does not and cannot resolve this problem using PJM’s ELCC approach.<sup>17</sup>

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<sup>17</sup> For the detailed explanation on why PJM cannot resolve this problem, *see* Protest of the Independent Market Monitor for PJM, Docket No. ER24-98-000 (November 9, 2023) at 12–21.



In addition, the proposed solution ignores the fact that there is a much larger source of uncertainty about units offering into the auctions than uncertainty about planned resources based on the fact that intermittent and storage resources do not have a must offer obligation and DR does not have a must offer obligation. Requiring a non enforceable Notice of Intent for planned resources is not a solution to the identified problem. PJM's filing proposes that there be no must offer requirement for Variable Resources based on the fact that PJM's ELCC approach would impose irrational performance requirements on solar and other intermittent resources.<sup>18</sup>

In response to the Market Monitor's point, PJM (at 33-34) also suggests that because PJM runs Incremental Auctions, the differences between the full portfolio of resources analyzed in the ELCC simulations and the resources that actually clear are somehow reduced. PJM suggests that because the cleared resources are included in the total resources included in ELCC simulations, the differences are "minimized to the extent practicable." PJM's response misses the point entirely and does not address the admitted fact that the cleared resources are not the same as the resources in the ELCC simulations and the reliability of the cleared resource portfolio is not analyzed.

PJM (at 31-34) does one sensitivity analysis to help determine the likely impact of this issue. PJM's single, selective sensitivity analysis was for a 2,000 MW reduction in the nameplate capacity of the Solar Tracking class and a 300 MW reduction in the installed capacity of the 4-hour Storage class between the analysis of all resources and the analysis of just the cleared resources. Even that limited sensitivity demonstrates that the marginal ELCC of all classes, except for Nuclear and Gas Combustion Turbine Dual Fuel, would be affected. While PJM shows that the ELCC values would be affected, the assumed deviations used by PJM for the sensitivity analysis are an order of magnitude lower than the actual deviation

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<sup>18</sup> See Protest of the Independent Market Monitor for PJM, Docket No. ER24-98-000 (November 9, 2023) at 11, 24-25.

between the assumed resource mix and the actual cleared resource mix. Table 2 shows that the actual difference for the current delivery year is about 20,000 MW and not 2,000 MW. In addition, given that PJM simply assumes that all intermittent and storage resources will offer even though they do not have a must offer requirement, the actual deviations could be even larger than observed to date. The Market Monitor noted in its Protest that “thousands of MW were offered and did not clear” in the 2023/2024 BRA and 2024/2025 BRA.<sup>19</sup> Table 2 shows the difference in the resource mix between the installed capacity as of June 1, 2023, and the committed capacity immediately after the clearing of the 2023/2024 Base Residual Auction.<sup>20</sup> Table 2 provides additional evidence that there will be large differences in several resource classes between the portfolio of resources assumed in the ELCC analysis and the portfolio of resources that clears an auction or is included in an FRR plan.<sup>21</sup> Even Table 2 understates the likely difference because Table 2 uses the actual installed capacity as a metric for the capacity included in PJM’s ELCC analysis and does not include all the expected capacity included by PJM.

PJM’s sensitivity analysis (at 31) supports the Market Monitor’s assertion that PJM’s ex ante ELCC method is not just and reasonable. While the sensitivity is inadequate and not nearly as expansive as necessary, important conclusions can be drawn. Both the primary and

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<sup>19</sup> Id. at 21.

<sup>20</sup> See “Analysis of the 2023/2024 RPM Base Residual Auction,” <[https://www.monitoringanalytics.com/reports/Reports/2022/IMM\\_Analysis\\_of\\_the\\_20232024\\_RPM\\_Base\\_Residual\\_Auction\\_20221028.pdf](https://www.monitoringanalytics.com/reports/Reports/2022/IMM_Analysis_of_the_20232024_RPM_Base_Residual_Auction_20221028.pdf)> (October 28, 2022), pp. 31-32.

<sup>21</sup> See the “Analysis of the 2024/2025 RPM Base Residual Auction,” <[https://www.monitoringanalytics.com/reports/Reports/2023/IMM\\_Analysis\\_of\\_the\\_20242025\\_RPM\\_Base\\_Residual\\_Auction\\_20231030.pdf](https://www.monitoringanalytics.com/reports/Reports/2023/IMM_Analysis_of_the_20242025_RPM_Base_Residual_Auction_20231030.pdf)> (October 30, 2023), pp. 32-33.

<sup>22</sup> Other sources of uncertainty in the final portfolio mix that are not reflected in Table 1 include the levels of demand resources and energy efficiency resources.

secondary errors are significant.<sup>23 24 25</sup> The change in the solar tracking ELCC rating from 25 percent to 28 percent is mostly due to the primary error, the 2,000 MW assumed reduction in solar tracking. That the primary error is significant is not surprising. What stands out about the sensitivity is the significance of the secondary error. The Market Monitor noted in its Protest that the significance of the secondary error was not clear and stated conditions that were necessary for the secondary errors to be less than one percentage point.<sup>26</sup> Clearly those conditions do not hold as nine of the 20 classes that were held constant in the PJM scenario analysis experienced secondary errors of at least two percentage points and eight others had changes equal to one percentage point. Based on the single sensitivity provided, even with a 2,000 MW difference between the assumed total resource mix and cleared resource mix, it is likely there will be significant errors in most if not all ELCC class ratings calculated using PJM's ex ante ELCC approach. Table 2 shows the magnitude of the difference between the assumed resource mix and the cleared resource mix for the 2023/2024 Delivery Year. The differences are substantial. The secondary error compounds the primary error.

The change in the resource mix between the all inclusive resource portfolio assumed in the ex ante ELCC analysis and the actual cleared resources will result in different ELCC ratings for all or most resource technology classes.

PJM's ex ante administrative ELCCs will be wrong both as a result of the difference between the portfolio of total available resources and the cleared resources, and as a result of the interactive effects of changes in class ELCCs. As a result, PJM's administratively defined

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<sup>23</sup> See *Protest of the Independent Market Monitor for PJM* at 16-17, ER24-99-000 (November 9, 2023).

<sup>24</sup> The primary error is the change in the marginal ELCC rate for a resource class caused by the difference in the ICAP MW assumed in the ELCC analysis and the ICAP MW that clear the capacity auction or are included in an FRR plan.

<sup>25</sup> The secondary error is the change in the marginal ELCC rate for one resource class caused by the difference for another resource class in the ICAP MW assumed in the ELCC analysis and the ICAP MW that clear the capacity auction or are included in an FRR plan.

<sup>26</sup> See *Protest of the Independent Market Monitor for PJM* at 17, ER24-99-000 (November 9, 2023)

ELCC asset values will be incorrect and PJM’s actual reliability position will not be what PJM assumes because the reliability assessment is based on incorrect, ex ante ELCC ratings.

**Table 2 Resource mix of the installed capacity and committed capacity<sup>27</sup>**

Resource Type	Installed Capacity as of June 1, 2023		Cleared and FRR Committed Capacity for 2023/2024 Delivery Year			Difference	
	(Effective Nameplate MW or ICAP MW)	Percent	(Effective Nameplate MW or ICAP MW)	Percent	MW	Percent	
Coal	39,903.2	20%	32,486.2	18%	7,417.0	1.9%	
Gas	87,899.2	45%	87,914.5	50%	(15.3)	(5.0%)	
Hydroelectric	2,769.7	1%	2,106.2	1%	663.5	0.2%	
Nuclear	32,184.1	16%	32,293.9	18%	(109.8)	(1.9%)	
Oil	4,194.0	2%	4,232.6	2%	(38.6)	(0.3%)	
Solar	11,604.5	6%	5,854.8	3%	5,749.7	2.6%	
Solid waste	254.5	0%	122.2	0%	132.3	0.1%	
Wind	11,590.3	6%	6,827.7	4%	4,762.6	2.0%	
Storage	5,905.1	3%	4,662.4	3%	1,242.7	0.4%	
Total	196,304.6	100%	176,500.5	100%	19,804.1	0.0%	

## 2. Compliance with LOLE

PJM’s characterization (at 32) that there is no noncompliance with the LOLE criterion due to the differences in the assumed resource mix and actual cleared resource mix is inaccurate. The LOLE criterion was established for the sole purpose of procuring the desired level of reliability in the capacity market. PJM fails to meet this objective if PJM fails to satisfy the LOLE criterion. PJM’s approach does not include evaluating the portfolio of cleared resources.

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<sup>27</sup> The table shows the magnitude of the difference between the assumed resource mix in the RRS study and the cleared capacity in the auction. The installed capacity as of June 1, 2023, is used as a proxy for the assumed resource mix in the RRS study. The table shows installed capacity (ICAP MW) for Unlimited Resources and effective nameplate MW for Variable Resources. The differences shown in the table also account for derates and uprates between the auction clearing and the first day of the delivery year as well as imports from and exports to neighboring regions.

#### D. [IV.] Resource Adequacy Risk Modeling and Forecast Pool Requirement

9. The Garrido Affidavit presents illustrative results of PJM's proposed Reserve Requirement Study/ELCC model for the 2024/2025 Delivery Year. The illustrative analysis found that, with a total installed capacity of 194,017 MW: Solved Load is 164,452 MW, Installed Reserve Margin (IRM) is 17.98%, total Accredited UCAP is 159,971 MW, Forecast Pool Requirement without considering the Capacity Benefit of Ties is 0.9727, and Forecast Pool Requirement considering the Capacity Benefit of Ties is 0.9604. The Garrido Affidavit explains that the Reliability Requirement for the capacity auction is based on the product of the Forecast Pool Requirement and the annual forecasted peak load for a future Delivery Year.

- a. *Considering the fact that a Forecast Pool Requirement value less than one corresponds to a Reliability Requirement less than the annual forecasted peak load, please explain to what extent a Forecast Pool Requirement value less than one may result in PJM procuring less capacity than PJM's forecasted peak load.*
- b. *PJM's current OATT, Attachment DD, section 10A defines a resource's Expected Performance during a Performance Assessment Interval based, in part, on the resource's total MW of committed UCAP. Please address how PJM's proposed revisions to resources' Accredited UCAP and the Forecast Pool Requirement affect the total Expected Performance of all capacity resources relative to the forecasted peak load.*

Market Monitor's response to questions IV.9.a and IV.9.b:

PJM's response is not complete or detailed or responsive. The Commission's question is critical and requires a more comprehensive response.

**10. The Garrido Affidavit explains that the Reserve Requirement Study/ELCC model considers the correlation of Unlimited Resources' forced outages and ambient derates as a function of weather, in addition to planned and maintenance outages scheduled throughout the year.**

- a. Please clarify to what extent the Reserve Requirement Study/ELCC analysis consider how an Unlimited Resource's generating capability varies over the year, recognizing that a thermal resource's maximum generating capability generally increases as ambient temperature decreases.*

Market Monitor's response to questions IV.10.a:

PJM fails to recognize the increased capacity value of thermal resources in the winter. The result is that PJM's ELCC values, which are an average of summer and winter values, are unsupported and incorrect. For that reason alone, PJM has not supported the claim that their ELCC values are just and reasonable.

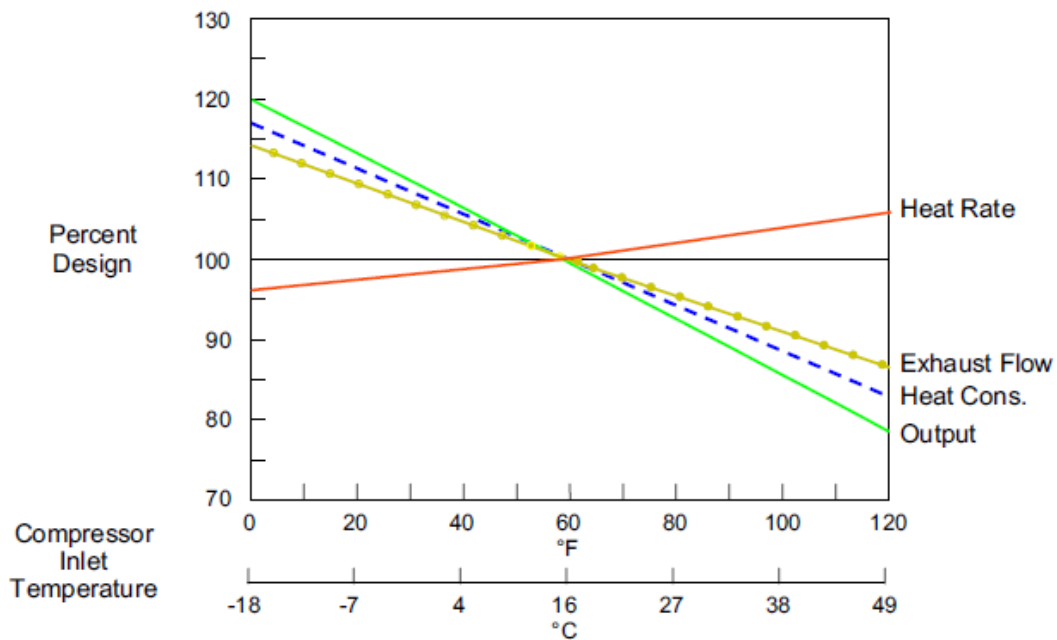
PJM does not have a meaningful response to this fundamental point. PJM answers (at 39) that the output of Unlimited Resources in the ELCC/RSS model is capped at the MW level used to study their deliverability. The deliverability has been defined by PJM as being summer deliverability. PJM admits that PJM does not model or recognize the increase in capability during winter from Unlimited Resources. PJM's response is basically that PJM failed to address this issue in the filing and did not propose appropriate changes to their prior approach in this filing. The filing is purported to be comprehensive but this significant gap in the approach renders the balance of the filing unsupported and therefore not just and reasonable.

PJM's explanation is illogical and PJM's approach ignores the increased capacity value of thermal resources in the winter as a result of ambient conditions. The illogic of PJM's response is reinforced by the fact that PJM wants to recognize an increased capacity value of wind resources in the winter as a result of ambient conditions.

The impact of winter ambient conditions on thermal resources' capability, especially combustion turbines and combined cycles, is significant. Figure 1 shows the temperature

curve of a GE MS7001 gas turbine. The curve shows that at 90°F, the expected output (green curve) is roughly 90 percent of the design output at ISO (International Standards Organization) conditions. Conversely, the curve shows that at 30°F the expected output of the generator is roughly 110 percent of the design output at ISO conditions. The change in ambient conditions equates to an increase of 22 percent from a 90°F summer day to a 30°F winter day.

**Figure 1 Effect of ambient temperature of GE MS7001.<sup>28</sup>**



PJM argues that because PJM does not study the deliverability of thermal resources using winter capability, such output cannot be used in the ELCC/RSS study. PJM’s proposal includes applying the ELCC method to all resource types including thermal resources. Under the ELCC construct, PJM models the capability of all ELCC resources and the modeling should recognize that such capability fluctuates across the hours of the day and across seasons, including winter for all resources. For example, the ELCC value of solar reflects the

<sup>28</sup> See GE Gas Turbine Performance Characteristics <[https://www.ge.com/content/dam/gepower-new/global/en\\_US/downloads/gas-new-site/resources/reference/ger-3567h-ge-gas-turbine-performance-characteristics.pdf](https://www.ge.com/content/dam/gepower-new/global/en_US/downloads/gas-new-site/resources/reference/ger-3567h-ge-gas-turbine-performance-characteristics.pdf)>.

fact that solar output varies hourly on every day and that solar output is much higher on summer days than on winter days. While the PJM proposal states that it applies ELCC to all resources, PJM incomprehensibly but explicitly ignores the higher capability of Unlimited Resources outside the summer season. PJM's ELCC analysis does reflect the lower capability of thermal resources in the summer when ambient conditions reduce output below the summer capability defined by PJM tests. Accounting for reductions in the summer but not accounting for increases in the winter is biased and unsupportable and clearly leads to an understatement of available thermal capability in the winter and leads to downwardly biased ELCC values for thermal resources. The secondary but also significant impact is that to the extent that recognizing higher winter thermal output reduces the significance of winter hours in the reliability analysis, there will be a significant impact on the ELCC ratings of all resource technology classes.

PJM's answer is a weak effort to justify an approach that is clearly incorrect and is therefore not just and reasonable. It took decades for PJM to recognize and model correlated forced outages. This improvement recognized the higher risks during summer and winter peaks in comparison to the average forced outages across the year. PJM fails to address another mistake in this filing by failing to model and recognize that Unlimited Resources' capability increases in the winter.

In the scenario provided by PJM in support of their proposal, in which winter has a higher loss of load probability, PJM's proposal will result in PJM procuring summer MW to meet winter demand.

The factual record shows that PJM's deliverability argument is wrong. If there were deliverability issues during the winter, PJM would have had to limit the output of the Unlimited Resources that remained online during Winter Storm Elliott to CIRs. In fact, PJM was able to use output above CIRs to continue to serve load.



As a technical and factual matter, PJM has also repeatedly recognized that there is additional, unused deliverability in the winter.<sup>29</sup> In the justification for additional CIRs for wind generators, PJM noted that in “the summer-based CIR studies, wind resources have a capacity factor of 13 percent, but that number increases three fold for the winter to around 40 percent.”<sup>30</sup> PJM further states that “allowing wind resources the opportunity to obtain Winter CIRs has the potential to greatly increase the amount of capacity offered for the winter portion.”<sup>31</sup>

We find PJM’s proposal to grant winter Capacity Interconnection Rights to wind resources and Environmentally-Limited Resources just and reasonable and accept it, to become effective January 19, 2017. We agree with PJM that these two resource types are uniquely situated with respect to the disparity between their winter-period and summer-period capabilities, and that this distinction is significant enough to support an accommodation that facilitates their participation in the RPM market.<sup>32</sup>

As PJM explains, some wind resources and Environmentally-Limited Resources have a significant disparity—upwards of 25 percent—between their summer-period and winter-period capacity factors and are impacted disproportionately by the existing rules for granting Capacity Interconnection Rights based solely on summer peak periods. While some thermal resources may have marginally higher capacity factors during winter periods, PJM explains that this disparity is markedly different than the large disparity faced by wind resources and Environmentally-Limited Resources.<sup>33</sup>

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<sup>29</sup> *Propose Modification for Enhanced Aggregation, Non-Summer Capacity Interconnection Rights, and Modified Demand Response Resource Measurement & Verification to Support Capacity Performance*, PJM Interconnection LLC, Transmittal Letter at 20, ER17-367-000 (November 17, 2016).

<sup>30</sup> *Answer of PJM Interconnection, LLC to Protests and Comments* at 21, ER17-367-000 (March 6, 2017).

<sup>31</sup> *Id.*

<sup>32</sup> 162 FERC ¶ 61,159 at 78

<sup>33</sup> 162 FERC ¶ 61,159 at 79

PJM has found it acceptable to give away such deliverability to intermittent resources but is not willing to recognize the actual increased deliverability available to thermal resources in the winter when it would mean a more efficient, lower cost and more accurate level of procured capacity and a more accurate definition of reliability.

In the response to the Commission's deficiency notice (at 9), PJM stated that the installed capacity of a Unlimited Resource will be continue to be based on summer operating conditions limited by the CIRs of the resource. PJM clarified (at 10) that even though PJM is proposing a winter testing requirement, the test is not designed to account for the increased capability of Unlimited Resources in the winter as a result of ambient conditions. PJM is explicitly not recognizing the increased capability of thermal resources in the winter:

The purpose of the winter capability test is not to establish or demonstrate some additional capability that an Unlimited Resource may have beyond its rated ICAP or CIRs, for which it is considered a Capacity Resource, but rather to demonstrate that the resource is capable of performing up to the level for which it has been committed for capacity in the winter season.<sup>34</sup>

The scope of the underlying issue is not just limited to the lack of unambiguous definition of installed capacity of Unlimited Resources. PJM's omission of additional capability of Unlimited Resources during the winter season has far larger consequences. PJM's lower ELCC based accreditation value of Combined Cycle and Combustion Turbine resources during the winter season is significantly affected by PJM's unwillingness to recognize and account for the additional winter capability available from these resources.<sup>35</sup>

PJM's failure to recognize and account for the ambient temperature based uprates in the Reserve Reliability Study (RRS) understates the value of these generating assets and overestimates the amount of capacity that must be purchased to meet the reliability

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<sup>34</sup> PJM Response to Deficiency Letter at 10.

<sup>35</sup> See *Protest of the Independent Market Monitor for PJM* at 10, ER24-99-000 (November 9, 2023).

requirement. PJM generation owners of these units are underpaid and PJM load has to pay more for capacity as a direct result.

The Commission has previously stated that “because the PJM region is summer-peaking, PJM studies generator deliverability on a summer-peak case.”<sup>36</sup> In their arguments that winter CIRs should be restricted to wind generators and environmentally limited resources, PJM does acknowledge that Unlimited Resources “suffer from lower deliverability in summer than winter due to ambient conditions.”<sup>37</sup> PJM then notes that the impacts on Unlimited Resources are not significant in comparison to the increased winter capability of wind and environmentally limited generators.<sup>38</sup> But the impacts are significant for ELCC calculations. The PJM ELCC calculations for unlimited resources are not capturing the increased winter capability.

#### **E. [V.] Capacity Performance Stop Loss**

##### **11. PJM proposes to revise the Non-Performance Charge Limit specified in OATT, Attachment DD, § 10A to be indexed to the Base Residual Auction (BRA) clearing price rather than to the Net Cost of New Entry (Net CONE).**

- a. Considering the fact that under PJM's proposal the BRA clearing price would not be known until after the auction completes, please explain how PJM will evaluate sellers' requests for a Capacity Performance Quantifiable Risk (CPQR) component in their unit-specific Market Seller Offer Caps, if applicable.*

Market Monitor's response to questions V.11.a:

PJM's filing would retain the high PAI penalties that led to near financial disaster as a result of Winter Storm Elliott while softening the blow by adding a stop loss mechanism based on total capacity market revenues for each unit. PJM ignores the fact that, if the stop

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<sup>36</sup> 162 FERC ¶ 61,159 at P. 65 (February 23, 2018).

<sup>37</sup> *Answer of PJM Interconnection, LLC to Protests and Comments* at 20, ER17-367-000 (March 6, 2017).

<sup>38</sup> *Id.*

loss mechanism binds, the incentive effect of high PAI penalties is entirely eliminated. The higher the penalty compared to the stop loss, the sooner the limit binds and the incentive effect is removed. If PJM's proposal had been in place during Winter Storm Elliott, the number of hours of penalties required to hit the stop loss, recognizing different capacity prices by LDA, would have averaged about 20 hours and ranged from about 11 hours to about 32 hours. Under the existing stop loss, the number of hours of penalties required to hit the stop loss was about 55 hours for all LDAs. PJM never explains why it does not take the logical approach and pair the level of the penalties with the level of the stop loss by basing both on the value of capacity as defined by the market. If PJM had done so, the number of hours of penalties required to hit the stop loss would have been remained about 55 hours for all LDAs.

#### **F. [VI.] Other Issues**

##### **12. PJM's proposed revisions to OATT, Attachment DD, section 5.5 describe PJM's proposed binding notice of intent to offer as follows:**

**Effective with the 2025/2026 Delivery Year and subsequent Delivery Years, a Planned Generation Capacity Resource may be included in a Sell Offer for an RPM Auction only if the Capacity Market Seller of such resource provides a binding notice of intent, as further detailed in the PJM Manuals, to submit a Sell Offer in such auction to the Office of the Interconnection no later than (a) the immediately preceding December 1 for a Base Residual Auction (except that for the 2026/2027 and 2028/2029 Delivery Years, such notice shall be submitted by 180 days prior to the commencement of the offer period), or (b) ninety (90) days prior to the commencement of the offer period for an Incremental Auction.**

- a. *Please clarify how PJM would apply the binding notice of intent to a Capacity Market Seller that only intends to offer a portion of its resource into the corresponding capacity auction.*
- b. *Please clarify to what extent a Capacity Market Seller would be required to specify the quantity of capacity it intends to offer into the corresponding capacity auction, and whether this quantity would have to be specified in terms of installed capacity, Effective Nameplate Capacity, Accredited UCAP, or some other measure.*
- c. *Please clarify whether a Capacity Market Seller would have its preliminary ELCC Class Rating and resource-specific performance adjustment prior to submitting a binding notice of intent to offer. If so, please describe the information provided to the Capacity Market Seller.*
- d. *Please clarify how the binding notice of intent would apply to a Capacity Market Seller that learns its resource will not be available due to factors beyond its control during the corresponding Delivery Year after it submits a binding notice of intent.*

Market Monitor's response to questions VI.12.a, VI.12.b, VI.12.c, VI.12.d:

While the Market Monitor supported and supports the concept of a binding notice of intent for planned resources, that support is linked to the Market Monitor's support for a binding must offer requirement for all existing intermittent and storage resources. PJM would impose a stronger offer requirement on planned intermittent and storage resources than on existing intermittent and storage resources. The binding notice of intent applicable only to new resources stands logic on its head by not extending the must offer requirement to all capacity resources but rather creating an unsupportable exception for intermittent and storage resources, linked in a further extension of illogic, to the fact that PJM would impose irrational nonperformance penalties on solar resources for not producing in the middle of the night.

A binding notice of intent places a significant obligation on a seller, and the seller's compliance with such obligation can significantly impact the market prices. This provision may need to be enforced. Under the rule of reason, a rule for notice of intent should be

included in the tariff and not the manuals.<sup>39</sup> PJM's attempt to justify (at 43 n.57) including the rule only in the manuals is unavailing because it could solve the identified problem, that sellers do not know UCAP at the time the notice is required, by instead requiring that the notice include a statement of ICAP. PJM will need an accurate and enforceable level of ICAP in order to calculate UCAP.

**13. PJM proposes to revise OATT, Attachment M – Appendix to make certain provisions, regarding the Market Monitoring Unit's review of a resource's EFORD for purposes of administering the capacity market must-offer requirement, only applicable through the 2024/2025 Delivery Year. However, in its transmittal letter, PJM does not explicitly explain these proposed revisions.**

*a. Please support the proposed revisions.*

Market Monitor's response to questions VI.13.a:

Attachment M–Appendix to the OATT is part of the PJM Market Monitoring Plan. Attachment M–Appendix provides details on how the Market Monitor interacts with market participants to perform its role in monitoring market participant behavior, including in the capacity markets. Because Attachment M–Appendix is core to the Market Monitor's role and purpose, the development of proposed changes to Attachment M–Appendix should involve the Market Monitor.

In the PJM Filing, PJM proposes revisions to Attachment M–Appendix that would eliminate Section II.C.3 for all auctions for delivery years after the 2024/2025 Delivery Year. Section II.C concerns the RPM Must Offer Requirement, a key requirement for preventing the exercise of market power.<sup>40</sup> Section II.C.3 concerns the Market Monitor's review of a seller's EFORD, which contributes to the determination of the quantity that a seller must offer.

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<sup>39</sup> See, e.g., *Energy Storage Ass'n v. PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,296, 62538 (2018).

<sup>40</sup> Physical and financial withholding are primary examples of how participants exercise market power. The must offer rule exists in part because of the corresponding requirement that customers must buy capacity at the clearing price.

The PJM Filing also proposes to delete from II.C.5 provision for the Market Monitor to “exercise its powers to inform Commission staff of its concerns and/or request a determination from the Commission that would require the Generation Capacity Resource to submit a new or revised Sell Offer, notwithstanding any determination to the contrary made under Tariff, Attachment DD, section 6.6” when the Market Monitor believes that a seller’s “maximum EFORd ... is inconsistent with the maximum level determined under section II.C.3.” In other words, PJM is proposing to delete provisions specifically authorizing steps that the Market Monitor can take when it is concerned that incorrect determinations about EFORd made by PJM could permit the exercise of market power. PJM’s proposals would unilaterally reduce the ability of the Market Monitor to fulfill its tariff defined responsibilities. PJM’s proposed changes are not consistent with the OATT, which assigns to the Market Monitor exclusive responsibility to make determinations concerning market power.<sup>41</sup>

PJM should not be permitted to unilaterally delete rules from the PJM Market Monitoring Plan that facilitate the Market Monitor’s carrying out its core responsibility to review offers to ensure that market power is not exercised in the capacity market. Determinations of EFORd directly relate to the quantity offered and potential for withholding.

PJM’s apparent rationale is that PJM is proposing to change/replace the EFORd concept with an analogous concept that PJM refers to as “Accredited UCAP Factor.”<sup>42</sup> The proposed conceptual change does not change the fundamental need for the Market Monitor to review the corresponding component of the quantity that sellers must offer in the capacity

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<sup>41</sup> See OATT Attachment M § IV.B; OATT § 12A.

<sup>42</sup> See PJM Filing at 35–36 (“PJM’s proposal includes using the Accredited UCAP of an individual resource to derive a resource’s Accredited UCAP Factor. The Accredited UCAP Factor represents the share of the installed capacity of a resource that is accredited as Capacity and is equal to ‘the ratio of the Capacity Resource’s Accredited UCAP to the Capacity Resource’s installed capacity.’ The Accredited UCAP Factor will replace the EFORd-based metric ...”).

market. Rather than proposing to eliminate Market Monitor review of the adjustment from ICAP to UCAP simply because the nature of the adjustment has changed from forced outages to ELCC, PJM should have simply have modified the review of the EFORD to a review of the derating factor. The current rules in Section II.C regarding the must offer requirement and determinations about the level of any adjustment to the quantity that must be offered, whether based on EFORD or Accredited UCAP Factor, should be retained.

PJM has not supported why it is just and reasonable for PJM to unilaterally eliminate a key review by the Market Monitor and the method of recourse by the Market Monitor in the event of a disagreement with PJM.

**14. PJM proposes to revise RAA, Schedule 6, section K and the parallel OATT, Attachment DD-1, section K to state that, for Demand Resources, “[c]ompliance is measured for Market Participant Bonus Performance, as applicable prior to the 2025/2026 Delivery Year, and Non-Performance Charges.” PJM does not discuss this proposed revision in its transmittal letter.**

*a. Please support the proposed revision.*

Market Monitor’s response to questions VI.14.a:

While Demand Resources that do not provide metered and locational incremental relief when called upon should not be eligible for Bonus Payments, it would be appropriate to include metered and locational incremental relief from Demand Resources in Bonus Payment eligibility.

### **III. MOTION FOR LEAVE TO ANSWER**

The Commission’s Rules of Practice and Procedure, 18 CFR § 385.213(a)(2), do not permit answers to answers or protests unless otherwise ordered by the decisional authority. The Commission has made exceptions, however, where an answer clarifies the issues or



assists in creating a complete record.<sup>43</sup> In this answer, the Market Monitor provides the Commission with information useful to the Commission's decision making process and which provides a more complete record. Accordingly, the Market Monitor respectfully requests that this answer be permitted.

#### IV. 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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<sup>43</sup> See, e.g., *PJM Interconnection, L.L.C.*, 119 FERC ¶61,318 at P 36 (2007) (accepted answer to answer that "provided information that assisted ... decision-making process"); *California Independent System Operator Corporation*, 110 FERC ¶ 61,007 (2005) (answer to answer permitted to assist Commission in decision-making process); *New Power Company v. PJM Interconnection, L.L.C.*, 98 FERC ¶ 61,208 (2002) (answer accepted to provide new factual and legal material to assist the Commission in decision-making process); *N.Y. Independent System Operator, Inc.*, 121 FERC ¶61,112 at P 4 (2007) (answer to protest accepted because it provided information that assisted the Commission in its decision-making process).

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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 21<sup>st</sup> day of December, 2023.



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