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190 FERC ¶ 61,195
FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426

March 28, 2025

In Reply Refer To:
PJM Interconnection, L.L.C.
Docket No. ER25-1095-000

PJM Interconnection, L.L.C.
2750 Monroe Boulevard
Audubon, PA 19403

Attention: Daniel Vinnik

Dear Daniel Vinnik:

1. On January 29, 2025, pursuant to section 205 of the Federal Power Act (FPA)[1] and part 35 of the Commission's regulations,[2] PJM Interconnection, L.L.C. (PJM) filed proposed revisions to the PJM Open Access Transmission Tariff (Tariff), the Amended and Restated Operating Agreement of PJM (Operating Agreement), and the Reliability Assurance Agreement Among Load Serving Entities (RAA)[3] to update market rules for the participation of Hybrid Resources[4] and other Mixed Technology Facilities (Phase III

[1] 16 U.S.C. § 824d.

[2] 18 C.F.R. pt. 35 (2024).

[3] See Appendix for eTariff records.

[4] A Hybrid Resource is "an Energy Resource or a Generation Capacity Resource composed of more than one component behind the same Point of Interconnection operating in the capacity, energy, and/or ancillary services market(s) as a single integrated resource, whereby each component is a separate generation and/or storage technology type." PJM, Intra-PJM Tariffs, OATT, pt. I (Definitions G-H) (9.0.0). Capitalized terms used but not otherwise defined in this order have the meanings ascribed to them in the Tariff.

filing).[5] As discussed below, we accept PJM's proposed revisions, effective March 31, 2025, as requested.

2. The Commission accepted PJM's Phase I filing, which established the definitions and market participation rules for Mixed Technology Facilities including Co-Located Resources and Hybrid Resources in 2022,[6] and PJM's Phase II filing, which broadened the scope of existing defined terminology to encompass other hybrid combinations beyond those with only either inverter-based or storage components (e.g., combinations with or without storage) in 2023.[7]

3. In the instant Phase III filing, PJM proposes to expand the Hybrid Resources market participation model to permit a non-inverter component to pair with a storage component, i.e., to allow gas plus storage, located behind the same point of interconnection to form one integrated market unit.[8] PJM states that the Phase III filing limits expansion of participation in the Hybrid Resources model to non-inverter resources that are paired with a storage component. PJM also proposes to amend Tariff, Attachment K-Appendix, section 1.4D, and the parallel provision in Operating Agreement, Schedule 1, section 1.4D, to clarify that Mixed Technology Facilities with non-inverter generation components and intermittent components are still only eligible to participate as Co-Located Resources.[9] PJM further proposes that any new Mixed Technology Facility must elect whether it will be modeled as a Hybrid Resource or Co-Located Resource no later than six months in advance of its initial participation in the energy markets.

4. PJM also proposes revisions to the definitions for Open-Loop and Closed-Loop Hybrid Resources to permit market participants to determine and indicate to PJM the Hybrid Resource's classification based on whether the facility will operate by charging

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[5] A Mixed Technology Facility is "a facility composed of distinct generation and/or electric storage technology types behind the same Point of Interconnection. Co-Located Resources and Hybrid Resources form all or part of Mixed Technology Facilities." PJM, Intra-PJM Tariffs, OATT, pt. I Definitions L-M-N (46.0.1).

[6] *PJM Interconnection, L.L.C.*, 180 FERC ¶ 61,017 (2022) (Phase I).

[7] *PJM Interconnection, L.L.C.*, Docket No. ER23-2484-000 (Sept. 22, 2023) (delegated order) (Phase II).

[8] *See* Transmittal at 4.

[9] *See* PJM, Intra-PJM Tariffs, OATT, pt. VI, attach. K – app., § 1.4D (Participation of Mixed Technology Facilities) (0.0.0); *id.* Operating Agreement, Schedule 1, § 1.4D (Participation of Mixed Technology Facilities) (0.0.0).

its storage component from the grid or from the on-site generation component only.[10] PJM explains that the existing definitions differentiate based on whether a resource can physically and contractually charge from the grid,[11] but that under the new provisions, resources that can physically and contractually charge from the grid but do not plan to do so may elect an alternative classification. PJM notes that, under the proposed revision to the definition of Closed-Loop Hybrid Resources, there may in the future be Closed-Loop Hybrid Resource facilities that have the capability to charge from the grid but have elected not to operate as such.[12] PJM therefore proposes revisions to the Network Integration Transmission Service (NITS) Agreement in Tariff, Attachment F-2 to clarify its application to all Hybrid Resources that are capable of charging from the grid, whether or not they choose to operate in PJM Markets as an Open-Loop or a Closed-Loop Hybrid Resource. Additionally, PJM proposes to clarify that "Hybrid Resources operating in PJM Markets as Closed-Loop Hybrid Resources shall not be charged pursuant to this Network Integration Transmission Service Agreement."[13] PJM states that these proposed revisions will therefore continue to require that all facilities that could potentially charge from the grid execute a NITS Agreement in case they elect to operate and be modeled as Open-Loop Hybrid Resources, while still leaving room for Hybrid Resources operating as Closed-Loop Hybrid Resources to not incur charges under the NITS Agreement.

5. PJM proposes to clarify that the energy market must-offer requirement for Hybrid Resources that have a capacity obligation, and Capacity Storage Resources with capacity obligations that participate in the ESR Participation Model, may not be satisfied by "offering the unit as dispatchable," which in this context refers to units that expect to be committed online by PJM.[14] PJM states that this clarification is necessary because the Hybrid Resources market participation model and ESR Participation Model are self-commitment models and these resources are required to self-schedule, where resources are unable to submit offers to PJM as dispatchable for commitment. PJM states that such self-scheduled units would satisfy their energy market must-offer requirement

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[10] Transmittal at 8.

[11] *See* PJM, Intra-PJM Tariffs, OATT, pt. I, Definitions C-D (37.1.1); *id.* Operating Agreement, art. 1, Definitions C-D (35.0.0); *id.* OATT, pt. I, Definitions O-P-Q (34.0.0); *id.* Operating Agreement, art. 1, Definitions O-P (22.0.0).

[12] Transmittal at 9.

[13] *Id.* at 10 (citing PJM, Proposed Tariff, attach. F-2 (NITS Agreement) (2.0.0), § 7.7).

[14] *Id.*

by committing to a specific MW value or offering within a dispatchable range for every day during a Delivery Year that they are not on an outage.[15]

6. PJM notes that its existing language around make-whole and lost opportunity cost (LOC) payments for Hybrid Resources and ESR Model Participants includes several ambiguities that PJM proposes to clarify through this filing.[16] First, PJM states that the instant filing will update the existing Tariff language around uplift payments for resources that increase charging in response to PJM's manual dispatch due to a transmission constraint or other reliability issue. According to PJM, ESR Model Participants would instead be eligible to receive balancing operating reserve (BOR) credits[17] per Tariff, Attachment K-Appendix, section 3.2.3(e) because they are being made whole for the difference between the amount the unit would have charged absent PJM's instruction, i.e., its LMP-desired quantity, and the additional amount the unit was directed to charge by PJM. PJM also proposes to add language clarifying that ESR Model Participants are only eligible for BOR credits, not LOC, when instructed by PJM to increase charging when they would otherwise already be charging based on their offer curve for the relevant intervals.[18] PJM similarly proposes to clarify rules for uplift and opportunity costs related to the provision of reactive service pursuant to Tariff, Attachment K-Appendix, section 3.2.3B.[19] PJM notes that these clarifications to reactive service compensation mirror the proposed clarifications to LOC payments and BOR credits. PJM also proposes revisions to Tariff, Attachment K-Appendix, section 3.2.3B(h), which mirror the changes made to Tariff, Attachment K-Appendix, section 3.2.3(f-5), adding language that provides a channel for ESR Model Participants and Hybrid Resources to attempt to demonstrate the compensation they believe would be appropriate if they do not believe that they have been accurately compensated for opportunity costs associated with following PJM manual dispatch instructions.[20]

7. PJM proposes to more clearly delineate eligibility and offer rules for providing Synchronized Reserves, Non-Synchronized Reserves, and Secondary Reserves for

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[15] *Id.*; PJM, Proposed Tariff, attach. K (Appendix), § 1.10 (52.0.0), § 1.10.1A(d).

[16] Transmittal at 11.

[17] *Id.* at 12 (citing PJM, Intra-PJM Tariffs, OATT, attach. K (Appendix), § 3.2 (Market Buyers) (64.0.1), § 3.2.3(e)).

[18] *Id.* at 13; PJM, Proposed Tariff, attach. K (Appendix), § 3.2 (66.0.0), § 3.2.3 (f-4).

[19] Transmittal at 14.

[20] *Id.* at 15.

generation-only (e.g., wind plus solar) and generation-plus-battery hybrids,[21] because its existing eligibility and offer rules do not distinguish between these two different Hybrid Resource types.[22] PJM proposes to revise Tariff, Attachment K-Appendix, sections 1.7.19A and 1.7.19A.02 to clarify that "Hybrid Resources comprised exclusively of wind and solar components" are not eligible to provide Synchronized Reserves or Secondary Reserves because they lack a storage component and cannot reserve their output.[23] Accordingly, PJM proposes to clarify that only Hybrid Resources with a battery component are eligible, and in certain situations required, to provide reserves. However, PJM notes that Hybrid Resources comprised exclusively of inverter-based generation components "are not eligible to provide reserves and cannot have a reserves must-offer requirement, unless an exception is requested and approved per the existing exception process outlined in 1.7.19A(a) which includes a written request for exemption and a requirement to provide documentation to support the resource's ability to follow dispatch, such as historical operating data or technical information about the physical operation of the resource."[24] Additionally, PJM proposes clarifications to Tariff, Attachment K-Appendix, section 1.7.19A.01 to state that inverter-based Hybrid Resources are not eligible to provide Non-Synchronized Reserves, consistent with the existing rules for standalone inverter-based resources.[25]

8. PJM also proposes to broaden the definition of "Hybrid Resource Class" to reflect the expansion of the Hybrid Resources market participation model beyond just Hybrid Resources with one generation and one storage component.[26] According to PJM, this expansion will allow certain Hybrid Resources with two generation components, such as wind and solar, to be included in the Hybrid Resource Class. Lastly, PJM proposes changes to the rules in RAA, Schedule 9.2 for establishing effective load carrying capability for Hybrid Resource Classes[27] by expanding the configurations for both

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[21] *Id.* (citing PJM, Intra-PJM Tariffs, OATT, attach. K (Appendix), § 1.7 (27.0.1), § 1.7.19A (Synchronized Reserve); *id.* § 1.7.19A.01 (Non-Synchronized Reserve); *id.* § 1.7.19A.02 (Secondary Reserve)).

[22] *Id.* at 15-16.

[23] *See* PJM, Proposed Tariff, attach. K (Appendix), § 1.7 (29.0.0), §§ 1.7.19A, 1.7.19A.02.

[24] Transmittal at 16.

[25] *Id.* at 17.

[26] *Id.* at 18.

[27] *Id.*

Open-Loop and Closed-Loop Hybrid Resources to include combinations that include the Unlimited Resource Class.[28]

9. Notice of PJM's filing was published in the *Federal Register*, 90 Fed. Reg. 9024 (Feb. 5, 2025), with interventions and protests due on or before February 19, 2025. Timely motions to intervene were filed by: the Independent Market Monitor for PJM; American Electric Power Services Corp.; Public Citizen, Inc; Old Dominion Electric Cooperative; Constellation Energy Generation, LLC; Dominion Energy Services, Inc.; PPL Electric Utilities Corporation; and Calpine Corporation. No comments were filed.

10. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2024), the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

11. We find that PJM's proposal is just and reasonable.[29] Consistent with PJM's Phase I and Phase II filings, the instant proposal continues to establish just and reasonable criteria for the market participation of Mixed Technology Facilities including Co-Located Resources and Hybrid Resources. It also will allow a broader group of generating resources, specifically configurations with a non-inverter component paired with a storage component, to use PJM's Hybrid Resource participation model and will thereby reduce barriers to entry for such resources. Barriers to the participation of new technologies in organized markets can occur when the rules governing participation in those markets preclude some technologies from providing services that they are technically capable of providing.[30] We agree with PJM that the instant filing will remove potential barriers in the Hybrid Resource market participation model by providing a path for non-inverter based generation paired with a storage component to participate in the wholesale markets. As PJM notes, the opportunity for resource owners of dispatchable resources to develop thermal-storage resources that can participate in PJM's markets as Hybrid Resources can result in potentially greater capacity (through higher Effective

[28] *Id.*; PJM, Proposed RAA, Schedule 9.2 (2.0.0), § B(2).

[29] Our holding here does not prejudge any issue related to transmission service—or otherwise—for co-located facilities in other proceedings currently pending before the Commission.

[30] *See, e.g.*, *Elec. Storage Participation in Mkts. Operated by Reg'l Transmission Orgs. & Indep. Sys. Operators*, Order No. 841, 162 FERC ¶ 61,127, at P 2 (2018); *see also Participation of Distributed Energy Res. Aggregations in Mkts. Operated by Reg'l Transmission Orgs. & Indep. Sys. Operators*, Order No. 2222, 172 FERC ¶ 61,247, at P 2 (2020).

Load Carrying Capability accreditation), energy, and ancillary service revenues, which ultimately could harness higher reliability contributions to the PJM system.[31]

12. We also find just and reasonable the Phase III filing's proposed clarifications to certain definitions. Moreover, we find just and reasonable the Phase III filing's proposed revisions to the rules for market participation. These proposed revisions help ensure clear and consistent rules for market participants participating in PJM's markets.

13. We further find that PJM's proposed revisions to the energy market must-offer requirements, rules for providing reserves, and rules for uplift and opportunity costs are just and reasonable because they appropriately recognize the physical and operational characteristics of storage resources, which are inherently energy limited. Accordingly, we also find reasonable PJM's proposal to update the definition of "Hybrid Resource Class" to include Hybrid Resources with two generation components as it now appropriately accounts for Hybrid Resource configurations that are permitted under PJM's rules.

14. The Commission hereby accepts PJM's proposed revisions to the Tariff, Operating Agreement, and RAA for filing, effective as requested, as discussed in the body of this order.

By direction of the Commission.

Debbie-Anne A. Reese,
Secretary.

[31] *See* Transmittal at 5.

Appendix – eTariff Records

- C-D, OATT Definitions - C - D (44.0.0)
- L-M-N, OATT Definitions L - M - N (51.0.0)
- O-P-Q, OATT Definitions - O - P - Q (36.0.0)
- Attachment F-2, OATT Attachment F-2 (2.0.0)
- OATT ATT K APPX Sec 1.4C, OATT Attachment K Appendix Sec 1.4C Participation of Hybrid (3.0.0)
- OATT ATT K APPX Sec 1.4D, OATT Attachment K Appendix Sec 1.4D Participation of Mixed T (1.0.0)
- OATT ATT K APPX Sec 1.7, OATT Attachment K Appendix Sec 1.7 General (29.0.0)
- OATT ATT K APPX Sec 1.10, OATT Attachment K Appendix Sec 1.10 - Scheduling (52.0.0)
- OATT ATT K Appx Sec 3.2, OATT Attachment K Appendix Sec 3.2 - Market Buyers (66.0.0)
- C-D, OA Definitions C - D (38.0.0)
- I-L, OA Definitions I - L (23.0.0)
- O-P, OA Definitions O - P (24.0.0)
- OA Schedule 1 Sec 1.4C, OA Schedule 1 Sec 1.4C Participation of Hybrid Resources (3.0.0)
- OA Schedule 1 Sec 1.4D, OA Schedule 1 Sec 1.4D Participation of Mixed Technology Fac (1.0.0)
- OA Schedule 1 Sec 1.7, OA Schedule 1 Sec 1.7 General. (29.0.0)
- OA Schedule 1 Sec 1.10, OA Schedule 1 Sec 1.10 - Scheduling (52.0.0)
- OA Schedule 1 Sec 3.2, OA Schedule 1 Sec 3.2 - Market Buyers (66.0.0)
- RAA ARTICLE 1, RAA ARTICLE 1 -- DEFINITIONS (50.0.0)
- RAA SCHEDULE 9.2, RAA SCHEDULE 9.2 (2.0.0)

Document Content(s)