UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C.	)	Docket No. ER21-2043-000

COMMENTS 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 on the filing submitted by PJM Interconnection, L.L.C. ("PJM") on June 1, 2021 ("June 1st Filing"). The June 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 August 1, 2021.[3]

PJM explains (at 2) that the June 1st Filing is "nearly identical" to PJM's previously proposed ELCC approach that was rejected by an order issued April 30, 2021 ("April 30th Order").[4] The April 30th Order rejected PJM's filing based on PJM's inclusion of an ELCC transition mechanism as unjust and unreasonable.

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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 June 1st Filing at 4.

4 *PJM Interconnection, L.L.C.*, 175 FERC ¶ 61,084 (2021) ("April 30th Order").

The Commission reasonably focused on the most objectionable feature of PJM's ELCC filing, the lengthy transition mechanism. The same was true of many of the comments. PJM's refiling of the same proposal, without the transition mechanism, provides the Commission and commenters the opportunity to focus more carefully on the other elements of the PJM proposal. The core parts of the PJM ELCC remain significantly flawed. While the ELCC approach remains a promising path toward calculating the actual reliability contribution of all technology types, PJM's approach steps off that path in ways that will create issues that will be hard to resolve in the future. It is essential to get it right now before developers, investors and customers are committed to a faulty approach that provides the wrong price signals to all in the market. The ongoing evolution of the MOPR rules makes it even more important to get the reliability contribution of all resource types correct. PJM's ELCC approach proposed in the June 1st Filing is unjust and unreasonable and unduly discriminatory. This pleading incorporates by reference the objections included in the Market Monitor's prior pleadings, in order to ensure a complete record. The Market Monitor requests consideration of the issues that remain in PJM's filing and provides additional responsive arguments and information.

I. COMMENTS

A. The Marginal Approach is Fundamental to Efficient Markets.

Resistance to the marginal approach to valuing intermittent resources is generally based on unhappiness with the results rather than arguments that the marginal approach is incorrect. As demonstrated in California, recognizing the marginal approach in a market with extremely large penetration of intermittent resources, after years of ignoring the declining marginal contributions of intermittents to reliability, would have a significant impact. PJM has the opportunity to do it right, from the beginning.

The E3 arguments, which underpin PJM's approach, are explicitly based on a ratemaking rather than a market approach.[5] Under the ratemaking approach, subjective judgments about tradeoffs are central rather than market logic. The E3 approach supports the average approach over the marginal approach based on subjective judgments about the impacts of the marginal approach rather than economic logic. At least one such core subjective judgment is based on a misunderstanding of the marginal approach. The PJM market is a market and generators are not subject to cost of service regulation, and regulators do not make decisions about how to dispatch resources or how to define the reliability contribution of resources. The PJM/E3 approach would apply a nonmarket approach to the PJM markets. The PJM/E3 approach would put PJM in the position of the ratemaking authority. The PJM/E3 approach should be rejected for these reasons and PJM directed to use market logic to apply ELCC.

The Commission stated (at P 54) that the Market Monitor's comments in support of a marginal approach are not relevant "to an evaluation of PJM's proposal under FPA section 205." The Federal Power Act requires that PJM demonstrate that its proposal is just and reasonable. PJM has not made the required demonstration. The issue of the correct design of the PJM Capacity Market is too important to be addressed by a solution inferior to a readily available alternative. It is not just and reasonable to propose or to approve a demonstrably inferior approach with no valid rationale. The marginal approach will produce efficient pricing, consistent with the logic of market based regulation. The average approach is designed to produce unduly discriminatory and preferential outcomes. The average approach has not been shown to be just and reasonable, the June 1st Filing should be rejected, and PJM should be permitted to resubmit its filing with a marginal approach.

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[5] E3, Capacity and Reliability Planning in the Era of Decarbonization; (August, 2020) <https://www.ethree.com/wp-content/uploads/2020/08/E3-Practical-Application-of-ELCC.pdf>.

The Market Monitor's discussion of the marginal approach to ELCC demonstrated why the average approach is incorrect and will result in an inefficient market design and market outcomes and is therefore not just and reasonable. The marginal approach is a standard application of economic theory and thus fully consistent with PJM's existing efficient market design. The marginal approach is already core to the PJM market design and should also be used as the basis for an efficient ELCC design. [6] [7]

The Commission stated (at 21) "that PJM explains that PJM and its stakeholders carefully considered the benefits and costs of a marginal versus average ELCC approach and ultimately selected an adjusted class average approach." This implies that there was an analytical comparison of the two approaches in the stakeholder process. That is not correct. PJM did not present any detailed evaluation or comparison of the marginal and average methods.

Table 1 includes a list of presentations made during the stakeholder process that at least touched on the average versus marginal ELCC issue. PJM presented one illustrative example on several occasions but never provided any marginal ELCC rates based on actual PJM data. The only comparison of average and marginal ELCC rates based on actual data was for energy storage resources in California. Energy + Environmental Economics ("E3"), acting as a consultant on PJM's behalf, presented a list of pros and cons related to average and marginal ELCC. The Market Monitor made two presentations describing the errors introduced with an average ELCC approach and provided a general description of an efficient marginal ELCC implementation. Neither PJM nor E3 responded to the Market Monitor's presentation of the basic economics of the marginal approach. Illustrative

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[6] Comments and Motion of the Independent Market Monitor for PJM, ER21-278-000 (November 24, 2020) at 18–20 ("November 24th IMM Comments").

[7] Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM, ER21-278-000 (December 18, 2020) at 6–7.

examples and a listing of asserted pros and cons do not constitute a careful consideration of benefits and costs. PJM did not present an analysis of the two approaches or a discussion of efficient market design. PJM's limited discussion of the marginal approach was based on a flawed understanding/assertion that "the marginal framework does not generally credit a portfolio of resources for its total contribution to resource adequacy."[8]

[8] PJM at 22.

Table 1 Marginal ELCC discussion during the stakeholder process[9] [10] [11] [12] [13] [14]

Date	Organization	Document Name	Page Numbers	Marginal ELCC Material
April 27, 2020	PJM	ELCC Rules at other ISO-RTOs	5, 9-12, 22	Description of the ELCC methods at other RTOs; includes an average vs marginal comparison for energy storage resources in California.
April 27, 2020	PJM	Proposed ELCC Design Components with Examples of Solution Options	6	Illustrative example of average ELCC rates compared to marginal ELCC rates
June 22, 2020	PJM	PJM Initial Package for ELCC Solution	24-25, 29-32	Illustrative example of average ELCC rates compared to marginal ELCC rates; speculative comments on the relationship between marginal ELCC and generator output during peak load hours
August 7, 2020	E3	Practical Considerations for Application of Effective Load Carrying Capability	9-11	Portfolio and marginal ELCC defined; pro & con comparison of average and marginal ELCC
August 7, 2020	MMU	ELCC - IMM Proposal	3-8	General description of a dynamic marginal ELCC implementation; illustrative examples highlighting the differences between average and marginal ELCC.
August 12, 2020	MMU	ELCC - IMM Proposal	4-14	Theoretical discussion of marginal ELCC implementation

The Market Monitor addressed PJM's flawed understanding by explaining that with a marginal approach the cleared capacity for ELCC resources would be equal to the "area

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[9] *Item 5 ELCC Rules at other ISO-RTOs*, Meeting Materials for the PJM Capacity Capability Senior Task Force, PJM (April 27, 2020) <https://pjm.com/committees-and-groups/task-forces/ccstf>.

[10] *Item 7 Proposed ELCC Design Components with Examples of Solution Options*, Meeting Materials for the PJM Capacity Capability Senior Task Force, PJM (April 27, 2020) <https://pjm.com/committees-and-groups/task-forces/ccstf>.

[11] *Item 7A PJM Initial Package for ELCC Solution*, PJM, Meeting Materials for the PJM Capacity Capability Senior Task Force (June 22, 2020) <https://pjm.com/committees-and-groups/task-forces/ccstf>.

[12] *Item 4C Practical Considerations for Application of Effective Load Carrying Capability*, E3, Meeting Materials for the PJM Capacity Capability Senior Task Force (August 7, 2020) <https://pjm.com/committees-and-groups/task-forces/ccstf>.

[13] *Item 6C, ELCC IMM Proposal*, Monitoring Analytics, Meeting Materials for the PJM Capacity Capability Senior Task Force (August 7, 2020) <https://pjm.com/committees-and-groups/task-forces/ccstf>.

[14] *Item 6A ELCC IMM Proposal*, Monitoring Analytics, Meeting Materials for the PJM Capacity Capability Senior Task Force (August 12, 2020) <https://pjm.com/committees-and-groups/task-forces/ccstf>.

under the marginal ELCC curve for a given MW amount" and this amount is the total amount of capacity provided.[15] PJM represented the average versus marginal question as a choice between two flawed approaches rather than using logic and analysis to define the correct approach or even to fairly evaluate both approaches. PJM misunderstands the implications of their own proposal when PJM states that the average "ELCC construct is not being established to determine signals for entry and exit to the market—the auction clearing process and Capacity Performance obligations already accomplish that objective."[16] But that is exactly what the ELCC calculations do. The correct capacity contribution is integral to the auction clearing and the correct ELCC values are a function of the auction clearing. PJM's approach will significantly distort the entry and exit signals for all resource types.

The PJM average ELCC approach assigns capacity values to intermittent resources in excess of the marginal capacity value. This follows from the fact that the marginal contributions of intermittents decrease as more are added.[17] [18]

The results of overstating the reliability contribution of intermittents through the use of an average ELCC include the overstatement of reliability, increased costs to consumers and incorrect price signals.

Table 2 is an illustrative example. Consider an ELCC class that is made up of six 50 MW renewable generators and each generator offers at $20 per MW-day ICAP. If the ex ante average ELCC is 0.20 then the equivalent offer in UCAP terms is $100 per MW-day

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15 *See* November 24th IMM Comments at 20.

16 PJM Transmittal Letter (at 23), Effective Load Carrying Capability, Docket ER21-278-000 (October 30, 2020).

17 *Item 5 ELCC Rules at other ISO-RTOs*, Meeting Materials for the PJM Capacity Capability Senior Task Force, PJM (April 27, 2020) <https://pjm.com/committees-and-groups/task-forces/ccstf>.

18 *See* E3, NorthWestern Energy Incremental ELCC Study – Project Results (July 14, 2020) <https://www.northwesternenergy.com/docs/default-source/documents/defaultsupply/appendix-2-e3-report-on-elccs.pdf>.

UCAP when recovered over 10 MW of UCAP because the resource requires $1,000 per day in total compensation. This is the price that the capacity auction will use to clear the generators. The renewable generators' capacity contribution as well the market value of the renewable generators' cleared capacity is dependent upon the marginal ELCC rate corresponding to the capacity resource mix that clears the auction. The economic principles still apply despite the fact that PJM has chosen not to follow the economics. The $100 per MW-day UCAP offer would only be correct in the coincidental case that the ex post marginal ELCC rate is equal to the ex ante average ELCC rate. This is an unlikely if not impossible outcome given that the average ELCC rate undervalues the capacity on a $/MW-day UCAP basis which will lead to an over purchase of the ELCC capacity. Table 2 shows the degree to which the assumed ex ante market value of the capacity (or effective offer price in $/MW-day UCAP) for purposes of clearing the auction contrasts with the actual realized capacity market value based on the ex post marginal ELCC rates corresponding to the resource mix that cleared the auction. The assumed ex post marginal ELCC rates, developed for illustrative purposes, satisfy the mathematical relationship between an average ELCC curve and the corresponding marginal ELCC curve. In Table 2, this mathematical relationship requires the cumulative ELCC MW based on ex post average ELCC rates to be equal to the cumulative ELCC MW based on the marginal ELCC rate. The last row shows the capacity values for the case when the ex ante ELCC analysis is consistent with the ex post auction results. There is a significant disparity between the effective offer price of $100/MW-day UCAP compared to the actual capacity market value of $1,500/MW-day UCAP which is based on a marginal ELCC rate of 0.013.

Table 2 Understatement of capacity market value under average ELCC

Resource	ICAP MW	Offer Price $ per ICAP MW-day	Ex ante Average ELCC Rate	Ex post Average ELCC rate	Ex post Marginal ELCC Rate	Cumulative ICAP MW	Cumulative ELCC MW based on ex ante Average ELCC	Cumulative ELCC MW based on ex post Average ELCC	Cumulative ELCC MW based on Marginal ELCC Rate (Area under the marginal ELCC function)	Effective Offer Price used to clear auction under PJM Average ELCC Approach $ per UCAP MW-day	Actual Capacity Market Value $ per UCAP MW-day
1	50	$20.00	0.200	0.600	0.600	50.0	10	30	30	$100.00	$33.33
2	50	$20.00	0.200	0.380	0.080	100.0	20	38	38	$100.00	$250.00
3	50	$20.00	0.200	0.300	0.047	150.0	30	45	45	$100.00	$428.57
4	50	$20.00	0.200	0.255	0.030	200.0	40	51	51	$100.00	$666.67
5	50	$20.00	0.200	0.224	0.020	250.0	50	56	56	$100.00	$1,000.00
6	50	$20.00	0.200	0.200	0.013	300.0	60	60	60	$100.00	$1,500.00

Given that the marginal capacity values of intermittents are less than the average capacity values of intermittents, the math leads to the unavoidable conclusion that the average approach will understate the capacity market cost/value ($/MW-day UCAP) of intermittents. PJM did not provide any analysis of what this understatement is expected to be. A demonstration that the PJM average ELCC method is just and reasonable requires such an analysis. PJM has not provided any marginal ELCC analysis to the PJM stakeholder group.

The April 30th Order (at P 54) states: "[W]e agree with PJM that an adjusted class average approach is appropriate because it: (1) applies uniform capacity obligations on similarly situated resources based on their class average contribution to system resource adequacy; and (2) ensures that the sum of resource class's accredited capacity values is equal to the aggregate reliability value of the ELCC Resource portfolio."

Of course similarly situated resources should expect the same outcome under a just and reasonable application of a market rule. This is not a characteristic unique to the PJM average ELCC method. A marginal approach would do the same. The second point appears simply to note that PJM's method assigns capacity values to resource classes so that they equal the aggregate value by definition.

The April 30th Order states (at 55) "that PJM generally can predict the resource quantities by class prior to making a final ELCC Class Rating determination such that its ex ante ELCC analysis is sufficiently accurate." But this assertion is not correct. PJM has not demonstrated or asserted its ability to accurately predict, from the pool of existing and

planned ELCC resources, the amount that will clear in the upcoming PJM Capacity Market Auction, which is what PJM would have to do. Even if PJM predicted, five months before the auction, the level of intermittent MW to be offered, that is very different than predicting the offer prices for intermittents and the offer MW and prices of all thermal resources, all of which is necessary to predict the level of cleared MW by technology type for intermittents.

An accurate ex ante ELCC analysis would require that PJM accurately predict the overall level of capacity cleared. In other words, PJM has to predict the UCAP level that will clear in the BRA without knowledge of the generator offers and prior to the determination of the VRR curve.[19] Accurate ELCC values can only be obtained by dynamically determining the ELCC values in the capacity auction. It is not reasonable to have a market design that depends on the system operator's ability to accurately predict the outcome of the base residual auction five months prior to the auction.

Any assertion that the PJM average ELCC method is just and reasonable should require support based on a detailed analysis that shows the impacts on ELCC values over a range of ICAP levels for both ELCC resources and non ELCC resources. Such an analysis has not been performed.

B. PJM's Assumptions Predetermine its ELCC Results for Batteries.

In the April 30th Order (at P 51) the Commission states that "[o]verall, PJM's proposed ELCC construct appears to allocate capacity values to resources using a logical and methodical process that reasonably estimates each resource type's reliability contribution based on the alignment of each resource's expected output profile with PJM's expected load profile." The Commission disagrees (at P 51) "with the IMM's assertion that PJM's assumptions regarding Limited Duration Resource behavior have no basis." The

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[19] Note that this prediction is further complicated by the downward sloping VRR curve, and the nested LDA construction used in the RPM. The downward sloping portion of the curve in the 2022/2023 BRA curve included 10,395.7 MW.

Commission goes on to state (at P 56) that "[a]lthough we agree with the IMM that resources are expected to engage in profit-maximizing behavior, it is also reasonable to expect that capacity resources will consider the risk of incurring capacity market nonperformance charges and preserve storage capability accordingly for periods where performance assessment intervals are likely to occur." On this basis, the Commission agrees (at P 56) with PJM's conclusion "that a 4-hour Limited Duration Resource has an ELCC Class Rating that is 'the approximate equivalent of a new, efficient gas fired combined cycle plant.'[footnote omitted]." The Commission asserts (at P 56) that a "preliminary ELCC Class Rating for 4-hour electric storage resources provided in PJM's Deficiency Letter Response (79%) is reasonable."

The Market Monitor disagrees with the statement (at P 51) that PJM has used a logical and methodical process that reasonably estimates each resource type's reliability contribution based on the alignment of each resource's expected output profile with PJM's expected load profile. The ELCC for batteries proposed in the June 1st Filing is not based on reasonable or supportable assumptions about limited duration storage resources' expected output profile. The ELCC analysis therefore does not, particularly in the case of limited duration storage resources, provide reasonable estimates of reliability contributions (ELCC values) of resources types. It is not plausible that a four hour battery provides the same reliability contribution to the system as a combined cycle unit that can operate effectively without limits. Combined cycle units in PJM had a capacity factor of 50.7 percent in the first three months of 2021 and a capacity factor of 56.0 percent in the first three months of 2020.[20]

[20] 2021 Quarterly State of the Market Report for PJM: January through March, Section 5: Capacity Market, pg 305.

Batteries in PJM had a capacity factor of 1.2 percent in the first three months of 2021 and a capacity factor of 1.0 percent in the first three months of 2020.[21]

As the Commission notes (at P 51), the ELCC value of a resource is entirely dependent on the assumed output of that resource type in every hour relative to the assumed output of every other resource in the same hour and relative to the load in the same hour for every hour in the study period. PJM's ELCC valuation for limited duration storage is dependent on strong and unsupported behavioral assumptions about battery resources and when they will use their limited capacity to inject power into the grid. PJM simply assumes that individual battery owners, each with their own incentives, will collectively behave in a way that maximizes their ELCC value rather than their profits. Specifically, PJM assumes that the output of limited duration storage (batteries) is only used "in hours in which all output from Unlimited Resources and available output from Variable Resources is insufficient to meet load."[22] Such conditions are equivalent to a Performance Assessment Hour (PAH).

PJM assumes that this behavior occurs every day, and not just on days when performance assessment intervals are likely to occur. While the Commission agrees (at P 56) with the Market Monitor that it is reasonable to assume that limited duration resources will engage in profit maximizing behavior, no factual or hypothetical support has been provided by anyone that profit maximizing storage resources will behave as assumed by PJM in its modeling. PJM never considers, defines or models profit maximizing behavior for batteries. PJM's assertions are simply assumptions, made without any supporting evidence or even analysis. PJM's assumptions predetermine its ELCC outcomes for batteries.

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[21] See 2021 Quarterly State of the Market Report for PJM: January through March, Section 5: Capacity Market, pg 305.

[22] *See* PJM at 30.

PJM's calculated ELCC values for storage depend entirely on an unsupported and unsupportable assumption about the hypothetical behavior of storage resources with a central planner rather than in a wholesale power market. This assumption is also used in ELCC studies by other RTOs, including NYISO and CAISO. [23] [24]

The basis for the assumption is in the E3 studies that are the foundation of the PJM, NYISO and CAISO's ELCC analysis.[25] The E3 studies are from a regulated utility and planner perspective rather than a market perspective. The E3 studies assume ELCC maximizing behavior by storage resources based on a hypothetical perfect, centrally controlled dispatch that reserves the output of batteries for periods where they provide the most ELCC value to the planner. The E3 studies do not reach a conclusion about whether the assumed behavior is profitable, whether any entry would occur if this were the behavior and whether any actual battery in a market behaved as E3 assumes. The E3 behavioral assumption confuses a planning process with a market. In wholesale power

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[23] The NYISO study "post processing method schedules the resources to meet the system need at the most optimal time for the resource. The most optimal time of the day has the smallest capacity margin + emergency assistance available. E.g. a 4-hour resource would be scheduled in the most optimal 4 hours of the day." <https://www.nyiso.com/documents/20142/3832196/Capacity%20Value%20Study%20Summary.pdf/e43f7c7b-cada-04be-05b2-95c1d9e1f007>.

[24] *See* CAISO. Deliverability Assessment Methodology (April 24, 2019) <http://www.caiso.com/Documents/IssuePaper-GenerationDeliverabilityAssessment.pdf>; See also Astrapé Consulting. Energy Storage Capacity Value on the CAISO System (November 20, 2019) <https://www.cpuc.ca.gov/uploadedFiles/CPUCWebsite/Content/UtilitiesIndustries/Energy/EnergyPrograms/ElectPowerProcurementGeneration/irp/2018/2019-20%20IRP%20Astrape%20Battery%20ELCC%20Analysis.pdf>.

[25] *See* E3, <*https://www.ethree.com/elcc-resource-adequacy/*>; E3, Capacity and Reliability Planning in the Era of Decarbonization; (August, 2020) <https://www.ethree.com/wp-content/uploads/2020/08/E3-Practical-Application-of-ELCC.pdf>; E3, NorthWestern Energy Incremental ELCC Study – Project Results (July 14, 2020) <https://www.northwesternenergy.com/docs/default-source/documents/defaultsupply/appendix-2-e3-report-on-elccs.pdf>; E3, Demand Response ELCC, CAISO ESDER Stakeholder Meeting (May 27, 2020) <http://www.caiso.com/InitiativeDocuments/E3Presentation-EnergyStorage-DistributedEnergyResourcesPhase4-May27-2020.pdf; CAISO. Deliverability Assessment Methodology (April 24, 2019) <http://www.caiso.com/Documents/IssuePaper-GenerationDeliverabilityAssessment.pdf>.

markets batteries provide regulation because it is more profitable than waiting for a PAH. Given the very low level of PJM PAH, waiting would not have been a profitable strategy at any point since the introduction of the capacity performance capacity market design. The actual behavior of batteries in the actual market designs is not modeled in the PJM, NYISO or CAISO ELCC analyses.

Unlike PJM and NYISO, California has had time to implement its assumptions about the ELCC value of batteries. CAISO's operational experience with batteries has not matched the assumptions CAISO made in its ELCC analysis when creating its resource adequacy plans. The reason for the discrepancy between assumed and realized behavior by CAISO's storage resources is that actual profit maximizing battery owners chose to provide regulation in all hours of the day rather than behave as assumed by E3 and the perfect central planner.[26] The same behavior is expected and observed in PJM.

PJM's ELCC analysis includes demonstrably incorrect behavioral assumptions for batteries that directly determine the ELCC values for batteries. There is no analytical basis for PJM's assertion that the initial ELCC Class Rating for 4-hour electric storage resources provided in PJM's Deficiency Letter Response (79 percent) is reasonable.

C. The Delta Method is Arbitrary and Irrelevant.

In the April 30th Order (at P 57), the Commission stated: "We disagree with the IMM's claims that PJM's method is "arbitrary" and does not actually use E3's Delta Method. Contrary to the IMM's assertions, PJM's proposed formula is the same as E3's formula, albeit expressed differently. [n.93: This can be verified by setting the two mathematical expressions equal to each other and solving.]"

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[26] *See* Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements, Rulemaking 16-02-007, Comments of the California Independent System Operator Corporation (January 22, 2019) <*https://www.caiso.com/Documents/Jul22-2019-Comments-PotentialReliabilityIssues-R16-02-007.pdf*>.

The Commission's statement is correct about the total ELCC value. The Delta Method is about how to allocate the total among classes. PJM's proposed Delta Method is not the same as the E3 Delta Method. The PJM Delta Method is arbitrary.

While the starting point of both calculations is the sum of the class ELCC totals within the total Portfolio ELCC value, the class specific total ex ante ELCC values generated by the E3 Delta Method and the PJM Delta Method are not the same. The E3 Delta Method and PJM Delta Method calculations are different ways to divide the total portfolio among the classes.

E3's Delta Method calculates the euphemistically named portfolio diversity impact as the difference between the total portfolio ELCC and the sum of all first in ELCC values of individual ELCC classes. PJM's Delta Method calculates the portfolio diversity impact as the difference between the portfolio ELCC and the sum of all last in ELCC values of individual ELCC classes. The class specific last in ELCC value is lower than the first in ELCC value for any class of resources. This means that the portfolio diversity impact under the PJM Delta Method will be a larger portion of total ELCC valuation than under the E3 Delta Method. Under both the PJM and E3 Delta Methods, this portfolio diversity impact is allocated among classes in proportion to the differences between the first in and last in ELCC values of each class relative to the sum of the differences between first in and last in ELCC values of all classes. The class specific allocation of the portfolio diversity impact is called the ELCC adjustment. The resulting proportions among the resource classes will be the same (but could be of opposite sign) between E3 and PJM approaches, but the amount being apportioned between the two methods (the portfolio diversity impact) will be different, meaning the ELCC adjustment under the E3 Delta Method will not match the ELCC adjustment under the PJM Delta Method. PJM measures the total ELCC of the class as the last in ELCC plus the PJM calculation of the class specific allocation of the portfolio diversity impact. E3 measures the total ELCC of the class as the first in ELCC plus the class specific allocation of the portfolio diversity impact.

The PJM and E3 approaches are not the same and generate different results on a class specific basis. There is, however, no way to determine, objectively, which of the two approaches is better. That is because both approaches are arbitrary and not grounded in any fundamental theory about the load carrying capability of resources. The Delta Method is not based on fundamental economic or mathematical theory about the interaction between average and marginal values in a continuous function.

D. Locational Differences Should Not Be Ignored.

The April 30th Order (at P 52) states: "Contrary to the assertions of P3, the IMM, and LS Power, we concur with PJM that the ELCC analysis to determine the UCAP of the entire set of ELCC Resources does not need to account for the locational nature of resources and transmission constraints within the PJM footprint." The Commission further states (at P 52): "PJM's existing resource adequacy study, the Reserve Requirement Study, does not consider transmission constraints within the PJM region because the transmission planning process ensures that specific areas of the PJM footprint have the necessary transmission infrastructure to receive the required level of energy imports. [footnote omitted]" Based on this, the Commission determined (at P 52) that "it is similarly appropriate to exclude transmission constraints for the purposes of determining the UCAP of the entire set of ELCC Resources and therefore find that PJM's proposed approach would be appropriate."

PJM's Reserve Requirement Study does account for transmission limitations within the PJM footprint.[27] The PJM Reserve Requirement Study considers capacity import limitations, energy deliverability limitations and the system ability to maintain reserves given transmission limitations. Every zone/LDA has its own separate reliability requirement, enforced through CETO/CETL. PJM's transmission planning process is not

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[27] PJM. 2020 PJM Reserve Requirement Study (October 6, 2020) <https://www.pjm.com/-/media/planning/res-adeq/2020-pjm-reserve-requirement-study.ashx>.

designed to eliminate locational differences in capacity market prices or in energy market prices.

The capacity market includes locational differences as part of the fundamental design. The current capacity market was implemented in significant part to address the problems arising from the fact that the prior design did not include locational differences. Reliability was at issue in the eastern part of PJM but there was only a single price for the entire market.[28] The current design results in significant differences in capacity market prices by location.

ELCC analysis recognizes that the load carrying capability of intermittent resources depends on the share of total resources represented by of intermittent resources. The actual clearing of the capacity market reflects transmission constraints which affect the cleared level of capacity by location and offer. As a result transmission constraints will affect the ELCC values that are a function of market clearing when done optimally.

A failure to include transmission constraints as a factor that affects LDA specific portfolio mixes in an ELCC framework will deny PJM an RPM market design that is consistent with an efficient and reliable market.

E. Transparency of Model

The Commission states (at 67) "[w]e are not persuaded by commenters' claims that the inability to precisely reproduce PJM's determination of ELCC Class Ratings and Accredited UCAP values would necessarily render the proposal unjust and unreasonable or insufficiently transparent." Further, the Commission states (at P 67) that PJM has already met the standard for transparency: "[W]e believe that PJM has provided a clear explanation of the process for determining these values, which only PJM as the market operator would

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[28] Prior to 2007, PJM operated Daily, Interval, Monthly and Multimonthly Capacity Credit Market. A single clearing price for the entire PJM territory was obtained by balancing supply and demand for capacity unmet by the bilateral market or self-supply. See 2006 State of the Market Report, Section 5: Capacity Market, pg 207.

be able to produce using the proprietary market and resource-specific data available to PJM."

The Market Monitor agrees with LS Power (LS Power Protest at 10), P3 (P3 Comments at 5-6), AEP (AEP Comments at 2) and Dominion (Dominion Protest at 4) that PJM's filing is deficient because that PJM's method is not transparent and is not sufficiently documented to be reproducible.

The Market Monitor agrees with LS Power's statements (LS Power 9-10) that PJM's promises of future documentation and clarification in manuals does not address the actual lack of transparency, and does not allow participants to understand and anticipate the ELCC values that will affect their resources.

The Market Monitor agrees with P3 statements (P3 Comments 5-6) that many of the technical details of PJM's ELCC process are still under development, and therefore not knowable or reviewable, by participants. The Market Monitor agrees with P3 that it is premature, absent a transparent, documented and reproducible process, for PJM's proposed ELCC approach to be approved or implemented.

F. Relief Requested.

The June 1st Filing should be rejected. PJM should be permitted to file an ELCC that corrects the identified flaws. Use of a marginal approach should be required. In addition, the Commission should direct PJM to engage in a deliberative approach to evaluating ELCC values for all technologies and not just intermittent technologies. PJM should be directed to develop 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.

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: June 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 June, 2021.

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