176 FERC ¶ 61,056
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Richard Glick, Chairman;
Neil Chatterjee, James P. Danly,
Allison Clements, and Mark C. Christie.

PJM Interconnection, L.L.C. Docket Nos. ER21-2043-000
ER20-584-000
EL19-100-000
(consolidated)

ORDER ACCEPTING TARIFF REVISIONS AND TERMINATING SECTION 206 PROCEEDING

(Issued July 30, 2021)

1. On April 10, 2020, pursuant to Federal Power Act (FPA) section 206,[1] the Commission established paper hearing procedures to examine PJM Interconnection, L.L.C.'s (PJM) rules pertaining to the determination of capacity values for all resources.[2] The Commission also held the paper hearing in abeyance through October 30, 2020 to allow PJM and the PJM stakeholders to consider a capacity valuation methodology or methodologies to apply to all resource types.[3]

2. On October 30, 2020, pursuant to FPA section 205,[4] PJM submitted proposed revisions to its Open Access Transmission Tariff (Tariff) and Reliability Assurance Agreement (RAA) to implement an Effective Load Carrying Capability (ELCC) construct for determining the accredited capacity capability of certain resource types that are unable to maintain output at a stated capability continuously on a daily basis without interruption (Initial ELCC Proposal). On April 30, 2021, the Commission

[1] 16 U.S.C. § 824e.

[2] *PJM Interconnection, L.L.C.*, 171 FERC ¶ 61,015, at P 33 (2020) (April 10 Order).

[3] *Id.* P 34.

[4] 16 U.S.C. § 824d.

rejected PJM's Initial ELCC Proposal, finding that a discrete aspect of the proposal, the "transition mechanism," was unjust, unreasonable, and unduly discriminatory.[5]

3. On June 1, 2021, PJM submitted the instant revised ELCC proposal (Updated ELCC Proposal), which does not include the transition mechanism. As discussed below, we accept PJM's Updated ELCC Proposal, to be effective August 1, 2021, as requested, and terminate the related section 206 proceeding.

I. Background

A. Procedural History

4. On October 17, 2019, the Commission accepted, subject to a further compliance filing, PJM's proposed revisions to its Tariff and Amended and Restated Operating Agreement (Operating Agreement) in compliance with the requirements of Order No. 841.[6] The Commission also instituted a proceeding in Docket No. EL19-100-000, pursuant to FPA section 206, to (1) direct PJM to submit tariff provisions reflecting the minimum run-time rules and procedures for every resource, which were then specified only in its Manual, and (2) to investigate whether PJM's minimum run-time rules and procedures are unjust, unreasonable, or unduly discriminatory or preferential as applied to Capacity Storage Resources.[7] The Commission noted concerns that PJM applied a 10-hour minimum run-time requirement to Capacity Storage Resources, while applying a 4-hour minimum run-time requirement to intermittent resources; that the 10-hour minimum run-time requirement does not reflect the physical and operational characteristics of Capacity Storage Resources; and that multiple PJM tariff provisions differ in the treatment of Capacity Storage Resources and Generation Capacity

[5] *PJM Interconnection, L.L.C.*, 175 FERC ¶ 61,084, at P 17 (2021) (Initial ELCC Order).

[6] *PJM Interconnection, L.L.C.*, 169 FERC ¶ 61,049, at P 2 (2019) (October 2019 Order); *see Elec. Storage Participation in Mkts. Operated by Reg'l Transmission Orgs. & Indep. Sys. Operators*, Order No. 841, 162 FERC ¶ 61,127 (2018), *order on reh'g*, Order No. 841-A, 167 FERC ¶ 61,154 (2019), *aff'd sub nom. Nat'l Ass'n of Regul. Util. Comm'rs v. FERC*, 964 F.3d 1177 (D.C. Cir. 2020).

[7] October 2019 Order, 169 FERC ¶ 61,049 at P 142. Capitalized terms that are not defined in this order have the meaning specified in the current or proposed Tariff and RAA.

Resources, even though PJM stated that Capacity Storage Resources are Generation Capacity Resources.[8]

5. On December 12, 2019, in Docket No. ER20-584-000, PJM proposed revisions to its RAA to incorporate rules for determining the capacity capability of all resources in compliance with the Commission's directive in the October 2019 Order. On February 27, 2020, in Docket Nos. ER20-584-000 and EL19-100-000, PJM filed a motion to hold the proceedings in abeyance until January 29, 2021 in order to pursue an ELCC construct with PJM stakeholders for calculating the capability of resources in the PJM Reliability Pricing Model (RPM). PJM maintained that an ELCC construct could potentially address the issues the Commission identified in the October 2019 Order regarding PJM's existing rules for Capacity Storage Resources and eliminate the need for these ongoing proceedings.[9]

6. In the April 10 Order, the Commission established paper hearing procedures to examine the rules pertaining to the determination of capacity values for all resources, consolidated Docket No. ER20-584-000 with the paper hearing proceeding previously established in Docket No. EL19-100-000, required that future filings in the consolidated proceedings be made solely in Docket No. EL19-100-000, and granted PJM's motion in part to hold the proceedings in abeyance through October 30, 2020.[10] The Commission stated that, if PJM makes an FPA section 205 filing on or before October 30, 2020 with a proposed methodology or methodologies to determine the capability of all resource types for Capacity Resource qualification purposes, the instant consolidated proceedings will be held in further abeyance until Commission action on that filing.[11] On October 30, 2020, PJM submitted its Initial ELCC Proposal in Docket No. ER21-278-000.

B. Initial ELCC Proposal

7. In its Initial ELCC Proposal, PJM proposed to use an ELCC analysis to assign the maximum quantity of Unforced Capacity (Accredited UCAP), or capacity value, that can be offered or provided by Generation Capacity Resources that are unable to maintain output at a stated capability continuously on a daily basis without interruption, or "ELCC Resources."[12] PJM proposed to classify three types of resources as ELCC Resources: (1)

---

[8] *Id.* P 141.

[9] PJM Motion at 1, 6.

[10] 171 FERC ¶ 61,015 at PP 33-34.

[11] *Id.* P 35.

[12] Initial ELCC Order, 175 FERC ¶ 61,084 at P 5.

Variable Resources;[13] (2) Limited Duration Resources;[14] and (3) Combination Resources.[15] PJM explained that the ELCC analysis uses probabilistic modeling to evaluate a resource's contribution to meeting PJM's Loss of Load Expectation (LOLE) standard of one day in ten years, and distinguishes among resources 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).[16] PJM proposed to update the applicable capacity value analysis annually because the results of the ELCC analysis are sensitive to resource deployment levels and load shapes.[17] To account for changes in accredited capacity values from one year to the next, PJM proposed a "transition mechanism" that would establish ELCC Class Rating floors for ELCC Resources on a rolling annual basis for 13 subsequent Delivery Years after they enter the PJM capacity market.[18] Specifically, PJM proposed to calculate prospective ELCC Class Rating floors for each resource class by developing a scenario in which expected antagonistic changes to the resource mix occur twice as quickly as forecasted, and expected synergistic changes to the resource mix occur half as quickly as forecasted.[19] In order to guarantee the ELCC Class Rating floors applicable to certain resources without overvaluing the overall ELCC Resource portfolio, PJM proposed to reduce the capacity value of certain

[13] PJM defined a Variable Resource as a Generation Capacity Resource with output that can vary as a function of its energy source, such as wind, solar, run of river hydroelectric power without storage, and landfill gas units without an alternate fuel source. *Id.* P 5 n.13.

[14] PJM defined a Limited Duration Resource as a Generation Capacity Resource, such as an Energy Storage Resource, that is not capable of running continuously at Maximum Facility Output for 24 hours or longer, and that is neither a Variable Resource nor a Combination Resource. *Id.* P 5 n.14.

[15] PJM defined a Combination Resource as a Generation Capacity Resource that has a component with the characteristics of a Limited Duration Resource combined with either a component that has the characteristics of an Unlimited Resource or a component that has the characteristics of a Variable Resource. *Id.* P 5 n.15.

[16] *Id.* P 6.

[17] *Id.* P 8.

[18] *Id*.

[19] *Id.* P 80.

resources for which the floor did not bind (unfloored) below their calculated ELCC Class Rating.[20]

8. On April 30, 2021, the Commission rejected PJM's Initial ELCC Proposal, finding the transition mechanism unjust and unreasonable because it would discount the accredited capacity value of some ELCC Resources below their actual capacity value in order to value other ELCC Resources above their actual capacity value.[21] Furthermore, the Commission found the transition mechanism unduly discriminatory because it would discount the capacity value of newer unfloored ELCC Resources within a given class below their actual capacity value, despite the fact that existing ELCC Resources and newer, unfloored ELCC Resources within the same class are similarly situated. However, the Commission noted that PJM's ELCC framework, without the transition mechanism, appeared to be a just and reasonable approach to determining the accredited capacity value of Variable Resources, Limited Duration Resources, and Combination Resources. The Commission also noted that the Commission's rule of reason policy would likely require PJM to define the ELCC Classes in its tariff.[22]

9. Because it rejected PJM's Initial ELCC Proposal, the Commission lifted the abeyance of the paper hearing in Docket Nos. EL19-100-000 and ER20-584-000 and established a briefing schedule.[23] The Commission noted that, if PJM wished to file a revised ELCC proposal pursuant to FPA section 205 on or before June 1, 2021, then PJM may move to hold the paper hearing in abeyance, and must, in that event, file such motion on or before May 14, 2021. PJM moved to hold the paper hearing in abeyance on May 14, 2021, stating its intention to file a revised ELCC proposal on June 1, 2021.[24] No party sought rehearing of the Initial ELCC Order.

II. Updated ELCC Proposal

10. PJM states that its Updated ELCC Proposal is nearly identical to its Initial ELCC Proposal, with two notable differences: (1) PJM is *not* including the transition

---

[20] *Id.* P 82.

[21] *Id.* P 17.

[22] *Id.* P 66.

[23] *Id.* P 18.

[24] *See* PJM, Motion, Docket Nos. ER20-584-000 and EL19-100-000 (filed May 14, 2021).

mechanism that the Commission found to be unjust and unreasonable; and (2) PJM is defining the ELCC Classes in the RAA, as suggested by the Commission.[25]

11. PJM contends that the ELCC methodology considers the simultaneous reliability contribution of all resources and recognizes the complementary and antagonistic interactions among resources expected to be able to provide capacity in a given Delivery Year.[26] PJM argues that the ELCC construct: (1) recognizes the diminishing returns associated with greater levels of deployment for most ELCC Resource types to ensure the region does not become overdependent on a single resource type with inherent limitations; (2) recognizes the synergistic relationship among distinct resource types, potentially facilitating greater provision of reliability from the various resource classes pooled together across the PJM Region than what those same classes could provide in isolation; and (3) evolves with a changing load shape to account for changes in the future grid such as greater electrification of heating and transportation.

12. PJM requests an effective date for the proposed RAA and Tariff revisions of August 1, 2021.[27] PJM maintains that this will allow PJM to implement the ELCC construct starting with the 2023/2024 Delivery Year.

III. Notice of Filing and Responsive Pleadings

13. Notice of the filing was published in the *Federal Register*, 86 Fed. Reg. 30,313 (Jun. 7, 2021), with interventions and protests due on or before June 22, 2021. Appendix A identifies entities that submitted notices of intervention, motions to intervene, protests, comments, and/or answers.

14. On July 16, 2021, LS Power filed a motion to lodge an email from PJM staff containing a chart showing the frequency of wind resources' output as a percentage of total nameplate capacity during summer hours 2 to 6 p.m. in calendar years 2016-2020, and a calculation of the number of those hours where actual output exceeded average output. LS Power also filed an answer to PJM's answer.

IV. Discussion

A. Procedural Matters

15. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2020), the timely, unopposed motions to intervene serve to make

[25] Transmittal at 2.

[26] *Id.* at 13-14.

[27] *Id.* at 63.

the entities that filed them parties to this proceeding. We accept the IMM's late-filed protest.

16. Pursuant to Rule 214(d) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214(d) (2020), we grant Brookfield's and Vistra's late-filed motions to intervene given their interest in the proceeding, the early stage of the proceeding, and the absence of undue prejudice or delay.

17. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2020), prohibits an answer to a protest and/or answer unless otherwise ordered by the decisional authority. We accept ACP's, AES', LS Power's, the IMM's and PJM's answers and LS Power's motion to lodge because they have provided information that assisted us in our decision-making process.

B. Substantive Matters

18. We accept PJM's Updated ELCC Proposal because it establishes a just, reasonable, and not unduly discriminatory or preferential framework for determining the capacity value of Variable Resources, Limited Duration Resources, and Combination Resources. Specifically, we find that PJM's Updated ELCC Proposal is just and reasonable because: (1) it assigns a capacity value to the portfolio of ELCC Resources consistent with their collective contribution to meeting PJM's LOLE standard; (2) it recognizes the synergistic and antagonistic interactions between ELCC resource classes, and justly and reasonably allocates ELCC capacity value amongst those resource classes; and (3) none of the methodological or transparency concerns identified by commenters rise to the level of demonstrating that PJM's Updated ELCC Proposal is unjust and unreasonable. Because we are accepting PJM's Updated ELCC Proposal, we also terminate the section 206 proceeding in Docket Nos. EL19-100-000 and ER20-584-000, as discussed further below. We address the specific issues raised by protestors and commenters in more detail below.

1. Adjusted Class Average Versus Marginal ELCC Approaches

a. Filing

19. PJM reiterates its reasons for selecting an adjusted class average approach rather than a marginal ELCC approach.[28] Specifically, PJM states that, while a marginal ELCC framework can provide an economically efficient signal to the market for entry and exit of capacity resources, it generally does not credit a portfolio of resources for its total contribution to resource adequacy because the marginal ELCC values assigned to resources will generally be different from the average reliability contribution. In contrast,

[28] *Id.* at 22-23.

PJM explains that the adjusted class average approach allocates total ELCC portfolio capacity value among ELCC Classes, so that the sum of all classes matches the total portfolio ELCC value.[29] To allocate ELCC Portfolio UCAP among ELCC Classes, PJM proposes to use a "Delta Method," which simultaneously accounts for synergistic, antagonistic, and neutral interactions between ELCC Classes within the entire portfolio of ELCC Classes.[30] PJM asserts that the adjusted class average approach has the advantages of providing an accurate measure of ELCC Resources' total reliability contribution and ensuring that each resource is responsible for and compensated for its share of that total reliability contribution, without changing the basic tenets of the capacity market, such as performance obligations, offer structures, and auction clearing.[31]

20. PJM explains that stakeholders ultimately selected the adjusted class average approach because the purpose of the ELCC construct is to establish the physical capability of resources and serve as a reliability "backstop," rather than to determine signals for entry and exit.[32] Furthermore, PJM states that the adjusted class average approach appropriately allows capacity market sellers to determine the potential risk/reward of offering a certain amount of UCAP into the capacity market, consistent with the Commission-approved Capacity Performance construct.[33]

21. As part of its adjusted class average ELCC approach, PJM proposes to calculate ELCC Resources' Accredited UCAP prior to each capacity auction using forecasts of the resource mix and other relevant data for the corresponding Delivery Year.[34] Specifically, PJM proposes to post final ELCC Class UCAP and ELCC Class Rating values once per year in a report (and communicate to Generation Capacity Resource Providers their

---

[29] *Id.* at 23.

[30] *Id.* at 43 (citing Proposed RAA, Schedule 9.1, § D). PJM explains that, under the Delta Method, the value of each ELCC Class's First-In ELCC run is adjusted either upward or downward according to the overall impact of diversity interactions within the portfolio, as well as the specific impact of diversity on the subject class as measured by the difference between its Last-In and First-In runs. The allocation is performed in a manner such that the sum of the ELCC Class UCAP values equals the ELCC Portfolio UCAP. *Id.*

[31] *Id.* at 23.

[32] *Id.* at 24.

[33] *Id.* at 24 (citing *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208, at P 355 (2015)).

[34] *Id.* at 25.

resources' ELCC Resource Performance Adjustment value) no later than five months prior to the start of the target Delivery Year.[35] PJM also proposes to post preliminary ELCC Class Rating values for nine subsequent Delivery Years in this annual report.[36]

b. Pleadings

22. AES supports many aspects of the ELCC construct, but contends that PJM's proposal is unjust and unreasonable because it would annually redistribute capacity offer quantity rights across the ELCC Resource portfolio regardless of when resources entered the market, impeding the development of new renewable resources.[37] Specifically, AES asserts that the annual "capacity redistribution mechanism" built into PJM's proposed ELCC construct would unjustly reduce a resource's Accredited UCAP below its initial purchased interconnection capability to create additional headroom to accommodate future new renewable entry.[38] AES contends that annual capacity redistribution will discriminate against ELCC Resources compared to thermal resources that retain the right to offer in the full quantity of UCAP that they have interconnected for the life of resource and can produce as determined by annual capacity tests.[39] AES contends that this paradigm masks the appropriate market entry/exit signals if PJM always creates room for new entry at the expense of existing units even if adding new MWs from the ELCC Classes adds no reliability value.[40] AES argues that PJM's proposed ELCC construct fails to recognize that a renewable resource added today provides incremental reliability benefits right now that the renewable resource added next year or five years in the future does not, such that an existing resource is fundamentally different from a future resource and warrants favorable treatment.[41] AES asserts that, if a new resource provides no

[35] *Id.* at 57-58.

[36] PJM states that, for any Delivery Year in which a final ELCC Class Rating has not been posted and a preliminary ELCC Class Rating has been posted, the Accredited UCAP of an ELCC Resource for such Delivery Year will be based on the most recent preliminary ELCC Class Rating value for that Delivery Year, together with the most recently posted ELCC Resource Performance Adjustment value for that ELCC Resource. *Id.* at 58.

[37] AES Protest at 2-4, 9-12.

[38] *Id.* at 4, 10.

[39] *Id.* at 4, 16-17.

[40] *Id.* at 10.

[41] *Id.* at 13-16.

marginal reliability benefit, then the appropriate price signal is that the marginal Accredited UCAP for that new resource should be zero. AES states that it is not economically justified to effectively confiscate someone else's Accredited UCAP as determined when that resource entered the market in order to provide extra revenue to a new entrant in excess of its reliability contribution.[42] AES avers that PJM erred in removing the transition mechanism that helped secure end-use customers and project finance, and selectively adopting the adjusted class average approach (as opposed to a marginal approach) that was previously selected by stakeholders only in the context of the transition mechanism.[43]

23. As a result, AES requests that the Commission accept PJM's filing conditioned on PJM: (1) eliminating the annual reallocation of rights to bid in capacity; and (2) consulting with its stakeholders and filing by a date certain a proposal that would provide ELCC resources with a guaranteed level of rights to bid in capacity either based on the reliability benefits brought by the resource when it first entered the market or, at a minimum, incorporating a mechanism that establishes a floor below which capacity adjustments for a then-existing ELCC resource cannot fall.[44]

24. In its protest, the IMM argues that a marginal ELCC approach, rather than PJM's proposed adjusted class average approach, is fundamental to efficient markets.[45] The IMM asserts that the average approach is incorrect and will result in an inefficient market design and market outcomes, and is therefore not just and reasonable. The IMM contends that the adjusted class average ELCC approach is a "ratemaking" approach based on subjective judgements rather than market logic. More specifically, the IMM explains that the average ELCC approach assigns a capacity value to intermittent resources in excess of their marginal capacity value, and thus overstates resources' reliability contributions, increases costs to consumers, and leads to incorrect price signals.[46] The IMM explains that, under a marginal approach, the cleared capacity for ELCC resources would be equal to the area under the marginal ELCC curve for a given MW amount, and that this amount is the total capacity provided.[47] The IMM provides a table demonstrating the declining marginal ELCC value of hypothetical solar resources as

---

[42] *Id.* at 16.

[43] *Id.* at 10-11.

[44] *Id.* at 18.

[45] IMM Protest at 2-4.

[46] *Id.* at 6-9.

[47] *Id.* at 6-7 & n.15.

successively more units are added to the cleared capacity mix, and asserts that there is a significant disparity between the value of the "last-in" resource under PJM's proposed average ELCC approach compared to the marginal ELCC approach, and that the marginal values are less than the average values for these last-in resources.[48] The IMM asserts that PJM did not provide any analysis contrasting PJM's proposed approach with the marginal ELCC approach, or the extent to which the average approach would overstate capacity value. The IMM argues that such an analysis is required to demonstrate that the average ELCC method is just and reasonable.

25. Moreover, the IMM argues that PJM has not demonstrated its ability to accurately predict the amount of ELCC Resource capacity that will clear in the capacity auction, and thus that PJM will not be able to conduct an accurate ex ante ELCC analysis.[49] The IMM asserts that accurate ELCC values can only be obtained by dynamically determining the ELCC values in the capacity auction.[50] Accordingly, the IMM states, 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. The IMM argues that a detailed analysis of ELCC values over a range of installed capacity levels for both ELCC Resources and non-ELCC resources is necessary to demonstrate that the average ELCC method is just and reasonable.

26. The IMM also argues that PJM's use of the Delta Method to allocate the total capacity value of the ELCC portfolio among resource classes is arbitrary.[51] The IMM asserts that PJM's proposed Delta Method is not the same as Energy and Environmental Economics' (E3) Delta Method,[52] and contends that both approaches are arbitrary and not grounded in any fundamental theory about the load carrying capability of resources.[53]

---

[48] *Id.* at 9, tbl. 2 (demonstrating that the marginal approach would assign a marginal ELCC rate of 60% to the "first-in" resource and 1.3% to the "last-in" resource, in contrast to PJM's proposal to apply the average ELCC rate of 20% to all resources).

[49] *Id.* at 9-10.

[50] *Id.* at 10.

[51] *Id.* at 14-15.

[52] E3 presented its Delta Method and other ELCC methods to PJM stakeholders. *See* E3, *Practical Considerations for Application of Effective Load Carrying Capability* (Aug. 7, 2020), https://www.pjm.com/-/media/committees-groups/task-forces/ccstf/2020/20200807/20200807-item-04-e3-allocating-elccmw-from-portfolio-to-classes.ashx.

[53] IMM Protest at 16.

The IMM states that the Delta Method is not based on fundamental economic or mathematical theory about the interaction between average and marginal values in a continuous function.

27. In reply, PJM states that the IMM's complaint that use of the class-average ELCC approach overstates the reliability contribution of ELCC Resources is not accurate, as the class-average approach ensures that ELCC Resources cannot offer more, in aggregate, than their total reliability value as a class.[54] PJM notes that, in the Initial ELCC Order, the Commission evaluated the IMM's concerns and found the adjusted class average approach appropriate.[55] PJM explains that in the instant filing PJM proposed the identical adjusted class average approach and contends that the IMM has presented nothing that would undermine the Commission's prior determination. In response, the IMM argues that PJM's claim that the class average approach captures the aggregate reliability value of a resource class is only correct if PJM accurately forecasts the expected resource mix, which the IMM claims is unlikely.[56] The IMM contends that, even if PJM's forecasts are accurate, the capacity prices and cleared quantities would not be correct because they would be based on an average ELCC approach.[57] The IMM states that PJM has never disclosed marginal ELCC rates based on the same data PJM used to calculate average ELCC values, and argues that PJM should be required to publicly post such data.[58]

28. PJM also counters the IMM's argument that the Delta Method is "arbitrary" and not identical to the Delta Method developed by E3, PJM's consultant.[59] PJM states that the Commission has already explained that the two methods are the same. Furthermore, PJM contends that, while the IMM contends that there is no way to determine which expression of the Delta Method is "better," PJM's proposed Delta Method need only be just and reasonable, and that this is adequately supported in the instant filing.[60]

---

[54] PJM July 9, 2021 Answer at 7-8.

[55] *Id.* at 8 (citing Initial ELCC Order, 175 FERC ¶ 61,084 at PP 51, 54).

[56] IMM July 20, 2021 Answer at 2-3.

[57] *Id.* at 3.

[58] *Id.* at 4.

[59] PJM July 9, 2021 Answer at 10.

[60] *Id.* at 10 (quoting IMM Protest at 16).

29. In reply to AES, both PJM and the IMM state that AES' protest amounts to a collateral attack on the Initial ELCC Order, on which AES did not seek rehearing.[61] PJM states that AES' proposal to lock in ELCC Class Ratings is essentially a repackaging of the guaranteed capacity floor that the Commission found unjust, unreasonable, and unduly discriminatory, because it would treat existing ELCC Resources and ELCC Resources that invest in the near future differently from those making investments in later years.[62] PJM explains that no ELCC Resource provides more (or less) capacity capability simply because it entered first, and argues that a resource's size and past performance should determine what proportion of the resource class' overall capacity value is allocated to that resource, as PJM proposes.[63] The IMM asserts that, under AES' proposal, some resources would be paid for more than their contribution to reliability and some would be paid less.[64] The IMM contends that this result would be unduly discriminatory because it treats similarly situated resources differently.

30. In response, AES asserts that it is fundamentally wrong for both PJM and the IMM to seek to discriminate between thermal and renewable resources when establishing capacity values.[65] AES argues that PJM's ELCC proposal discriminates against renewable resources because their right to offer into the PJM capacity market will likely be reduced on a year-to-year basis irrespective of meeting the requirements for their annual PJM performance tests.[66] AES contends that, rather than address the discrimination caused by this filing, PJM and the IMM focus only on whether PJM's proposal treats similarly situated renewable resources the same.[67] AES asserts that it is a fact that units built at different times are not similarly situated and reiterates its prior argument that resources that invest today should be evaluated in PJM's ELCC analysis differently than resources making investments in later years.[68] AES also argues that it is not seeking a guarantee of cleared quantity for renewable resources, as the IMM alleges,

---

[61] *Id.* at 6 n.21; IMM July 9, 2021 Answer at 1-2.

[62] PJM July 9, 2021 Answer at 5-6 (citing Initial ELCC Order, 175 FERC ¶ 61,084 at P 104).

[63] *Id.* at 6.

[64] IMM July 9, 2021 Answer at 2.

[65] AES Answer at 2.

[66] *Id.* at 2-3.

[67] *Id.* at 3.

[68] *Id.* at 3-4.

but a guarantee of a right to offer the same quantity that the resource had when it interconnected.[69] Finally, AES refutes PJM's and the IMM's argument that it is making a collateral attack on the Initial ELCC Order or trying to resurrect a transition mechanism that the Commission previously rejected. AES claims that it is not requesting that the Commission reimpose the transition mechanism, but rather that the Commission find PJM's proposed annual redistribution of "offer rights" unjust and unreasonable and require PJM to submit a proposal to address the discriminatory redistribution concerns identified by AES.[70]

c. Determination

31. We find that PJM's adjusted class average ELCC framework is just and reasonable because: (1) it reasonably assigns the same capacity value to resources with the same performance within a class, recognizing that all resources in a class contribute to changes to the overall ELCC of the class; (2) it models all ELCC resources simultaneously, recognizing the possible synergistic and antagonistic interactions between resource classes, and ensures that the sum of resource classes' accredited capacity values is equal to the aggregate reliability value of the ELCC Portfolio; and (3) it informs ELCC Resources of their capacity accreditation prior to the capacity auction, which better informs resource entry and exit decisions.

32. Both AES and the IMM claim that PJM's filing is unjust and unreasonable because it values all resources of a given class at the class average ELCC capacity value computed by PJM for that Delivery Year, and thereby overvalues their expected contribution to system reliability. They advocate for an ELCC framework that would assign a lower capacity value to the "last" incremental MW of ELCC Resource capacity, whether that allocation be based on vintage (AES) or cost (IMM), when that MW provides less marginal resource adequacy value to the PJM region than the ELCC class average value. They argue that such an approach is necessary to avoid overvaluing incremental MW of ELCC Resource capacity and sending the wrong signal for market entry and exit. We address AES' and the IMM's arguments in turn below.

i. Vintaging of Capacity Resources

33. We do not find persuasive AES' arguments that the filing is unjust and unreasonable because it could reduce a resource's Accredited UCAP below its interconnection rights. AES' contention is that the ELCC framework must preserve the capacity value of a resource at the time of interconnection. However, we rejected PJM's prior ELCC filing because we found unjust and unreasonable and unduly discriminatory

[69] *Id.* at 5.

[70] *Id.* at 3, 5-6.

PJM's proposed transition mechanism, which would place a floor on ELCC capacity value for earlier vintages of resources.[71]

34. Specifically, we disagree with AES' assertion that PJM's proposal to recalculate ELCC Class Ratings annually and assign the same ELCC Class Rating to all resources within a class amounts to a "capacity redistribution mechanism" because ELCC Class Ratings may change from year to year. We find that it is reasonable for PJM to update ELCC Class Ratings on an annual basis to account for changes to the resource mix, load shape, weather patterns, and other factors that affect ELCC Resources' contribution to meeting PJM's reliability requirements. To the extent that the ELCC Class Rating varies from one year to the next, we find that it is just and reasonable to assign the same ELCC Class Rating to all resources within a class regardless of vintage, because all resources in the class contribute to the change in ELCC Class Rating. Furthermore, we affirm our finding in the Initial ELCC Order that "[it has not been demonstrated] that resources entering the capacity market in different years are differently situated in a manner that warrants granting more favorable treatment to resources the earlier they enter into the capacity market."[72] We agree with PJM and the IMM that AES' attempt to argue that existing ELCC Resources deserve special treatment is a collateral attack on this finding.

35. We also disagree with AES' assertion that ELCC Resources will be subject to undue discrimination under PJM's proposal in comparison to Unlimited Resources. As the Commission explained in the Initial ELCC Order, it is erroneous to contend "that PJM's markets must ensure 'comparable' outcomes for ELCC Resources and Unlimited Resources, despite the fact that these resources have different physical characteristics."[73] PJM's Updated ELCC proposal correctly aims to "ensure that each resource's capacity supply obligation does not exceed its expected contribution to system reliability."[74]

---

[71] Initial ELCC Order, 175 FERC ¶ 61,084 at P 108 ("The transition mechanism would discriminate between resources in a class based on vintage despite the fact that all resources within a class bear equal responsibility for the decrease in the capacity contribution of their ELCC Class.").

[72] *Id.* P 108; *see id.* ("Where the growth in a particular ELCC Class causes the measured ELCC Class Rating for that class to decline, it is reasonable to allocate the reduction in capacity value to all ELCC Resources of that class. . . ."). *See BNP Paribas Energy Trading GP v. FERC*, 743 F.3d 264, 268 (D.C. Cir. 2014) (*Paribas*) ("the cost causation principle generally calls for giving the same treatment to new and continuing customers").

[73] Initial ELCC Order, 175 FERC ¶ 61,084 at P 109.

[74] *Id.*; *see* Transmittal at 3 (explaining that "[t]he primary objective of the ELCC construct is to ensure that variable and limited duration resources, as a group, cannot

36. Further, we disagree with AES' argument that PJM's proposal would "confiscate" Accredited UCAP from existing resources and overvalue new resources, thereby sending an incorrect signal for market entry and exit. AES relies on the premise that a new ELCC Resource's capacity value must be equal to its individual incremental ELCC, measured in relation to all existing resources. We disagree. As PJM explains, it is appropriate to simultaneously model *all* ELCC Resources expected for the Delivery Year to account for complementary and antagonistic interactions between different ELCC Resource types, and to ensure that the total reliability benefit is properly allocated amongst members of the class.[75] Moreover, we find that PJM's approach is beneficial because it would allow for a new and potentially lower cost resource to compete in the auction on equal footing and possibly displace a higher cost existing resource with equivalent expected performance, in contrast to AES' preferred alternative in which the incumbent, through its higher ELCC value (and thus capacity value), would have an advantage. As noted above,[76] we continue to find that affording existing ELCC capacity resources a preference relative to future ELCC capacity resources of the same class in this manner would be unjust and unreasonable as the two resources are similarly situated in their ability to meet PJM's resource adequacy needs during a given Delivery Year.

---

offer to provide more capacity than their aggregate reliability value" and that "the ELCC analysis acts as a reliability backstop, preventing the PJM Region from over-relying on such resources at the expense of system reliability").

[75] Transmittal at 21-22. PJM explains that the concurrent presence of certain resource types can create a "diversity benefit," such that the combined reliability benefit exceeds each resource type's individual reliability benefit if studied separately. For example, solar and wind resources may be complementary because wind resources generally produce more energy during the night when solar is not available, while solar resources produce more energy during the mid-day hours. PJM explains that, in contrast, some resource types have an antagonistic relationship because they have similar performance limitations. For example, battery storage and hydropower resources with water storage are both energy limited, and thus each might be working to reduce a similar duration peak risk period as the other type. Once that peak risk period is addressed, the reliability value of both resource types diminishes. *Id.* at 22.

[76] Initial ELCC Order, 175 FERC ¶ 61,084 at P 108; *see id.* ("Where the growth in a particular ELCC Class causes the measured ELCC Class Rating for that class to decline, it is reasonable to allocate the reduction in capacity value to all ELCC Resources of that class. . . ."). *See Paribas*, 743 F.3d at 268 ("the cost causation principle generally calls for giving the same treatment to new and continuing customers").

ii. Marginal ELCC

37. We find that the IMM has failed to demonstrate that PJM's proposal to use an average method for determining ELCC values is unjust and unreasonable. We disagree with the IMM's assertion that PJM's proposal would assign an "incorrect" class average capacity value to ELCC Resources, in contrast to the IMM's preferred marginal ELCC value. By its nature, the ELCC method of capacity valuation depends on resources' relative share of the resource mix, how resources' output compares to the expected load profile, and the order in which resource classes and individual resources are modeled within the ELCC analysis.[77] While the IMM characterizes the order in which resources are modeled within the ELCC analysis as a settled science, we agree with PJM that there is no single "correct" method to determine how the overall ELCC capacity value of a resource portfolio or resource class should be allocated amongst ELCC Resources.[78] Because selecting an ELCC method requires consideration of various complex tradeoffs, there is no single established just and reasonable ELCC approach.[79] Absent a single "correct" ELCC method, we find that PJM's proposal to model all ELCC Resources simultaneously and allocate total ELCC portfolio capacity value amongst resource classes using the Delta Method is just and reasonable, because the Delta Method accounts for the possible interactions between resource classes by comparing their "first-in" and "last-in" ELCC values.[80] We also find that PJM's proposal to assign the same average ELCC

---

[77] *See* Garrido Aff. ¶ 25 (explaining that allocating ELCC Portfolio UCAP amongst ELCC Classes requires multiple additional ELCC "first-in" runs and ELCC "last-in" runs for each resource class).

[78] *Id.* ¶ 24 ("ELCC does not provide an unambiguous way to isolate ELCC Class UCAP values or an individual resource's Accredited UCAP value.").

[79] *See, e.g.*, *N.Y. Indep. Sys. Operator*, 170 FERC ¶ 61,033 (2020) (accepting as just and reasonable an average ELCC approach for storage resources); *see also* MISO Resource Adequacy Business Practice Manual, Appendix A (calculating a system-wide average ELCC value and allocating to individual wind units based on share of actual output over the top 8 daily peak hours).

[80] Transmittal at 43 ("Under PJM's class-based Delta Method, the value of each ELCC Class's First-In run is adjusted either upward or downward according to the overall impact of diversity interactions within the portfolio, as well as the specific impact of diversity on the subject class as measured by the difference between its Last-In and First-In runs. The allocation is performed in a manner such that the sum of the ELCC Class UCAP values equals the ELCC Portfolio UCAP. This approach to the Delta Method can simultaneously account for synergistic, antagonistic, and neutral reactions between ELCC Classes within the entire portfolio of ELCC Classes.").

Class Rating to resources within a class is just and reasonable, because it recognizes that all of the resources in a class contribute to the overall ELCC capacity value of the resource class. Furthermore, PJM's approach ensures that the sum of ELCC capacity values allocated amongst resource classes is equal to the measured capacity value of the ELCC Portfolio, which is an unambiguous value derived from a probabilistic LOLE analysis.[81] As PJM notes, PJM and its stakeholders closely considered both the marginal and average ELCC approaches, but ultimately decided in favor of the average approach. While a marginal approach may also be designed in such a way that it is just and reasonable and not unduly discriminatory, that fact does not render PJM's proposed average approach unjust and unreasonable.[82]

38. We also disagree with the IMM's argument that PJM's approach will not be sufficiently accurate because it relies on a forecast of the resource mix, in contrast to the IMM's proposed marginal approach, which would determine marginal ELCC values within the capacity auction clearing process. As the Commission found in the Initial ELCC Order, PJM can predict the resource quantities by class with sufficient accuracy five months in advance of the Delivery Year, when it will finalize ELCC Class Ratings.[83] Because PJM's proposed adjusted class average approach will determine capacity values on an ELCC resource class basis, we find that the ELCC Class Rating will be robust to minor changes in the relative size of the resource classes, and errors in PJM's resource forecast will not result in unjust and unreasonable ELCC Class Ratings.[84] Furthermore, we find that PJM's proposed *ex ante* approach has the benefit of informing ELCC Resources of their capacity accreditation prior to the capacity auction, which will reduce uncertainty for ELCC Resource owners and provide them with better information to

[81] Garrido Aff. ¶¶ 17-25. PJM notes that a marginal approach may not credit a portfolio of resources for its total contribution to resource adequacy. Transmittal at 22-23.

[82] *Petal Gas Storage, L.L.C. v. FERC*, 496 F.3d 695, 703 (D.C. Cir. 2007) ("FERC is not required to choose the best solution, only a reasonable one."); *Wis. Pub. Power, Inc. v. FERC*, 493 F.3d 239, 266 (D.C. Cir. 2007) ("Merely because petitioners can conceive of a refund allocation method that they believe would be superior to the one FERC approved does not mean that FERC erred in concluding the latter was just and reasonable. Again, reasonableness is a zone, not a pinpoint.").

[83] Initial ELCC Order, 175 FERC ¶ 61,084 at P 55 & n.89.

[84] *See* Transmittal at 20 ("[I]t is preferable to perform the ELCC analysis on a whole ELCC Class and not on a resource-specific basis. . . . Studying a portfolio of resources on an aggregate basis reduces the chance (and magnitude) of error.").

construct their capacity supply offers.[85] In contrast, under the IMM's proposed marginal approach, an ELCC Resource would not know its Accredited UCAP prior to the auction, because ELCC capacity value would be calculated within the auction clearing process.

39. While we find PJM's adjusted class average approach just and reasonable for the reasons explained above, we note that our finding above does not preclude PJM from further considering the tradeoffs between average and marginal ELCC approaches, and potentially proposing some form of marginal ELCC approach in the future if it so chooses. PJM states that it intends to conduct an initial review of the ELCC construct in the summer of 2022 and perform a comprehensive assessment of whether the ELCC model proposed herein is achieving its purpose of valuing and compensating capacity resources as accurately as practicable.[86] We encourage PJM and its stakeholders to further consider the tradeoffs between the two ELCC approaches, and potentially alternative approaches, as part of this planned review.

2. ELCC Methodology and Assumptions

a. Filing

40. PJM proposes to use a probabilistic ELCC analysis to determine the capacity value of ELCC Resources, which include Variable Resources, Limited Duration Resources, and Combination Resources.[87] Specifically, PJM proposes to use a hierarchical approach to derive an individual resource's Accredited UCAP based on the ELCC value of the entire resource portfolio and the resource's particular class.[88] At the top of the hierarchy is the ELCC Portfolio UCAP, which establishes the Effective UCAP of the entire set of ELCC Resources. PJM proposes to determine the ELCC Portfolio UCAP using an ELCC analysis that compares expected hourly load levels (based on historical weather) with the expected output of the expected future resource mix for each hour of the Delivery Year to identify the relative resource adequacy value of the portfolio of ELCC Resources as compared to Unlimited Resources with no outages.[89] At the mid-level of the hierarchy are the ELCC Class UCAP values, which establish the Effective UCAP value for the

[85] Initial ELCC Order, 175 FERC ¶ 61,084 at P 55.

[86] Transmittal at 61.

[87] *Id.* at 9-10.

[88] *Id.* at 42.

[89] *Id.* at 37 (citing Garrido Aff. ¶ 13; Proposed RAA, Schedule 9.1, § H).

entire set of resources in each ELCC Class.[90] To allocate ELCC Portfolio UCAP amongst ELCC Classes, PJM proposes to use the "Delta Method," which simultaneously accounts for synergistic, antagonistic, and neutral reactions between ELCC Classes within the entire portfolio of ELCC Classes.[91] At the bottom of the hierarchy are the ELCC Class Rating factors, which are used with resource-specific performance adjustments to determine the Accredited UCAP values for individual resources, i.e., the amount of capacity (in MW) each resource is eligible to offer into the PJM capacity market.[92] PJM explains that the ELCC Class Rating is analogous to the "capacity factor" for wind and solar resources that is currently referred to in PJM Manual 21, and is determined based on the ratio of the ELCC Class UCAP and the sum of the Effective Nameplate Capacity of modeled resources in the class.[93]

41. PJM explains that, as part of its overall ELCC analysis, it will simulate the hourly output of each resource, using approaches specific to each resource class.[94] PJM states that, for Limited Duration Resources and Combination Resources, the simulated output should be reflective of the system conditions simulated in the ELCC model, and not based directly on historical performance.[95] Specifically, PJM proposes to use four principles to simulate the output of these resources.[96] First, PJM will simulate the dispatch of all economic generation resources, including Limited Duration Resource and Combination Resources, before deploying Demand Resources in accordance with its tariff rules. Second, PJM will conservatively simulate the output of Limited Duration and Combination Resources by assuming no foresight across hours of a simulated operating day.[97] Third, PJM will simulate the output of Limited Duration and Combination Resources in hours in which all output from Unlimited Resources and Variable Resources is insufficient to meet load, recognizing the flexibility provided by

---

[90] *Id.* at 42.

[91] *Id.* at 43 (citing Proposed RAA, Schedule 9.1, § D). *See supra* note 30.

[92] Transmittal at 42.

[93] *Id.* at 44-45.

[94] *Id.* at 38-39.

[95] *Id.* at 39.

[96] *Id.* at 40.

[97] *Id.* at 40-41.

these resources.[98] Finally, PJM will model Hydropower with Non-Pumped Storage and other unique Limited Duration and Combination Resources on a resource-specific basis in recognition of their unique parameters that do not lend themselves to be modeled in an aggregate fashion.

42. PJM's witness Dr. Rocha Garrido clarifies that transmission limitations are not explicitly modeled in the ELCC simulations.[99] Rather, PJM assumes there are no transmission-related reliability issues within the PJM footprint. Dr. Rocha Garrido states that this assumption is also used in PJM's main resource adequacy study, the Reserve Requirement Study, based on the fact that PJM's Regional Transmission Expansion Plan (RTEP) ensures that specific areas of the PJM footprint have the necessary transmission infrastructure to receive the required level of energy imports. Furthermore, PJM proposes to limit the amount of capacity an ELCC Resource may provide to the lesser of its capacity capability as determined by the ELCC analysis (i.e., its Accredited UCAP) and transmission constraints (i.e., its Capacity Interconnection Rights (CIRs)).[100] PJM states that, under this approach, a resource cannot offer more capacity than it is capable of providing nor more capacity than it is capable of delivering.

43. PJM indicates that, similar to existing processes for the Reserve Requirement Study, it intends to review and manage the ELCC construct's methodology, assumptions, inputs, and procedures on an annual cycle, and post an annual report that will be reviewed by stakeholders.[101]

b. Pleadings

44. Several commenters highlight that PJM's proposed ELCC methodology offers a significant improvement over the status quo. Public Interest Organizations argue that PJM's ELCC simulation methodology is reasonable because it: (1) utilizes a probabilistic projection of summer and winter load profiles using a range of potential future hourly loads derived from actual weather patterns of previous years; (2) simulates the hourly output of each resource category using the same range of weather and other variables to derive a series of resource-specific availability/unavailability patterns; and (3) simulates dispatch following conservative principles that simulate how resources will

[98] *Id.* at 41.

[99] Garrido Aff. ¶ 28.

[100] Transmittal at 51.

[101] *Id.* at 59-60.

be used in practice.[102] Further, Public Interest Organizations state that PJM's ELCC methodology corrects the flawed 10-hour minimum run-time requirement that "unreasonably undervalued storage resources" and PJM's flawed treatment of hybrid resources as separate resources.[103] P3 states that it has consistently supported the ELCC construct over the current 10-hour rule for storage resources, and ESA asserts that the ELCC construct alleviates the issues underlying the unjust and unreasonable 10-hour rule.[104] EPSA supports PJM's ELCC proposal and urges the Commission to encourage the development and implementation of ELCC in every RTO/ISO to ensure reliability and resource adequacy.[105] Finally, LS Power argues that it is absolutely critical that system operators develop methodologies to properly evaluate the different resource types that are needed for reliability, and asserts that PJM's ELCC proposal is a necessary first step that should be accepted.[106]

45. While they support PJM's proposal, P3, EPSA, and LS Power urge PJM and the Commission to ensure the ELCC proposal is achieving its intended purpose. P3 notes its concerns surrounding transmission constraints, CIRs, and the distinctions between a marginal versus average ELCC, but states that many of its concerns can be addressed, if not rectified, through PJM's stated commitment to a strong ELCC methodology review with appropriate reporting requirements and stakeholder involvement.[107] LS Power states that PJM's ELCC construct does not account for transmission limitations and CIRs,[108] and asserts that PJM's failure to recognize transmission limitations will have negative impacts on the accuracy of PJM's modeling and ability to maintain reliability with the expected increase in ELCC Resources.[109] Moreover, LS Power states that, because CIRs reflect PJM's determination of the ability of a resource to deliver useful energy to the

---

[102] Public Interest Organizations Comments at 4.

[103] *Id.* at 5-6.

[104] P3 Comments at 3; ESA Comments at 4-5.

[105] EPSA Comments at 3.

[106] LS Power Comments at 4.

[107] P3 Comments at 4-5.

[108] LS Power states that the problems with the transmission limitations result from PJM's Capacity Emergency Transfer Objective (CETO) and Capacity Emergency Transfer Limit (CETL) tests that PJM uses to determine the amount of energy that can be transferred to a Locational Deliverability Area (LDA). LS Power Comments at 6-7.

[109] *Id.* at 10.

grid during peak periods, the ELCC modeling must also consider CIRs.[110] LS Power notes that there is an ongoing stakeholder process to address concerns about CIRs and asks that the Commission direct PJM to file any necessary tariff modifications in time for the 2026/2027 BRA.[111] LS Power also moves to lodge a chart provided by PJM illustrating the frequency of summer wind output across the RTO footprint from 2 to 6 p.m. during calendar years 2016-2020.[112] LS Power asserts that the chart demonstrates that at least 69% of the energy produced by wind resources occurred in hours when the energy did not have assured deliverability, showing that PJM's ELCC analysis significantly overestimates the reliability contribution of wind and other intermittent resources.[113]

46. In contrast, the IMM argues that PJM's Updated ELCC Proposal should be rejected due to its methodological flaws. Specifically, the IMM argues that PJM's proposal fails to consider locational differences between resources, despite the fact that PJM's capacity market includes locational differences as part of its fundamental design through its consideration of transmission constraints.[114] The IMM argues that PJM's Updated ELCC Proposal is not consistent with an efficient or reliable market because it fails to recognize transmission constraints. The IMM also argues that PJM's treatment of batteries is not based on reasonable or supportable assumptions. Specifically, the IMM explains that PJM relies on unsupported behavioral assumptions that individual battery resource owners will collectively behave in a manner that maximizes their ELCC value rather than their profits.[115] The IMM argues that batteries provide regulation service because it is more profitable than waiting for a performance assessment interval.[116] The IMM also asserts that the California ISO's (CAISO) operational experience with battery storage resources demonstrates that actual profit-maximizing battery owners will choose to provide regulation service in all hours of the day rather than provide energy.[117] The IMM argues the same behavior is expected and observed in PJM, and thus there is no

---

[110] *Id.* at 11.

[111] *Id.* at 12.

[112] LS Power Motion to Lodge and Answer at 1-4.

[113] *Id.* at 4.

[114] IMM Protest at 16-17.

[115] *Id.* at 11-12.

[116] *Id.* at 13-14.

[117] *Id.* at 14.

analytical basis for PJM's assertion that the initial ELCC Class Rating for 4-hour electric storage resources of 79% is reasonable.

47. In reply to the IMM, PJM asserts that its assumptions regarding the dispatch of storage resources (e.g., batteries) are just and reasonable. Specifically, PJM argues that the IMM fails to demonstrate that a revenue maximizing storage resource owner would provide less reliability than the current heuristic PJM uses to simulate the dispatch of storage resources in its ELCC model, considering that PJM and the Commission have worked for decades to align pricing with reliability.[118] PJM also contends that it is just and reasonable to assume that storage resources will consider the risk of incurring capacity market non-performance charges and, as a result, take steps to preserve storage capability for intervals when a performance assessment interval is in effect.

48. In its second answer, the IMM clarifies that it does not assume what the exact profit maximizing behavior for storage resources would be because the behavior of batteries varies based on market conditions and decisions by many independent resource owners.[119] The IMM avers that PJM uses strict dispatch assumptions for storage resources that are inconsistent with profit maximization. For example, the IMM highlights that PJM assumes that storage resources are always available at full capacity when needed to avoid loss of load, and it does not account for charging constraints.[120] The IMM also states that PJM's assumptions do not allow for the possibility that storage resources will provide regulation service, congestion relief during off-peak conditions, or engage in arbitrage activity that will leave storage resources at less than full charge when needed for emergencies.[121] The IMM contends that PJM's assumptions result in inflated ELCC values for storage resources.

49. Regarding the issue of transmission constraints, PJM explains that, while the ELCC analysis does not explicitly model transmission limitations, it does implicitly account for historic transmission limitations for ELCC resources by considering actual operating transmission constraints that impacted historical performance.[122] Furthermore, PJM states that it recognizes the potential need to improve its CETO, CETL, and LDA policies in the future to account for hourly considerations, but asserts that adoption of ELCC to improve the resource adequacy accreditation process does not in and of itself

---

[118] PJM July 9, 2021 Answer at 9.

[119] IMM July 20, 2021 Answer at 4.

[120] *Id.* at 4 & n.5.

[121] *Id.* at 5.

[122] PJM July 9, 2021 Answer at 10.

trigger the need for an hourly analysis nor a move to hourly analysis in any other planning analysis.[123] In reply to LS Power's Motion to Lodge and Answer, PJM notes that it has initiated a stakeholder process to consider the issue of CIRs for Variable Resources, and asserts that the ELCC framework's treatment of CIRs would not jeopardize reliability, because it improves upon the status quo accuracy of resource accreditation and reliability.[124]

50. Responding to PJM's answer, the IMM contends that transmission limits must be explicitly accounted for, not implicitly, as PJM asserts, "by considering actual operating transmission constraints that impacted historical performance."[125] The IMM asserts that PJM combines "historical putative" generation data with actual historical generation data in the ELCC analysis meaning it is "logically impossible" that it implicitly accounts for transmission limits or any other network feature.[126]

51. Further, in its answer, the IMM notes the remaining concerns cited by commenters and asserts that each of the identified flaws is significant, fundamental, and sufficient to reject PJM's Updated ELCC proposal.[127] The IMM asserts that it is well established that implementing flawed proposals leads to unintended consequences, and argues that implementing a flawed ELCC proposal will make it harder rather than easier to have a meaningful stakeholder process.[128]

c. Determination

52. We find that PJM's ELCC methodology is a just and reasonable approach to determining the capacity value of Variable Resources, Limited Duration Resources, and Combination Resources. We continue to find that PJM's proposed ELCC construct allocates capacity values to resources using a logical, transparent, 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. We also find that the ELCC construct is a practicable approach to ensuring that ELCC

---

[123] *Id.* at 11.

[124] PJM July 22, 2021 Answer at 2-3.

[125] IMM July 20, 2021 Answer at 5 (quoting PJM July 9, 2021 Answer at 4-6).

[126] *Id.* at 6 (quoting Garrido Aff. ¶ 15(b)).

[127] IMM July 9, 2021 Answer at 2-3 (citing P3 Comments at 4-5; LS Power Comments at 1; SEIA/AEE Comments at 5-6).

[128] *Id.* at 3.

resources are allocated Accredited UCAP in a manner that reflects their overall reliability contribution and contribution to serving the system's resource adequacy needs. Moreover, we find that the ELCC framework, which is grounded in a probabilistic LOLE analysis, offers a significant improvement over the 10-hour rule and PJM's other existing provisions for determining the capacity value of ELCC Resources, and will ensure that the PJM capacity market continues to deliver a level of reliability commensurate with the prevailing industry standard (i.e., an LOLE of 0.1, or 1 day of outage per 10 years).[129]

53. Regarding the issue of transmission constraints, we agree with PJM that the first step of the ELCC analysis, which determines 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, or limit resources' modeled output to their CIRs. As PJM explains, its existing resource adequacy study, the Reserve Requirement Study, does not consider transmission constraints within the PJM region because the RTEP is designed to ensure that specific areas of the PJM footprint have the necessary transmission infrastructure to receive the required level of energy imports.[130] Additionally, PJM states it will implicitly account for historically binding transmission constraints by considering each Variable Resource's historic performance, including instances of curtailment due to transmission constraints. Given the fact that a Variable Resource may deliver more than its CIR quantity to the PJM system during hours when the transmission system is not constrained, we find PJM's approach reasonable in contrast to artificially limiting a Variable Resource's output to its CIRs within the ELCC model.[131] Finally, after PJM has determined ELCC Resources' Accredited UCAP, PJM will limit an ELCC Resource's capacity market offer to be no greater than its CIRs, ensuring that the capacity market clearing process will not give an ELCC resource a capacity supply obligation that exceeds the capacity the resource can physically deliver. Thus, we find PJM's proposed treatment of transmission constraints within its ELCC analysis just and reasonable. Furthermore, we continue to find LS Power's concern about the compatibility between the ELCC analysis and the CETO/CETL analysis, which is used to determine the LDA transfer limits used within the capacity auction, outside the scope of the instant filing. We find that the ELCC framework will offer an improvement

---

[129] Transmittal at 13 ("PJM's proposed ELCC construct ensures that PJM has a more accurate understanding of the reliability contribution of each resource on its system and can appropriately plan resource adequacy to sustain the 0.1 loss of load expectation ('LOLE') standard.").

[130] *See* Garrido Aff. ¶ 28.

[131] As PJM notes, historic aggregate data from the PJM wind fleet illustrate that wind output during summer afternoons is often significantly above the average value, which is the basis for wind resources' CIRs. PJM July 22, 2021 Answer at 2.

in contrast to the status quo treatment of ELCC Resources within the CETO/CETL analysis, and we note PJM's statement that it may need to improve its CETO, CETL, and LDA policies in the future as the resource mix evolves.

54. We disagree with the IMM's assertion that PJM's assumptions regarding the dispatch of Limited Duration Resources within the ELCC analysis have no basis. Although 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 non-performance penalties and preserve storage capability accordingly for periods where performance assessment intervals are likely to occur. Indeed, a primary goal of capacity market non-performance charges is to ensure that resources have the incentive to be available to provide capacity when needed in real-time.[132] We agree with PJM that the IMM has failed to demonstrate that a storage resource's profit-maximizing behavior during stressed system conditions would not result in equivalent or greater reliability contributions than PJM assumes for Limited Duration Resources. Regarding the IMM's claim that CAISO ELCC studies have found that storage resources tend to provide regulation service rather than energy, we are not persuaded that the findings about the operational behavior of storage resources in CAISO render PJM's assumptions about the performance of storage resources in PJM unjust and unreasonable. However, we encourage PJM to compare the assumed versus actual dispatch patterns of Limited Duration Resources, including energy storage resources, as part of its planned review of the ELCC framework.

55. Accordingly, we find PJM's proposed methodology just and reasonable, and we decline to impose the directives requested by commenters. However, we note commenters' remaining concerns regarding various methodological assumptions, and PJM's stated commitment to conduct an initial review of the ELCC construct starting in the summer of 2022 that will comprehensively assess whether the ELCC model is achieving its purpose of valuing and compensating capacity resources as accurately as practicable. Given the growing importance of accurately determining the capacity value of resources amidst the evolving resource mix, we strongly encourage PJM and

[132] *See PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208 at P 158 ("PJM argues, and we agree, that under the existing rules a seller can earn substantial revenues through PJM's capacity auctions by committing its resource as capacity, with little concern that it will lose significant revenue even if it performs poorly. . . . By contrast, we find that PJM's proposed Non-Performance Charge, and the mechanics by which it will be applied, will provide incentive to capacity sellers to invest in and maintain their resources by tying capacity revenues more closely with real-time delivery of energy and reserves during emergency system conditions.").

stakeholders to continue refining the ELCC methodology as PJM gains experience with the ELCC approach.

3. ELCC Transparency and Reproducibility

a. Filing

56. PJM explains that it intends to review and manage the ELCC methodology, assumptions, inputs, and administrative procedures through an annual stakeholder cycle and post an annual report on the ELCC construct.[133] PJM states that it intends to provide sufficient transparency in administering and documenting the ELCC construct for interested parties to reproduce ELCC results to a sufficient degree of accuracy that they can anticipate future ELCC values, especially for the purposes of investment decisions.[134] Specifically, PJM states that it plans to post a model and input data, including: (1) hourly output shapes for every year in the model for every Unlimited, Variable, Limited Duration, and Combination Resource type; (2) forced, planned, and maintenance outages for Unlimited Resources; (3) simulated dispatch of Demand Response resources; (4) hourly load shapes for each year; (5) weather variables used to develop the load shapes; and (6) hourly load scenarios.[135]

b. Pleadings

57. P3 supports PJM's new reporting commitment and increased efforts at transparency for posting the ELCC methodology and data.[136] Public Interest Organizations state that, while participating in the development of PJM's ELCC construct, they found the data provided by PJM sufficient to allow for productive technical discussions. Thus, they assert, PJM has provided sufficient data to allow for a just and reasonable level of independent review and stakeholder participation.[137]

58. SEIA/AEE request that the Commission hold PJM to its commitments to provide adequate transparency as to the data and methodology used to develop the ELCC

---

[133] Transmittal at 59-60.

[134] *Id.* at 60.

[135] *Id.* at 60-61.

[136] P3 Comments at 4-5.

[137] Public Interest Organizations Comments at 7.

values.[138] They also request that the Commission direct PJM to publicly post information sufficient for interested market participants to comprehend the methodology and reproduce its results. They assert that information provided to date has not been sufficient for independent analysts to replicate PJM's results.[139] They also request that the Commission direct PJM to submit a compliance filing summarizing its planned methodologies and data disclosure practices so that affected parties can comment on whether PJM has adhered to its commitment to provide adequate transparency regarding the ELCC methodology and data.

59. ACP requests that the Commission direct PJM to disclose annual forecasted deployment figures in megawatts for every resource type, including non-ELCC Resources.[140] ACP asserts that this information is critical to better predict future ELCC Class Ratings and Accredited UCAP values, which are based in part on the quantities of various resource types that are deployed. ACP argues that if market sellers of ELCC Resources cannot reasonably estimate the ELCC Class Ratings and Accredited UCAP values, then they will be at an unduly discriminatory disadvantage in terms of project finance compared to sellers of Unlimited Resources with more stable UCAP values. ACP requests that the Commission direct PJM to ensure this information is easily accessible for market participants given its importance. ACP argues that market participants must be able to share this information with entities financing projects because such entities require transparency regarding this information. ACP further requests that the Commission direct PJM to post all public data related to its ELCC methodology in one central location on its website, as opposed to across multiple pages.[141] ACP believes that this will enable all market participants to view this information in a more transparent and accessible manner.

60. In reply, PJM asserts that ACP's request for annual forecasted deployment figures is problematic.[142] PJM explains that the resource mix and deployment data PJM relies on its ELCC modeling is proprietary to, and the intellectual property of its outside vendor. Thus, PJM states, it cannot publicly post this data, though it may be able to share it if the vendor approves a confidential arrangement. PJM avers that requiring public disclosure of such data could harm its ability to obtain the data it needs for the proposed ELCC analyses. Relying on outside data, PJM explains, is necessary to produce the most

---

[138] SEIA/AEE Comments at 5 (citing Transmittal at 60).

[139] *Id.* at 5-6.

[140] ACP Comments at 4-5.

[141] *Id.* at 6 & n.16.

[142] PJM July 9, 2021 Answer at 3.

accurate ELCC analysis.[143] PJM underscores that stakeholders will be able to replicate its results with reasonable accuracy based on the non-proprietary information PJM already commits to disclose.

61. The IMM argues that PJM's Updated ELCC Proposal lacks a transparent methodology, is insufficiently documented to be replicated, and requires further development.[144] Thus, the IMM argues, the filing is deficient, and the Commission should not yet approve it. The IMM agrees with SEIA/AEE that it is essential that one be able to replicate PJM's ELCC analysis.[145] The IMM supports ACP's request for PJM to disclose annual deployment figures and it supports making the underlying data broadly available to all market participants.[146] The IMM asserts that PJM has not demonstrated that the ELCC analysis can be replicated based on the hourly output and shape data; moreover, it does not provide the needed transparency.[147] The IMM further asserts that the installed capacity forecast, which the IMM alleges is the key component of the ELCC analysis, should be publicly available. The IMM maintains that PJM's use of proprietary data to define the capacity value of intermittent resources is unacceptable.

62. ACP argues that PJM mischaracterizes one of its requests.[148] ACP maintains that it did not ask that PJM publicly post annual forecasted deployment figures, but only to make them available. ACP further states that it has no objection to the sharing of such data pursuant to confidentiality arrangements, if necessary. But, ACP alleges, it is imperative that the Commission direct PJM to make this information available upon request for the reasons stated in its comments.[149]

c. Determination

63. We find that, given PJM's commitment "to provide sufficient transparency that interested parties have the opportunity to reproduce ELCC results to a sufficient degree of accuracy that they can anticipate future ELCC values, especially for the purposes of

---

[143] *Id.* at 4.

[144] IMM Protest at 18.

[145] IMM July 9, 2021 Answer at 3.

[146] *Id.* at 3-4.

[147] IMM July 20, 2021 Answer at 2.

[148] ACP Answer at 2.

[149] *Id.* at 2-3.

investment decisions,"[150] the measures PJM includes in the Updated ELCC Proposal will provide interested entities sufficient transparency into its ELCC methodology, results, and key values, i.e., ELCC Class Ratings and Accredited UCAP values. First, PJM commits to review and post the ELCC methodology, assumptions, inputs, and procedures in an annual report to allow for the reasonable prediction of future ELCC values.[151] Second, PJM plans "to post a model and sufficient data by which parties may replicate PJM's results with reasonable accuracy."[152]

64. We encourage PJM to post all public data related to its ELCC methodology in one central location on its website to facilitate access, as ACP requests. We similarly encourage PJM to provide any and all additional input data that might be necessary for market participants to forecast future ELCC Class Ratings and Accredited UCAP values.

65. As to the deployment figures that ACP requests and the installed capacity forecast the IMM requests, we are not persuaded that this information is necessary to provide adequate transparency into PJM's proposed ELCC methodology and key values, because PJM will post the hourly output shapes for every year in the model for every Unlimited, Variable, Limited Duration, and Combination Resource type, and as PJM states, the data it commits to provide should be sufficient to replicate PJM's results and anticipate future ELCC values with reasonable accuracy. We agree with SEIA/AEE that it is appropriate to direct PJM to submit an informational filing to ensure that the data and methodology PJM has committed to post will provide stakeholders with sufficient transparency. Specifically, we direct PJM to submit an informational filing summarizing its posted ELCC methodology documentation, model, and input data, and we will allow affected parties to comment on whether PJM has adhered to its commitment to provide adequate transparency regarding the ELCC methodology and data.[153] PJM must submit this filing to the Commission in Docket No. ER21-2043 within 30 days of the date that PJM posts its first annual ELCC report.

---

[150] Transmittal at 60.

[151] *Id.* at 59-60.

[152] *Id.* at 60-61.

[153] To ensure this filing is noticed, PJM should file the informational report as an eTariff Code 80 compliance-type filing.

4. Treatment of Unlimited Resources Versus ELCC Resources

a. Filing

66. PJM states that it does not propose to alter the current approach for determining the capacity capability of Unlimited Resources, which involves testing the maximum output capability, adjusting those test results to match conditions expected during peak load conditions, and applying an Equivalent Demand Forced Outage Rate (EFORd) performance adjustment based on historic unavailability over several years.[154] PJM asserts that this method provides a reliability result that is comparable to the ELCC value at quantifying the expected amount of output that can serve load during conditions of extremely tight supply.[155]

67. However, PJM states that it and its stakeholders will need to re-evaluate many aspects of its current practices as the resource mix evolves from one predominantly composed of Unlimited Resources (e.g., a natural gas-fired combined cycle generator) to one that is composed of more resources with varying hourly output capability (e.g., ELCC resources).[156] Accordingly, PJM explains that it will continue to evaluate and refine the ELCC construct with stakeholders and may consider whether the ELCC construct should be expanded to determine the capacity capability of so-called Unlimited Resources.

b. Pleadings

68. ACP and SEIA/AEE request that the Commission direct PJM to explore and review the application of ELCC to all resources.[157] Given the events of February 2021 in Texas and the May 2021 attack on the Colonial Gas Pipeline, ACP believes that the presumption that Unlimited Resources are infinitely available is "open to scrutiny."[158] ACP notes that PJM has indicated that stakeholders should consider expanding the ELCC construct to all resource types during the upcoming "Phase 2" stakeholder process.[159] Furthermore, in light of the PJM region's increasing reliance on renewable and storage

---

[154] Transmittal at 10-11.

[155] *Id.* at 11.

[156] *Id.* at 60 n.150.

[157] ACP Comments at 7; SEIA/AEE Comments at 7.

[158] ACP Comments at 7.

[159] *Id.* at 7-8.

resources, ACP asks the Commission to direct PJM and its stakeholders to re-examine whether ELCC is a suitable capacity accreditation method during the Phase 2 stakeholder process, and whether start-up time/flexibility should be considered within capacity accreditation.[160] SEIA/AEE argue that PJM must address capacity valuation for all resources to ensure the ELCC proposal is not implemented in an unreasonable and unduly discriminatory manner.[161] SEIA/AEE argue that ELCC Resources will face new risks regarding the volume of capacity they can offer under the ELCC construct that thermal resources will not face.[162] They maintain that overreliance on natural gas-fired, coal, or nuclear resources during recent events presents a risk of correlated outages that PJM has not addressed while reconsidering capacity valuation.[163] For PJM to address this issue, SEIA/AEE request that the Commission either keep open the existing investigation in Docket No. EL19-100 or institute a new FPA section 206 proceeding, and hold it in abeyance until summer 2022, when PJM will review the ELCC construct.[164] Furthermore, SEIA/AEE request that the Commission and PJM consider providing additional flexibility to project developers to address how implementing ELCC without a transition mechanism impacts projects in the interconnection queue that face changing rules.[165] They ask the Commission to require PJM to engage with stakeholders to develop a solution to provide stability that ELCC Resources need to secure project financing, such as allowing standalone solar resources to add batteries to their facilities without triggering the material modification provisions of the PJM tariff.

69. In its answer, the IMM supports the comments that would require the application of ELCC to all resource types.[166] PJM responds that while ACP's and SEIA/AEE's comments are outside the scope of this proceeding, it plans to continue to engage with its stakeholders to develop the necessary solutions to provide more stability for Intermittent and Limited Duration Resources.[167]

---

[160] *Id.* at 8.

[161] SEIA/AEE Comments at 6.

[162] *Id.* at 2.

[163] *Id.* at 6-7.

[164] *Id.* at 7 & n.19.

[165] *Id.* at 8.

[166] IMM July 9, 2021 Answer at 4.

[167] PJM July 9, 2021 Answer at 4 n.11.

c. Determination

70. We find that PJM need not extend the ELCC framework to Unlimited Resources to demonstrate that its filing is just and reasonable. PJM has demonstrated that the capacity value of ELCC Resources depends on the expected resource mix, the expected load shape, and how the hourly output of ELCC Resources aligns with hourly load. Therefore, ELCC Resource classes that produce energy during the same hours may provide diminishing capacity value as incremental MW of that resource class are added to the system.[168] Protesters have failed to demonstrate that the same relationships and dynamics exist for Unlimited Resources (i.e., non-ELCC Resources), which can generally produce energy on demand. We reaffirm our finding in the Initial ELCC Order that the proper objective of capacity valuation is to ensure that each resource's capacity supply obligation does not exceed its expected contribution to system reliability.[169] The expressed concern with Unlimited Resources is with the potential for statistically correlated forced outages, but that concern is not directly related to the concern that ELCC Resources' capacity value may decline as more units are added. Accordingly, we find this concern is outside the scope of this FPA section 205 proceeding. To the extent PJM believes reforms to capacity valuation methods for Unlimited Resources are necessary, we encourage PJM and its stakeholders to consider these issues in another venue.

71. Furthermore, we find that all of the substantive issues underlying the paper hearing in EL19-100-000 and ER20-584-000 have been resolved by the instant filing, and we therefore terminate the section 206 proceeding in those dockets and dismiss as moot PJM's December 12, 2019 compliance filing in ER20-584-000. PJM's Updated ELCC Proposal includes a methodology for valuing the capacity of multiple non-traditional resources, including Capacity Storage Resources and hydropower with non-pumped storage, which were the primary basis of the Commission's inquiry. Furthermore, consistent with the October 2019 Order,[170] PJM has proposed revisions to RAA Schedule 9 reflecting its current methodology for Unlimited Resources. Thus, we find that PJM's Updated ELCC Proposal establishes just and reasonable capacity valuation rules for all resources and obviates the need for further inquiry. Accordingly, we decline SEIA/AEE's request that we impose further directives on PJM or require further briefing in the paper hearing regarding the potential application of ELCC to Unlimited Resources.

72. Finally, regarding SEIA/AEE's request that the Commission require PJM to engage with stakeholders to develop a mechanism to give ELCC Resources more stable

---

[168] *See* Transmittal at 20-22.

[169] Initial ELCC Order, 175 FERC ¶ 61,084 at P 109.

[170] October 2019 Order, 169 FERC ¶ 61,049 at P 140.

capacity values over time for the purposes of project financing, we expect PJM and stakeholders to explore this issue in the stakeholder process as they do with other issues of stakeholder interest. Because we accept the Updated ELCC Proposal as just and reasonable, we decline to impose any further directives on PJM.

The Commission orders:

(A) PJM's filing is hereby accepted, effective August 1, 2021, as requested, as discussed in the body of this order.

(B) The consolidated paper hearing procedures in Docket Nos. EL19-100-000 and ER20-584-000 are hereby terminated, as discussed in the body of this order.

(C) PJM's December 12, 2019 compliance filing in Docket No. ER20-584-000 is hereby dismissed as moot, as discussed in the body of this order, and its proposed tariff records in that docket are hereby rejected.

(D) PJM is hereby directed to submit an informational filing within 30 days of the date that PJM posts its first annual ELCC report.

By the Commission. Commissioner Danly is concurring with a separate statement attached.
Commissioner Christie is dissenting with a separate statement attached.

(S E A L)

Debbie-Anne A. Reese,
Deputy Secretary.

Appendix A

Entities filing interventions, protests and/or comments, and answers are as follows:

Entity	Short Name or Acronym
Advanced Energy Economy	AEE
AES Clean Energy Development, LLC*	
AES Solutions Management, LLC±	AES
American Clean Power Association±	ACP
American Electric Power Service Corporation[171]*	AEP
American Municipal Power, Inc.*	
Brookfield Renewable Trading and Marketing LP*†	Brookfield
Calpine Corporation*	
Delaware Division of the Public Advocate*	
Dominion Energy Services, Inc.*	
East Kentucky Power Cooperative, Inc.*	
Electric Power Supply Association	EPSA
Exelon Corporation, Exelon Generation Company, LLC and its Affiliates*	
Glidepath Development LLC*	
Institute for Policy Integrity, New York University School of Law*	
J-POWER USA Development Co., Ltd.*	
LS Power Development, LLC±	LS Power
Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM±	IMM
New York Transmission Owners[172]*	

[171] AEP moves to intervene on behalf of its affiliates Appalachian Power Company, Indiana Michigan Power Company, Kentucky Power Company, Kingsport Power Company, Ohio Power Company, Wheeling Power Company, and AEP Energy Partners, Inc.

[172] New York Transmission Owners include Central Hudson Gas & Electric Corporation, Consolidated Edison Company of New York, Inc., Long Island Power Authority, New York Power Authority, New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation d/b/a National Grid, Orange and Rockland Utilities, Inc., and Rochester Gas and Electric Corporation.

North Carolina Electric Membership Corporation*	
NRG Power Marketing LLC and Midwest Generation, LLC*	
Office of the People's Counsel for the District of Columbia*	
PJM Interconnection, L.L.C.±	PJM
PJM Power Providers Group	P3
Public Interest Organizations[173]	
Solar Energy Industries Association	SEIA
U.S. Energy Storage Association	ESA
Union of Concerned Scientists*	
Vistra Corp. and Dynegy Marketing and Trade, LLC*†	Vistra

* Entities submitting interventions only
† Entities submitting motions to intervene out of time
± Entities submitting answers

[173] Public Interest Organizations include: Sustainable FERC Project, Natural Resources Defense Council, Union of Concerned Scientists, and Sierra Club.

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C. Docket Nos. ER21-2043-000
ER20-584-000
EL19-100-000
(consolidated)

(Issued July 30, 2021)

DANLY, Commissioner, *concurring*:

1. I concur in the Commission's order today because, on the record before us, PJM Interconnection, L.L.C.'s (PJM) Effective Load Carrying Capability (ELCC) proposal meets the requirements of section 205 of the Federal Power Act. Commissioner Christie may well be—in fact, probably is—correct that a marginal approach to allocating capacity to individual resources would be preferable to PJM's proposed resource-class based averaging mechanism. But the fact that there might be a better approach does not change the standard we must apply under section 205.[1] Should parties seek rehearing, I urge them to concentrate their pleadings on why PJM's proposal is not just and reasonable or why it is unduly discriminatory or preferential. That, ultimately, is all we are called upon to decide here.

For these reasons, I respectfully concur.

_____
James P. Danly
Commissioner

[1] *Petal Gas Storage, L.L.C. v. FERC*, 496 F.3d 695, 703 (D.C. Cir. 2007) ("FERC is not required to choose the best solution, only a reasonable one."); *Wis. Pub. Power, Inc. v. FERC*, 493 F.3d 239, 266 (D.C. Cir. 2007) ("Merely because petitioners can conceive of a refund allocation method that they believe would be superior to the one FERC approved does not mean that FERC erred in concluding the latter was just and reasonable.").

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C. Docket Nos. ER21-2043-000
ER20-584-000
EL19-100-000
(consolidated)

(Issued July 30, 2021)

CHRISTIE, Commissioner, *dissenting*:

1. I dissent from today's order concerning PJM's proposed ELCC and offer the following.

2. In my concurrence to the Commission's April 30, 2021 ELCC order[1] I noted:

> It is absolutely essential that RTO/ISO capacity markets value and compensate capacity resources as accurately as practicable, for two primary reasons: First, reliability depends on it, and second, consumers should only pay for capacity that actually performs when needed. That was an oft-heard theme of the Commission's . . . [March 23, 2021 *Technical Conference regarding Resource Adequacy in the Evolving Electricity Sector*, Docket No. AD21-10-000] in RTOs/ISOs with capacity markets.[2]

---

[1]. *PJM Interconnection, L.L.C*, 175 FERC ¶ 61,084 (2021) (April 30 Order) (Christie, Comm'r, concurring).

[2] *Id*. at P 2 and n.3 (citing *Transcript March 23, 2021 Technical Conference regarding Resource Adequacy in the Evolving Electricity Sector*, Docket No. AD21-10-000 (*Transcript March 23, 2021 Technical Conference*), Tr. 263:15-19 ("Keep the lights on, while at the same time not undermining individual state preferences. The key to it is appropriately evaluating resources based on their capacity contributions and capabilities.") (Conway); Tr. 108:25-109:1 ("Efficient capacity accreditation is something that would really facilitate the policy objectives.") (LeeVanSchaick); ISO-New England Mar. 19, 2021 Pre-Technical Conference Statement at 3 ("The next step in the evolution includes a project to revise the capacity accreditation of various resource types, which may require modifications to capacity clearing and qualification procedures *to ensure we are not crediting resources for more than their actual reliability benefit to consumers*.") (emphasis added); *Transcript March 23, 2021 Technical Conference*, Tr.

3. In addition, I noted that:

> . . . I hope the parties continue to address the distinctions between a marginal versus average ELCC value. The Independent Market Monitor has expressed his view that the marginal approach is superior to the average approach and, indeed, has expressed concerns that use of average values will cause increased inefficiencies.[3]

4. I also expressed my explicit expectation that PJM's proposal "can and *will* be improved."[4] I dissent today because the proposal has not been improved sufficiently and, as a result, consumers and system reliability may well suffer.

5. I agree that under Section 205, a proposal does not need to be theoretically the most just and reasonable or the best of all possible alternatives, it need only be found as just and reasonable. I acknowledge that a reasonable person could make a reasonable argument concluding that PJM's proposal herein may meet that standard if combined with the possibility of future fixes and further refinement.

6. I cannot reach this conclusion, however. I agree with PJM's Independent Market Monitor (IMM) that, based on this record, PJM's proposal fails to meet the standard

---

242:1-7 ("The type of generation or resource technology that a state wants to deploy or retain demonstrates its ability to meet demand consistently and when most needed. And that type of resource should be able to participate and compete for capacity revenue in the PJM capacity market, but *only to the extent that it actually provides capacity performance and no more*.") (emphasis added) (Conway)).

[3] *Id*. at n.5 (citing Independent Market Monitor for PJM, Docket Nos. ER21-278 and EL19-100, Nov. 23, 2020 Comments at 19 ("The use of average rather than marginal ELCC values will cause PJM's capacity market results to be incorrect and inefficient, at the expense of the PJM customers and non-ELCC resources competing with ELCC resources."); *see also*, *id*. at 19-20 ("Using the marginal rather than average ELCC value in market clearing results in every resource receiving the same price per MW of provided equivalent load carrying capacity, the correct assignment of capacity obligations per MW of cleared of a ELCC adjusted resource and the correct allocation of any penalties for non performance.")).

[4] *Id*. at P 4 (emphasis added).

required for a finding that it is just and reasonable and I further conclude that the mere possibility of future refinements that may fix its fundamental flaws is speculative.[5]

7. It comes down to this for me: PJM's ELCC may well force consumers to pay for capacity that does not deliver or to overpay for the amount of capacity that the resource does deliver.[6] That is both a *cost problem* and a *reliability problem*.

8. Let's remember what a capacity market is and what it is not. It *is not* a true free market open to all sellers willing to compete on price and quality. It *is* an administrative construct, with some market features, that exists to pay money to resources to replace the "missing money" that generating resources lost when restructuring took resources out of rate base – with its guaranteed revenue stream – to pay for the all-in costs of a resource, including capital costs. This "missing money" comes from consumers. That is, consumers pay these resources to be available in the future when called upon. So if an ELCC overvalues the actual capacity a resource will deliver at that future time, consumers have paid too much. And, reliability suffers because the whole point of a capacity market is to ensure that adequate resources are available in the future to keep the lights on.

9. Not only has the IMM extensively detailed flaws in PJM's ELCC proposal,[7] but since our April 30 Order we have received on-the-public-record evidence from Dr. David Patton,[8] President of Potomac Economics which is the IMM or Market Monitoring Unit

---

[5] *See, e.g.*, *PJM Interconnection, L.L.C*, 176 FERC ¶ 61,056, at P 39 (2021).

[6] *See, e.g.*, IMM June 23, 2021 Comments at 7 ("The results of overstating the reliability contribution of intermittent[] [resources] through the use of an average ELCC include the overstatement of reliability, increased costs to consumers and incorrect price signals.").

[7] *See e.g.*, IMM June 23, 2021 Comments; IMM July 9, 2021 Answer and Motion for Leave to Answer; and IMM July 20, 2021 Answer and Motion for Leave to Answer; *see also* IMM Answer, Docket Nos. EL19-100 and ER20-584 (filed May19, 2021). The IMM also made several filings addressing flaws in the PJM proposal addressed by the Commission's April 30 Order. *See, e.g.*, IMM Corrected Comments, Docket Nos. ER21-278 and EL19-100, (filed Nov. 24, 2020); IMM Answer, Motion for Leave to Answer and Motion for Consolidation, Docket No. ER21-178 (filed Dec. 15, 2020); IMM Answer and Motion for Leave to Answer, Docket No. ER21-278, (filed Dec. 21, 2020); and IMM Comments, Docket No. ER21-278 (filed Mar. 22, 2021).

[8] This May 25, 2021 on-the-record testimony exists in the public record in Docket No. AD21-10-000 and is highly relevant to the docket before us today, as the marginal

for several of the nation's ISOs.[9] Dr. Patton agrees with what is to me a fundamental point made by the PJM IMM: only a marginal valuation – not average – will accurately produce capacity accreditations for compensation and will deliver the reliability value relied upon by the RTO.[10]

10. Another fundamental failure of PJM's ELCC proposal, in my view, is its failure to extend the ELCC to all resources, including thermal resources. Today's order recognizes supporting comments in favor of equal application of the ELCC across all resources when it states, for example, "[American Clean Power Association (ACP) and Solar Energy Industries Association (SEIA)/Advanced Energy Economy (AEE)] request that the Commission direct PJM to explore and review the application of ELCC to all

---

versus average issue is a material issue raised and commented on in this proceeding.

[9] Potomac Economics serves as the "Independent Market Monitor for the Midcontinent ISO and ERCOT, the Market Monitoring Unit for the New York ISO, and the Independent Market Monitoring Unit for ISO New England." https://www.potomaceconomics.com/about-us/.

[10] *See, e.g*, *Transcript Technical May 25, 2021 Conference regarding Resource Adequacy in the Evolving Electricity Sector* (AD21-10-000), Tr. 170:1-9 ("I will say one thing though that's *very important is that for all technology types we have to accredit them based on their marginal value, their marginal contribution to reliability* even though like for a lot of resources that we're talking about here their value goes down as the penetration increases, but *the market can't perform efficiently unless we recognize what the next megawatt is going to give you in terms of reliability*.") (emphasis added) (Patton); *id*. at 181:15-21 ("So this is the same sort of marginal versus average issue that arises in a lot of areas going all the way back to should locational marginal prices be marginal. Should they reflect the value of the next increment of energy. *All well-functioning markets are priced and compensate participants based on the marginal value they provide*.") (emphasis added) (Patton); *id*. at 144:1-6 (If the objective of the market is to provide reliability, then the quantification of the amount of capacity that resources can sell *has to reflect the marginal reliability value of those resources*, and in all of these markets we over accredit certain resource types.") (emphasis added) (Patton). Moreover, Dr. Patton made clear that marginal valuations can be made. In response to a question of whether "it's feasible to design the ELCC based on marginal values, or is it just too hard to do" Dr. Patton stated "*I think it's definitely possible*. . . . *in fact I think you can simulate for what different levels of penetration would give you." Id.* at 182:21-25 (emphasis added).

resources"[11] and "SEIA/AEE argue that PJM must address capacity valuation for all resources to ensure the ELCC proposal is not implemented in an unreasonable and unduly discriminatory manner."[12] I agree that the ELCC should apply to all resources and PJM's proposal does not.

11. In my view, there is no urgency to replace the current rules and there is no reason to approve an ELCC at this time that is not as good as it needs to be. Further, I think the prospect that PJM will revisit this proposal in the near term to fix the flaws identified is fanciful.

For these reasons, I respectfully dissent.

_____

Mark C. Christie
Commissioner

[11] *PJM Interconnection, L.L.C*, 176 FERC ¶ 61,056 at P 68 (footnote omitted) (citing ACP Comments at 7; SEIA/AEE Comments at 7).

[12] *Id.* (footnote omitted) (citing SEIA/AEE Comments at 6).

Document Content(s)

ER21-2043-000.DOCX.....1