UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

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PJM Interconnection, L.L.C.	)	Docket No. ER21-278-001
	)	

COMMENTS AND MOTIONS OF THE
INDEPENDENT MARKET MONITOR FOR PJM

Pursuant to Rule 211 of the Commission's Rules and Regulations,[1] Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor ("Market Monitor") for PJM Interconnection, L.L.C. ("PJM"),[2] submits these comments responding to the filing submitted by PJM Interconnection, L.L.C. ("PJM") on March 1, 2021 ("March 1st Filing"). The March 1st Filing proposes revisions to the PJM market rules to apply an Effective Load Carrying Capability ("ELCC") approach for determining the amount of capacity that variable (intermittent), limited duration (storage), and combination (hybrid) resources may provide. PJM requests that their approach be implemented effective July 1, 2021.[3]

PJM proposes to implement a significant change to the capacity market based on an admittedly expedited stakeholder process that failed to address key issues, as evidenced by the Commission's deficiency letter. PJM's responses are inadequate and serve to illustrate rather than to resolve the fundamental flaws with the ELCC proposal. There is no need to

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[1]   18 CFR § 385.211 (2020).

[2]   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").

[3]   March 1st Filing at 1.

rush any solution into place for the already tightly spaced next three capacity market auctions. PJM's response (at 26) to the deficiency letter recognizes that there is no reason to rush: "Moreover, the October 30 Filing does not allege that the current rules for evaluating an ELCC Resource's capacity capability are unjust and unreasonable, only that the ELCC construct is a just and reasonable means for evaluating an ELCC Resource's capacity capability. Consequently, there is no compelling rationale for rushing the ELCC rules into effect for Delivery Years that have already had a BRA." That logic extends to rushing the ELCC rules into place for either of the next two BRAs, in December and May.

The proposed ELCC would actually make all renewable resources worse off than under the status quo. The only technology class to benefit from the proposed ELCC approach is batteries and that benefit is based on a series of egregiously unsupported and unsupportable assumptions.[4] No batteries in PJM behave in the way that PJM assumes that batteries behave. The Commission should direct PJM to engage in a deliberative approach to evaluating ELCC across all technologies and not just intermittent technologies. This process should be planned to take a year and PJM should be directed to start from the beginning and build up a logical, sustainable approach to evaluating the reliability contributions of all technology types that will enhance the efficiency and competitiveness of PJM markets and ensure that the markets treat all technologies fairly.

PJM states that the ELCC methodology is a technology-neutral approach that is based on loss of load probability and is designed to determine a resource's effective contribution to resource adequacy.[5] The proposed ELCC approach is clearly not technology

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[4] *See* Comments and Motions of the Independent Market Monitor for PJM, Docket No. ER21-278-000 et al. (November 30, 2020) at 20–21. See Comments of the California Independent System Operator Corporation before the Public Utilities Commission of the State of California, July 22, 2019, Rulemaking 16-02-007. "

[5] March 1st Filing at 3.

neutral, favoring batteries over renewable technologies and favoring the class of intermittents over all existing resources.

PJM asserts that the ELCC analysis distinguishes among generators with differing levels of reliability, size, and hourly output profiles to determine an ELCC rating for a given resource or a class of resources (an ELCC Class Rating).[6] PJM's ELCC analysis is fatally flawed and fails to account for the dynamic interactions among even the identified classes let alone all technology classes.

PJM fails to address the fact that the proposed ELCC with locked in floors is exactly the opposite of a reasonable approach to ELCC in a time of dynamic technical change. PJM's approach is a planning/IRP approach rather than a market approach. The planning is based on what is, by repeated reference, only putative data plus assumptions about behavior that are not founded in empirical analysis of markets. This should not be the basis for locking in capacity market outcomes for at least thirteen years. Planners are almost always proven wrong by markets and the longer the planning target the more likely planners are to be proven wrong. It is illogical to lock in existing technologies that are already outdated or will soon be when better technologies exist and even better technologies will soon emerge. One of the benefits of markets is that they provide both risks and rewards to investors. The PJM ELCC proposal would provide rewards to existing technologies, explicitly fail to provide rewards for innovation and impose the risks of outdated technologies on customers.

I. COMMENTS

A. PJM's Response to the Commission's Deficiency Letter Question 1.

In question 1, the Commission asks PJM to "describe the methodology PJM will use to allocate the ELCC Portfolio UCAP amongst ELCC Classes to establish the ELCC Class

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6   March 1st Filing at 9.

UCAP values and ELCC Class Ratings, including how the results of the First-In and Last-In runs for each ELCC Class will be used."

PJM does not explain, at the outset, that PJM needs to use its subjective and ad hoc method because PJM ignores the fundamental economics of the interactions among resource types. PJM treats all existing non intermittent resources as a given and defines only intermittent/limited resources as ELCC resources. A valid ELCC method would start at the beginning and define the ELCC of all resource types. But even given the narrow focus on only the intermittent resources, PJM ignores the dynamic interactions among all resource types and attempts to define a single ELCC value, which will be locked in for thirteen years as a floor. This allocation method is at the core of PJM's proposed approach to ELCC and its lack of analytical or theoretical support means that the Commission should reject the PJM filing and direct a 12 month process to evaluate ELCC approaches from the ground up, including all resources.

As a direct result of its flawed overall approach to the definition of ELCC, PJM needs an allocation method to assign the total ELCC of the assumed portfolio of resources (based on an assumed total UCAP for every assumed resource type in each assumed ELCC class) among the ELCC classes. [7] The result would be that every ELCC class has an ELCC MW per installed MW contribution to the assumed portfolio ELCC total, based on an assumed resource mix. PJM's describes its allocation approach as the "delta method."

PJM has not modeled or defined the interactions among the ELCC resources at different potential combinations of resources. PJM has only calculated the sum of ELCC contributions for specific assumed levels of resources using putative data and behavioral

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[7]   The source cited by PJM for this approach is a slide deck by Energy + Environmental Economics ("EEE"). EEE defines the delta approach based on EEE's explicit decision to reject marginal economics because EEE misunderstands the impact of the marginal approach on reliability. Appendix A to the March 1st Filing.

assumptions. As a result, PJM has no direct way to calculate the ELCC class specific contribution to the total portfolio ELCC value assumed in PJM's calculations.

The delta method proposed by PJM is intended to take PJM's limited modeling information for specific levels of ELCC resources to approximate each ELCC class's total ELCC contribution to the ELCC of the entire assumed portfolio mix.

The first step of the allocation ("first in") defines the marginal contribution of each technology, assuming that it is the only technology added to the existing mix. The first in result, if done correctly and based on real data, will be the marginal value of a technology, holding all other technologies constant. PJM's simple multiplication of the marginal result by the MW of the technology is not a correct calculation of the total contribution of the technology and misstates the total contribution of each technology at the assumed amount of MW. PJM's method then needs to assign this shortfall between the total portfolio value and the sum of the first in values multiplied by the total MW of the technology.

The next step ("last in") defines the marginal contribution of each technology, assuming that all the intermittent resources are already included. As with the first in, PJM's simple multiplication of the marginal result by the MW of the technology is not a correct calculation of the total contribution of the technology and understates the total contribution of each technology.

PJM then creates an allocator based on the difference between the first in and last in values for each technology as a share of the total such differences. That allocator is used to allocate the difference between the total portfolio value and the sum of the first in values.

Despite trying to describe the method clearly and simply, it is clear that the PJM allocation method is not based on economics or engineering. Despite the names attached to the components of this method, e.g. Portfolio Diversity Interaction, the method is arbitrary and fails to address the portfolio diversity interactions in an analytical way or based on economics. It is a workaround that is required by PJM's failure to define the issues correctly in the first place.

PJM did not actually use EEE's delta method. PJM's delta method switches the use of first in and last in ELCC values in each step of EEE's delta method. PJM did not explain why they made this choice, whether there was any economic or engineering basis, or what the impact of the choice is. This is one example of arbitrary decisions made that could have an impact on the results.

The premise of the ELCC approach to defining the reliability contribution of different resource types is that there is a definable functional ELCC relationship among resource types. Given that relationship, economics provides a correct, internally consistent approach to determining the ELCC values. The premise of the ELCC method is that total ELCC is a function of the interaction (See Appendix A page 18) among resources in a portfolio. This means that there is a definable function for total ELCC that explicitly describes both the marginal contributions of a resource to total ELCC and the marginal interactions among resources for all combinations of resources in a portfolio. The marginal and total valuations of ELCC contributions would not result in the need for an ad hoc method to allocate ELCC among affected resources. The conclusion reached by PJM, that ad hoc judgements are needed to attribute ELCC valuation among resources, is based on a misunderstanding and misspecification of the relationship among marginal, average and total values from a single functional form.

While PJM has used the marginal ELCC in its calculations of first in and first out, PJM has incorrectly claimed (PJM's Appendix A at 11) that using marginal ELCC values for determining resource specific ELCCs does not result in the correct total contribution to reliability. This conclusion comes from the erroneous assumption that the marginal ELCC of a resource (either first in or last in) at a particular portfolio mix would or should be used as the fixed ELCC value of every MW of that resource for determining total ELCC contributions of that resource. Assuming this interpretation of the marginal ELCC for any resource demonstrates a misunderstanding of the marginal value of a functional form. Assuming this incorrect interpretation of the marginal ELCC (first in or last in ELCC applied to every MW) results in the delta between total portfolio ELCC and the sum of

ELCCs from class specific contributions to the total portfolio ELCC and generates the need for an ad hoc, arbitrary way to allocate the resulting delta. This is the reason that PJM's flawed overall approach to ELCC requires the proposed delta method. The fact that PJM needs a delta method is evidence that their logic is internally inconsistent and their understanding of marginal and average concepts is incorrect.

The theory underlying ELCC analysis requires the use of marginal rather than average ELCC values for determining unit specific contributions to total contributed capacity by class, for determining the UCAP obligations of cleared resources, for determining market clearing prices for ELCC affected resources and for determining potential performance penalties for ELCC affected resources. It is generally recognized that marginal ELCC values for PJM's identified ELCC resource types will decline as additional MW of that ELCC resource are added. (See PJM's Appendix A p. 6, 9) The use of average rather than marginal ELCC values will cause PJM's capacity market results to be incorrect and inefficient.

B. PJM's Response to Question 2

The Commission's question 2 is about the impact of changes in ELCC class definition. PJM expects the ELCC class definitions to change periodically in response to innovation and new technology. PJM's response to question 2 highlights another issue caused by the guaranteed ELCC floors. When a previously defined class is split into two or more classes, the previously guaranteed floor values must also be split. When two or more classes are combined to form a single new class, the previously guaranteed floors must also be combined.

PJM's complex response illustrates the type of unnecessary complications that arise from a guarantee of floors in the proposed ELCC design. PJM's answer states (at 7): "the floors for a given resource whose class has been redefined will be adjusted based on a ratio of the aggregate performance of the newly defined class of which it is a member relative to the aggregate performance of the previously defined class of which it had been a member."

This proposed method makes no effort to capture and account for the marginal interactions among the subclasses that are either being split or combined. All of the interactions assumed by PJM among the subclasses are based on average ELCC contribution to the class ELCC, not the marginal interactions. PJM proposes to use "estimated hypothetical historical output" as the basis for these calculations.[8] Estimated hypothetical data is not an appropriate basis for any market design and illustrates the implications of trying to project floors 10 years into the future in the face of changing reality.

The proposed method introduces further uncertainty into the process for investors, directly counter to the stated intent of the proposal. This illustrates again that fundamental market and technological uncertainties cannot be eliminated. Attempts to create complex and unworkable bureaucratic workarounds will not succeed.

C. PJM's Response to Question 3

In question 3, the Commission asks PJM to explain, in detail, what will happen when the ELCC floors bind and require hard decisions with winners and losers. PJM fails to provide substantive responses to multiple parts of question 3.

The October 30th Filing includes guaranteed floor values for the defined ELCC technologies.[9] The floor values establish a lower bound on the ELCC value for a group of resources.[10] Floor values will be in place for the first 13 delivery years for new ELCC

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[8]   Section E(2)(a) in proposed RAA Schedule 9.1, Attachment A to March 1st Filing.

[9]   *See* Section J of Schedule 9.1 in the proposed updates to the PJM Reliability Assurance Agreement, Attachment A to "Effective Load Carrying Capability Construct", Federal Power Act Section 205 filing ("October 30th Filing"), ER21-278-000, PJM Interconnection, L.L.C., October 30, 2020.

[10]   October 30th Filing, Attachment A (Redlines), proposed RAA Schedule 9.1 § J(1).

resources, and for at least 11 years for other ELCC resources.[11] Guaranteed floor values create multiple issues including the risk that the floors will require payment to resources covered by the floors that are greater than the correct market values. PJM proposes a number of workarounds to the issue, including convening stakeholder processes in the future to address how to assign the negative consequences.

PJM states in proposed RAA language that the ELCC for a class must always be above the predetermined floor value. The proposed RAA also states that ELCC classes are to be organized into groups for the purpose of sharing the risk that an ELCC class floor is binding.[12] In other words, in order to retain the floor values for ELCC resources with an actual ELCC that falls below the predefined floor, PJM will take capacity away from ELCC resources with an actual ELCC value that is above the applicable floor. But the proposed RAA language and the other materials that accompanied the October 30th Filing did not provide details on the formation of the risk sharing groups nor the prospective allocation of "claims." PJM simply noted that an allocation method would be specified in a PJM Manual.[13]

PJM's response to question 3 is really not an answer. It is not a reasonable design to leave significant risks like this unidentified. Since PJM does not actually answer the question, preferring to defer the answer to a future manual change that does not require review, PJM does not have to address the many details that follow from their high level proposal. Presumably the ELCC class would be the first level for defining a risk sharing group. If a resource has a binding ELCC floor, then other ELCC resources in the same class

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[11]   Each ELCC resource will be associated with an ELCC floor schedule corresponding to the resource's ELCC class and first delivery year for which the resource satisfies certain queue milestones.

[12]   *Id.* at Section J(3)(e).

[13]   *Id.* at Section J(3)(e)(ii)

would be assigned a capacity value below the actual ELCC capacity value in order to cover for the resource with the binding floor. However, since the available capacity in excess of the floors may be quickly exhausted for the ELCC class, this approach for defining risk sharing groups requires that a hierarchy of risk sharing groups be established. This quickly becomes a very complicated task which creates winners and losers based on arbitrary rules and associated unknown levels of risk for market participants.[14]

The example provided by PJM in Appendix A is simplistic; a single resource has an ELCC class rating above the floor, and three resources have ELCC class ratings below the applicable floors. The floor values guaranteed for the three resources are to be met by taking capacity value away from the single resource. Appendix A provides little information beyond the material already provided to stakeholders when the concept of floors was introduced in July 2020.[15]

It is an understandable and predictable result of PJM's guaranteed long term floor approach that it creates a need to arbitrarily define winners and losers when the floors collide with reality. To date, the PJM ELCC proposal has only abstractly defined the need for the reduction of capacity values for one group of resources to cover the guaranteed floors established for another group of resources. It is clear even at the current abstract level that new resources with superior technology will lose out to older less efficient resources. But many questions remain unanswered with the requested effective date less than four months away. Will the new policy favor a particular technology? Will capacity values be

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[14]   The PJM Capacity Capability Senior Task Force is considering alternatives and their most recent documentation indicates there are five proposals on the table. The five proposals are wide ranging with each proposal specifying criteria for categorizing the ELCC resources into risk sharing groups. See "Item 4 Effective Load Carrying Capability Floor Grouping" in the meeting materials for the PJM Capacity Capability Senior Task Force, March 8, 2021 <*https://pjm.com/-/media/committees-groups/task-forces/ccstf/2021/20210308/20210308-item-04-elcc-floor-groupings.ashx*>.

[15]   *See* Slide 12 in "Emerging Strawman," Item 6 in the meeting materials for the Capacity Capability Senior Task Force, July 27, 2020.

reduced for wind generators in order to honor floor values for solar generators? Will solar and wind generators subsidize limited duration resources? These are difficult questions to answer because the underlying design is so badly flawed. There are no good answers to the questions posed by the Commission. PJM and the stakeholder group that supported this ELCC design are now faced with the task of codifying a process that will take capacity value from one group of resources and award it to another. The fact that these questions need to be addressed is evidence that PJM's design is flawed. An efficient ELCC policy that relies on market mechanisms would not require the RTO and its stakeholders, or the Commission, to choose winners and losers.

Another risk is that aggrieved resource owners could seek compensation from PJM if they lose some ELCC value as a result of this process. There is an unfortunate precedent in the case of storage resources. Battery owners complained that the compensation rules changed and were paid a significant amount in a settlement with PJM as a result.[16]

In response to question 3d, PJM addresses the situation in which there is not sufficient ELCC capacity to cover the guaranteed floor values. PJM starts by asserting, without any basis, that this situation will likely never occur. PJM added additional language to RAA Schedule 9.1 but the accompanying description of the issue is incorrect. PJM argues (at 12) that anticipated "large volumes of new ELCC Resources entering service in the coming years" will "add to the amount of UCAP available to support previously issued floors" and that this makes it unlikely there will ever be a situation where floors cannot be fully supported. But in fact, large volumes of new ELCC resources will reduce the incremental capacity values of ELCC resources, with the result that older ELCC resources will be at their floor values. PJM has not provided the floor values. PJM's response to question 3d is evidence that the proposal is antithetical to technological innovation and new

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[16]   *See PJM Interconnection, L.L.C.*, 170 FERC ¶ 61,258 (2020).

entrants with superior technology. Under the PJM design, the ELCC values of new resources will be suppressed in order to support the floors of incumbent resource owners.

D. PJM's Response to Question 4

The Commission's question 4 asks about the relationship between a unit's CIR, its UCAP and its ELCC capacity value.

PJM's responses to the parts of question 4 demonstrate that PJM's ELCC filing does not address the issues raised by the Commission and demonstrates one of many fundamental flaws in PJM's ELCC analysis.

PJM's responses to question 4.a and 4.b illustrate that PJM does not have a method for reconciling the differences between current CIR values and expected ELCC values. PJM has started a stakeholder process to address these issues. PJM recognizes that inconsistencies between CIRs and ELCC values will persist and may require extensive additional interconnection studies. There is already a significant backlog in interconnection studies. These issues are an essential part of the ELCC design and the PJM capacity market design and therefore the reliability of the PJM system and should not be treated as a secondary matter.

The fundamental flaw in PJM's analysis is explained in PJM's response to 4.e. PJM acknowledges that the ELCC analysis assumes that the ELCC resources inject more power at times than they will actually be able to inject based on their CIRs. In other words, the ELCC analysis is not consistent with the way that capacity is defined. PJM sets a CIR value for all generation resources based on their deliverability to the grid under identified conditions. For thermal resources, the CIR value sets the amount of capacity that must be offered into the capacity market and limits the injection rights of the resource.

This is a flaw not only under current definitions and practice but will continue to be under PJM's ELCC proposal. The CIR value is based on average output over 368 hours. By definition, the output will exceed the average value for a substantial number of the

resource's hours of operation. In other words, even when done as designed, the ELCC design is inconsistent with the actual deliverability of ELCC resources.[17]

While PJM's entire response to 4.e should be read carefully, this part makes the point very clearly. PJM's reliability analysis ignores the actual power that an ELCC resource will be able to provide when needed for reliability.

> The ELCC analysis evaluates the contribution to reliability of the output of the Variable Resource or Combination Resource without regard to a resource's (expected) UCAP or CIR levels. As a result, the reliability value of output above a resource's CIR level is included in the ELCC evaluation.

These issues need to be fully addressed before the ELCC proposal is ready for prime time.

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[17] *See* March 1st Filing (PJM response to 4.e.) at 24.

II. CONCLUSION

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

Respectfully submitted,

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Dated: March 22, 2021

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 22nd day of March, 2021.

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