167 FERC ¶ 61,030
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Neil Chatterjee, Chairman;
Cheryl A. LaFleur and Richard Glick.

PJM Interconnection, L.L.C. Docket Nos. ER19-210-001
EL19-8-000
EL19-8-001

ORDER ON PROPOSED TARIFF AND OPERATING AGREEMENT REVISIONS

(Issued April 15, 2019)

1. On October 29, 2018, PJM Interconnection, L.L.C. (PJM) submitted proposed revisions to (i) Schedule 2 of the Amended and Restated Operating Agreement of PJM (Operating Agreement), pursuant to Federal Power Act (FPA) section 206,[1] and (ii) Attachment DD of the PJM Open Access Transmission Tariff (Tariff), pursuant to FPA section 205.[2] On February 14, 2019, PJM submitted amended revisions to Attachment DD pursuant to FPA section 205 in response to a deficiency letter issued by Commission staff. The proposed section 206 revisions to the Operating Agreement would remove the purported disparate treatment of combined cycle (CC) and combustion turbine (CT) resources in Manual 15 by explicitly defining the Maintenance Adders and Operating Costs that a Market Seller can include in its cost-based offers in the energy market for all resource types. The proposed section 205 Tariff revisions clarify that variable operating and maintenance costs that are directly attributable to the production of electricity shall be excluded from a Market Seller's Avoidable Cost Rate in the capacity market.[3]

[1] 16 U.S.C. § 824e (2012). PJM states that it filed the Operating Agreement provisions pursuant to section 206 because its proposal did not receive the required two-thirds majority sector vote of the Members Committee required to authorize a filing under FPA section 205, 16 U.S.C. § 824d (2012). The sector vote was 2.92 out of 5.0 in favor.

[2] 16 U.S.C. § 824d (2012).

[3] PJM submitted the proposed revisions to the Tariff under section 205 in Docket No. ER19-210-000, and the proposed revisions to the Operating Agreement under

2. As discussed below, we find PJM's existing Operating Agreement unjust and unreasonable, and direct PJM to submit a compliance filing to revise its Operating Agreement to provide clarity as to the permissible components of energy-market cost-based offers, to become effective April 15, 2019. We also accept PJM's proposed Tariff revisions to become effective April 15, 2019.

I. Background

3. Schedule 2 of the Operating Agreement details the components of costs that a Market Seller may include in a cost-based offer to sell energy in PJM.[4] Schedule 2 also incorporates by reference PJM's Manual 15: Cost Development Guidelines.[5] Manual 15 contains, among other things, details on the types of costs Market Sellers may include in their cost-based offers.

4. PJM's current market rules allow a Market Seller to include a Maintenance Adder in its cost-based offer in the energy market to account for variable operating and maintenance costs, but only if those costs are incurred "as a result of electric production."[6] While these rules apply to all generation resource types, PJM currently has a separate rule providing that Maintenance Adders for CC and CT resources may not include any costs for major maintenance after June 1, 2015.[7] This separate rule arose in 2012, when PJM revised Manual 15 to prohibit CC and CT resources from including major inspections and overhaul costs in calculating their Maintenance Adders in determining their cost-based

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section 206 in Docket No. EL19-8-000. PJM Transmittal at 1 (citing 16 U.S.C. §§ 824d and 824e (2012)). *See PJM Interconnection, L.L.C.*, 149 FERC ¶ 61,091, at P 1 n.4 (2014). Appendix B lists the Tariff and Operating Agreement sections filed by PJM. Capitalized terms not otherwise defined herein have the meaning specified in the Tariff and Operating Agreement.

[4] *See* PJM Operating Agreement, Schedule 2.

[5] PJM, *PJM Manual 15: Cost Development Guidelines* (Feb. 15, 2019), https://www.pjm.com/-/media/documents/manuals/m15.ashx.

[6] Maintenance Adder "shall mean an adder that may be included to account for variable operation and maintenance expenses in a Market Seller's Fuel Cost Policy. The Maintenance Adder is calculated in accordance with the applicable provisions of PJM Manual 15, and may only include expenses incurred as a result of electric production." *See* Operating Agreement § 1, Definitions M – N; Tariff § 1, Definitions L – M – N.

[7] PJM Transmittal at 6, 10; Hauske Affidavit at 2 (citing PJM Manual 15, §§ 5.6.1, 6.6.2).

offers in the energy market.[8] PJM states that it believed at the time that other resources, such as nuclear and fossil-steam resources, did not include such maintenance costs in their energy market offers but instead recovered these maintenance costs in the capacity market.[9]

5. PJM explains that for variable costs to be included in the calculation of a Maintenance Adder, the costs must be incurred as a result of electric production. PJM states that the timing of when CC or CT resources undergo major inspection, which is a major maintenance expense, is primarily based on the manufacturer's recommendation and will vary depending on how often and how long resources run.[10]

6. In 2016, PJM submitted revisions to its Tariff and Operating Agreement to comply with the Commission's order in the Hourly Offers proceeding.[11] In that compliance filing, PJM included provisions relating to its Fuel Cost Policy to include, among other things, any applicable Maintenance Adders. PJM stated that Maintenance Adders cannot include any costs that are included in a generation resource's Avoidable Cost Rate.[12] The Commission accepted PJM's proposal and found it reasonable that Schedule 2((j)(iv)) of the Operating Agreement prohibits market participants from including Maintenance Adders as part of any costs that are included in the generation resource's Avoidable Cost Rate.[13] The Commission also determined that Schedule 2(k) of the Operating Agreement establishes an annual review process to verify that Market Sellers

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[8] *Id*. at 17.

[9] *Id*. at 6; Hauske Affidavit at 6.

[10] PJM Transmittal at 12-14. PJM states that General Electric, a manufacturer of gas turbines accounting for 38 percent of the total CC resource capacity (installed or under construction) in PJM, based its gas turbine maintenance requirements on unit-specific counts of starts and run hours. *Id.* (citing David Balevic, Steven Hartman, Ross Youmans, *Heavy-Duty Gas Turbine Operating and Maintenance Considerations*, GE Power, 5 (Nov. 2009), https://www.scribd.com/document/41225485/GER3620L-Nov-3-09b-rev.).

[11] *PJM Interconnection, L.L.C.,* 155 FERC ¶ 61,282 (2016).

[12] The Avoidable Cost Rate is the fixed annual operating costs and incremental investments that allow a generation resource to remain in commercial operation to be available to PJM as a Capacity Resource. *See* PJM's Tariff Attachment DD § 6.7.

[13] *PJM Interconnection, L.L.C.,* 158 FERC ¶ 61,133, at P 125 (2017) (February 2017 Order).

either submit to PJM and the PJM Independent Market Monitor (IMM), no later than June 15 of each year, an updated Fuel Cost Policy that complies with Schedule 2 and Manual 15, or confirm that their currently effective Fuel Cost Policy remains compliant, pursuant to the procedures and deadlines specified in Manual 15.[14]

7. PJM states that, during its 2017 annual review of variable operating and maintenance costs, it found that nuclear and fossil-steam resources had included major maintenance costs in their cost-based offers in the energy market, despite its earlier assumption that nuclear and fossil-steam resources recovered those costs in their capacity market offers.[15]

8. PJM explains that because the Operating Agreement only incorporates Manual 15 by reference, certain details regarding cost-based offers are absent from the Operating Agreement. PJM states that "[b]ecause the current restriction on CC and CT plant energy market offers was effected through a PJM Manual change in 2012, it was not presented to the Commission for decision, and the Commission has not had a prior occasion to address it."[16] In addition, PJM states that the "unsustainable difference in treatment [of CC and CT resources in Manual 15] is unduly discriminatory and thus unlawful under the FPA."[17]

II. Proposed Revisions

9. PJM submitted two concurrent filings—Tariff revisions pursuant to FPA section 205 and Operating Agreement amendments pursuant to FPA section 206—which PJM argues are necessary to ensure that CT and CC resources are treated on the same basis as all other resource types, with respect to reflecting major maintenance costs in the

[14] *Id.* P 54.

[15] PJM explains that it only gained access to data on the components of cost-based offers in the energy market in 2017 after proposing revisions to section 4.1, Schedule 2 of the Operating Agreement, to collect such information annually from Market Sellers. PJM Transmittal at 17-18; Hauske Affidavit at 6 (citing February 2017 Order, 158 FERC ¶ 61,133 at PP 50–58; *PJM Interconnection, L.L.C.*, 155 FERC ¶ 61,282, at P 63 (2016); PJM Interconnection, L.L.C., Compliance Filing, Docket No. ER16-372-003, at 8–10, 19–20 (filed Mar. 6, 2017)).

[16] PJM Transmittal at 2.

[17] *Id*. at 2.

calculation of the Maintenance Adder for cost-based offers in the energy market.[18] PJM states that, while the restriction on CC and CT resources is stated in Manual 15, which implements Schedule 2 of the Operating Agreement, this disparate treatment can be most authoritatively resolved through changes to Schedule 2 itself and a related Tariff provision.[19]

10. PJM states that it initially proposed changing only Manual 15, but stakeholders suggested that this issue was best resolved through changes to the Operating Agreement and Tariff, as well as through conforming changes to Manual 15. PJM states that it is not authorized to file Operating Agreement changes under section 205 unless the changes are approved by a two-thirds majority sector-weighted vote of the Members Committee, thus PJM submitted the instant proposed Operating Agreement changes in a separate section 206 filing.[20] PJM has the exclusive right to make changes to the Tariff under section 205 of the FPA.[21]

11. In its FPA section 205 filing, PJM proposes to revise its Tariff to prohibit a Market Seller from recovering any variable operating and maintenance costs in its Avoidable Cost Rate in the capacity market.[22]

12. In its FPA section 206 filing, PJM proposes to incorporate definitions for Maintenance Adders and Operating Costs in Schedule 2 of the Operating Agreement.[23]

III. Notice of Filings and Responsive Pleadings

13. Notices of PJM's October 29, 2018 filings in Docket Nos. ER19-210-000 and EL19-8-000 were published in the *Federal Register*, 83 Fed. Reg. 55,357 (2018) and 83 Fed. Reg. 58,556 (2018), respectively, with interventions, comments and protests due on or before November 19, 2018. Notices of intervention and timely-filed motions to

[18] *Id*. at 5.

[19] *Id*. at 2.

[20] *Id*. at 19-20.

[21] PJM OATT, section 9.2(a) (Rights of the Transmission Provider) ("PJM shall have the exclusive and unilateral right to file pursuant to Section 205 of the Federal Power Act and the FERC's rules and regulations thereunder to make changes in or relating to the terms and conditions of the PJM Tariff.").

[22] *Id*. at 21.

[23] *Id*. at 20.

intervene were submitted by the entities noted in Appendix C to this order. In addition, motions to intervene out-of-time were submitted by the Southern Maryland Electric Cooperative, Inc. (SMECO) and Public Citizen, Inc. (Public Citizen).

14. Duke Energy Corporation (Duke), PJM Utilities Coalition (PJM Coalition),[24] and Dominion Resources Services, Inc. (Dominion) filed supporting comments in Docket No. ER19-210-000. PJM Power Providers Group (P3) and Electric Power Supply Association (EPSA) filed comments in both proceedings. PJM Industrial Customer Coalition (PJM ICC) and Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM (IMM), filed protests in both proceedings.[25] The Organization of PJM States, Inc. (OPSI) filed a motion to file comments out-of-time and comments in Docket No. EL19-8-000.

15. On November 30, 2018, PJM ICC and Rockland Electric Company (Rockland) (together, Load Coalition) filed a motion to answer and answer out-of-time. On December 4, 2018, P3 and EPSA filed answers to the IMM's protests and the late-filed comments of OPSI in both pleadings. On December 4, 2018, the IMM filed answers, in both pleadings, to the comments submitted by Dominion, and P3 and EPSA. On December 6, 2018, P3 and EPSA jointly filed an answer to the IMM's protests and the late-filed comments of OPSI in Docket No. EL19-8-000. On December 7, 2018, PJM filed answers to the protests and comments in both pleadings (PJM Answer). On December 21, 2018, the New Jersey Board of Public Utilities (New Jersey Board) filed a motion for leave to answer and answer in support of the IMM's protests in both pleadings. On December 21, 2018, in Docket Nos. ER19-210-000 and EL19-8-000, the IMM filed an answer to PJM's answer (IMM First Answer) and on December 26, 2018, in Docket No. EL19-8-000, the IMM filed an answer to PJM's Answer (IMM Second Answer).

16. On January 15, 2019, Commission staff issued a deficiency letter to PJM seeking additional information on the specific types and amounts of maintenance costs PJM proposed to allow Market Sellers to recover in cost-based offers in the energy market, as well as how PJM verifies maintenance costs in the capacity market and the energy market. Commission staff also inquired whether Market Sellers will have any discretion in determining which costs are variable and whether PJM will review these choices to determine whether the particular cost items are properly included in either market.

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[24] The PJM Coalition is comprised of: American Electric Power Service Corporation, the Dayton Power and Light Company, and East Kentucky Power Cooperative.

[25] In Docket No. ER19-210-000 (IMM First Protest) and in Docket No. EL19-8-000 (IMM Second Protest).

17. PJM filed a response to the deficiency letter (Deficiency Letter Response) on February 14, 2019. Notice of PJM's response to the deficiency letter was published in the *Federal Register*, 84 Fed. Reg. 5,431 (2019), with comments due on or before March 7, 2019. The New Jersey Board and the IMM filed comments on or protests to PJM's response to the deficiency letter.

IV. Discussion

A. Procedural Matters

18. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure,[26] the timely, unopposed motions to intervene serve to make the entities that filed them parties to the proceedings in which they were filed.

19. Pursuant to Rule 214(d) of the Commission's Rules of Practice and Procedure,[27] we accept SMECO's and Public Citizen's late-filed motions to intervene given their interest in the proceedings, the early stage of the proceedings, and the absence of undue prejudice or delay.

20. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure prohibits an answer to a protest unless otherwise ordered by the decisional authority.[28] We accept the parties' answers because they have provided information that has assisted us in our decision-making process.

B. Substantive Matters

21. As discussed below, we find just and reasonable PJM's proposed Tariff revisions, which PJM filed under FPA section 205, to prohibit resources from recovering variable costs that are directly attributable to the production of energy in their Avoidable Cost Rates. These revisions will ensure comparable treatment across resource type and prohibit Market Sellers from double recovering these costs in both the energy and capacity markets.

22. We also agree with PJM that its current market rules are unjust and unreasonable and unduly discriminatory because they permit disparate treatment of similarly situated resources with respect to the inclusion of major maintenance costs in cost-based offers in the energy market. In particular, we find that the PJM Operating Agreement is unjust and unreasonable because it fails to provide a sufficient level of clarity regarding the

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[26] 18 C.F.R. § 385.214 (2018).

[27] 18 C.F.R. § 385.214(d) (2018).

[28] 18 C.F.R. § 385.213(a)(2) (2018).

permissible components of energy market cost-based offers. We agree with PJM that its proposed Tariff revisions, together with further revisions to the Operating Agreement, are needed to address these concerns. However, we find that PJM's proposed Operating Agreement revisions are insufficient to render the Operating Agreement just and reasonable and, as discussed below, we direct PJM to submit a compliance filing reflecting additional changes to Schedule 2. We discuss each of the contested issues in more detail below.

1. Recovery of Variable Maintenance Costs

a. PJM's Filings

23. PJM proposes Tariff revisions to prohibit Market Sellers from including in their capacity market offers variable costs that are directly attributable to the production of electricity. PJM clarifies that such variable costs can only be included in a Market Seller's energy market offer.[29]

24. PJM claims that its proposal is consistent with Southwest Power Pool, Inc.'s (SPP) Commission-approved major maintenance cost component for mitigated start-up offers and mitigated no-load offers.[30] PJM explains that a key difference between its proposal and SPP's is that PJM already has such a cost component in its market rules, but it is expressly not available to CC and CT resources. PJM states that, similar to SPP, its filing would ensure that major maintenance costs are those associated with the number of unit starts and run hours for the CC and CT resources.[31] It notes that as long as maintenance costs are incurred as a result of electric production, they should be included as Maintenance Adders for CC and CT resources, just as they are for nuclear and fossil-steam resources.[32]

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[29] PJM Deficiency Letter Response at 2-3; Tariff, Attachment DD, section 6.8(c).

[30] *Southwest Power Pool, Inc.*, 165 FERC ¶ 61,026, at P 16 (2018) (*SPP*).

[31] PJM Transmittal at 3.

[32] PJM Transmittal at 11 (stating "[T]here is nothing intrinsic in combustion turbine generating equipment that makes its required maintenance activities uniquely 'major' compared to the activities needed to maintain nuclear or fossil boiler or generation plant in satisfactory operating condition.").

b. Deficiency Letter Response

25. In its response to Commission staff's data request regarding whether resources will have any discretion in determining which costs are variable, PJM states that Market Sellers will have no discretion in determining which maintenance costs are variable (and should be recovered in the energy market) and which are fixed (and should be recovered in the capacity market). PJM submits amended revisions to Tariff, Attachment DD, section 6.8(c) to clarify that variable costs cannot be recovered in the capacity market.[33]

26. PJM states that for capacity offers that are greater than the default offer cap, it requires Market Sellers to submit a breakdown of data on capacity market costs that includes a variable operating and maintenance costs line item for review by PJM and the IMM. However, PJM clarifies that the default offer cap is not based on unit-specific cost data, and if Market Sellers' capacity offers are less than the default offer cap, PJM does not require them to provide unit-specific cost data.[34] It explains that its proposed revisions clarify that major maintenance costs can only be included in the energy market offer and cannot be double-recovered through both the capacity and energy markets.[35]

c. Comments and Protests

27. Dominion, Duke, ODEC, PJM Utilities Coalition, and P3 and EPSA filed comments supporting PJM's proposals. However, P3 and EPSA seek clarification that: (1) variable major maintenance costs can, at the resource owner's discretion, be included in cost-based start-up and no-load costs rather than in cost-based incremental energy offers;[36] and (2) PJM's revisions are limited to construction of cost-based offers, such that generation resources can continue to include maintenance costs in their Avoidable Cost Rates, if they choose, as long as they commit to not include the same costs in their energy market cost-based offers.[37]

28. The IMM and PJM Load Coalition oppose PJM's proposal, and argue that major maintenance costs incurred as a result of electric production should be recovered in the

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[33] PJM Deficiency Letter Response at 6.

[34] *Id*. at 2.

[35] *Id*. at 3.

[36] P3 and EPSA Comments at 3.

[37] *Id*. at 4.

capacity market, and not the energy market, because they are not short-run marginal costs.[38]

29. The IMM explains that short-run marginal costs consist of fuel and variable operation and maintenance costs associated with other consumables used at the time of electric production.[39] The IMM states that fuel generally represents 90 percent of total short-run marginal costs.[40] The IMM explains that while some major maintenance costs are correlated with the historical operation pattern of a resource, such as operating hours or starts, it is not necessary to incur any specific maintenance expenditure to produce power in the short run because a resource does not consume a defined amount of maintenance parts and labor in order to start or produce additional MWh.[41]

30. The IMM recommends that the Commission require that the PJM Tariff define cost-based offers as equal to short-run marginal costs, which should be defined as the "cost of inputs consumed and the net costs of byproducts created at the time of electric production." The IMM recommends that the Commission clarify that maintenance costs are not short-run marginal costs, but rather are avoidable costs.[42] The PJM Load Coalition similarly argues that PJM should require all resources to include only short-run marginal costs in their incremental cost-based energy offers, and not allow any unit to reflect certain maintenance costs in its cost-based offer in the energy market because such costs are not short-run marginal costs.[43]

31. The IMM argues that PJM incorrectly claims that the current rules impede cost recovery for CC and CT resources.[44] The IMM contends that CC and CT resources have the highest levels of avoidable cost recovery in the PJM market, while nuclear and coal

[38] IMM First Protest at 4-5; PJM Load Coalition at Protest at 7.

[39] IMM First Protest at 6-7.

[40] *Id*. at 6.

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

[42] *Id*. at 20-21.

[43] PJM Load Coalition Protest at 7.

[44] IMM First Protest at 34.

resources have the lowest, and thus CC and CT resources do not face under recovery of costs as PJM claims.[45]

32. PJM Load Coalition argues that PJM's desire to shift variable operating and maintenance costs to the energy market can best be understood as a response to low capacity prices that persisted prior to the 2018 Base Residual Auction.[46] It also argues that allowing Market Sellers to "market shop," i.e., allocate variable operating and maintenance costs to either capacity market or energy market offers, in order to subvert or undermine market fundamentals encourages uneconomic generators to suppress prices while remaining in service.[47] PJM Load Coalition states that while it agrees with PJM that market rules should not allow variable operating and maintenance costs to be treated differently by different generation types, it believes that all generators should be prohibited from including fixed maintenance costs in their energy market offers and required to include them only in their capacity market offers.[48] Thus, it requests that the Commission deny PJM's proposal and act to eliminate the "present unjust and unreasonable practice" by some nuclear and fossil-fuel resource owners to recover fixed maintenance costs in energy market offers.[49]

33. OPSI states that "PJM provides no analysis explaining why energy or capacity prices under its proposed rules could not be unjust and unreasonable."[50] OPSI requests that the Commission either deny implementation of PJM's proposed revisions or

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[45] *Id*. The IMM provides statistics on avoidable costs recovered from energy markets and all markets. The IMM explains that in 2017, 86 percent of CCs and 99 percent of CTs recovered their avoidable costs from all markets, compared to 52 percent of all coal units and 68 percent of all nuclear units. The IMM argues that avoidable costs are not incurred at the time of power production, and thus avoidable costs are covered by cleared capacity market offers.

[46] PJM Load Coalition Protest at 5-6.

[47] *Id*. at 6.

[48] PJM Load Coalition Protest at 8-10. PJM Load Coalition states that, to show the inconsistency in the treatment of variable operating and maintenance costs across different generation types, PJM argues that certain generators (some coal and nuclear units) have been ignoring the rules in PJM's manuals on how and where variable operating and maintenance costs can be included in a generator's offer.

[49] PJM Load Coalition at 10.

[50] OPSI Comments at 4.

alternatively, find them deficient until the Commission has had the opportunity to review the appropriate analysis supporting PJM's proposed revisions.[51]

34. The IMM argues that the recent SPP ruling is not a precedent for PJM because almost all resources in SPP are subject to cost-of-service regulation, which ensures full recovery of all costs. The IMM also argues that SPP's market rules are not comparable to PJM's market rules since SPP's tariff supports mitigated offer development with a level of specificity that is missing from the PJM rules.[52]

35. The IMM argues that PJM's proposal will take PJM back to the era of the PJM power pool among vertically integrated utilities, when its members chose to share costs according to the FERC accounting system, and transactions were based on a split savings method in order to achieve a more efficient dispatch among the participating companies.[53] The IMM argues that the PJM market, unlike SPP, requires efficient entry and exit signals for resources to support competition, and allowing costs in excess of short-run marginal costs distorts both efficient dispatch and investment signals.[54] The IMM also argues that the "overstatement of short run marginal costs" would allow a resource that is uncompetitive in the capacity market to "inefficiently recover avoidable costs in the energy market and to correspondingly lower their capacity offer below a competitive level in order to maintain capacity revenues," and thereby remain in the capacity market. The IMM contends that "the inefficient outcome is intended by PJM" and that PJM's proposal is "clearly meant to allow Market Sellers with uneconomic capacity resources to use market power in the energy market to impose inefficient capacity costs on customers."[55]

d. Answers

36. PJM states that the IMM's and the PJM Load Coalition's arguments that major maintenance and overhaul costs should not be included in energy market offers because they are not short-run marginal costs lack merit. According to PJM, the Commission has

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[51] *Id*.

[52] IMM First Protest at 31. The IMM also states that the Commission should evaluate PJM's proposal, and its alternative proposal in this docket, without deference to rules established in other RTOs/ISOs.

[53] IMM First Protest at 32.

[54] *Id*.

[55] IMM First Protest at 33.

previously rejected, in another proceeding, similar arguments from the IMM that underlying variable operations and maintenance costs are not short-run costs recoverable in energy market offers, and should do the same here.[56] PJM asserts that it has provided evidence in the record that shows that major maintenance and overhaul costs are clearly variable in nature and neither the IMM nor PJM Load Coalition has contested the variable nature of these costs.[57] PJM further clarifies that its proposal would not allow a wide variety of other costs, "such as fuel availability costs, labor costs, and administrative costs"[58] to be included in cost-based offers in the energy market. PJM states that its proposal only calls for the inclusion of variable costs that are directly attributable to the production of electricity in the energy market offer.[59]

37. With respect to the double recovery concerns raised by protesters, PJM clarifies that any variable costs directly associated with energy production should be included in energy market offers, and not in a resource's Avoidable Cost Rate in capacity market offers.[60] In response to P3 and EPSA's request for clarification on whether a Market Seller may include major maintenance and overhaul costs for CT and CC resources in the cost-based start-up and no-load cost components of the energy market rather than in cost-based incremental energy offers, PJM states that it intentionally did not specify one or the other component of the energy market because, "[c]onsistent with the status quo, Market

[56] PJM First Answer at 7 (citing February 2017 Order, 158 FERC ¶ 61,133 at PP 122–25 (rejecting the IMM's argument that Maintenance Adder costs should not be recoverable in the energy market because they are not short-run marginal costs)). PJM further adds that the "Commission has not accepted the distinction of short-run marginal costs versus other types of variable costs as relevant to whether a cost is recoverable in energy or capacity markets." *Id.*

[57] PJM First Answer at 7 (citing Attachment C, Hauske Aff. ¶¶ 9–12 of these proceedings. *See also SPP*, 165 FERC ¶ 61,026 at PP 1–2, 16).

[58] PJM First Answer at 8.

[59] *Id*. (stating that "For example, revisions to Operating Agreement, Schedule 2, section 1.1(e), state that 'Maintenance Adders may include expenses incurred as a result of electric production and can be a function of starts and/or run hours. Allowable expenses include repair, replacement, inspection, and overhaul expenses including variable long term service agreement expenses.'").

[60] PJM First Answer at 4.

Sellers can choose in which component of their energy market offers they wish to include their major maintenance and overhaul costs."[61]

38. The IMM responds that PJM's response is inadequate because the distinction is not between variable and fixed costs, but rather between short-run marginal costs and avoidable costs. The IMM further adds that PJM's definition of variable costs leaves open the possibility for Market Sellers to include costs that are not part of the proposed Manual 15 by including the open-ended phrase "not limited to." The IMM states that the phrase provides discretion over which maintenance costs can be included in cost-based offers.[62] The IMM further states that PJM is incorrect to claim that the "Commission has not accepted the distinction of short-run marginal costs versus other types of variable costs as relevant to whether a cost is recoverable in energy or capacity markets."[63]

39. Regarding the potential for double recovery of costs in both the energy and capacity markets, the IMM states that PJM does not have a process for preventing double recovery of maintenance costs since it does not routinely review the capacity market's Avoidable Cost Rate in its review of maintenance adders for cost-based offers in the energy market.[64]

40. With respect to OPSI and the IMM's concern that an inefficient market outcome could result from a generator having the option of including maintenance costs in either its energy or capacity market offers, P3 and EPSA contend that the concern is both speculative and remote. P3 and EPSA assert that, in PJM, offers that clear the energy market are seldom cost-based and, as the IMM acknowledged, very few of these offers are mitigated.[65] P3 and EPSA argue that the benefits of addressing maintenance issues either in the energy or capacity market outweigh the risks associated with potentially creating a remote likelihood of an inefficient market outcome.[66]

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

[62] IMM Answer to the PJM Deficiency Letter Response at 13.

[63] IMM First Answer at 2.

[64] IMM Answer to the PJM Deficiency Letter Response at 7.

[65] P3 and EPSA Answer at 5 (citing http://www.monitoringanalytics.com/reports/Presentations/2018/IMM_MC_Special_Session_SOM_20180322.pdf at 26).

[66] P3 and EPSA Answer at 5.

e. Commission Determination

41. We agree with PJM that its current treatment of CC and CT resources is unduly discriminatory because these resource types are restricted from including variable costs that are directly attributable to the production of electricity in their energy market offers. We also agree that the PJM Operating Agreement is unjust and unreasonable because it fails to provide a sufficient level of clarity regarding energy market cost components to address this concern. PJM asserts, and no party disputes, that revisions to the Tariff and Operating Agreement are necessary to effectuate the comparable treatment of all resource types. In its filings, PJM proposes to permit Market Sellers to include in their energy market offers only those maintenance costs directly related to electric production, and to prohibit Market Sellers from recovering these costs in the capacity market. As detailed further below, we find that PJM's proposed Tariff revisions are just and reasonable, and we find that PJM's proposed Operating Agreement revisions, with the further revisions discussed below, are just and reasonable.[67]

42. We disagree with the IMM's assertion that major maintenance costs are not short-run costs of electric production and thus should not be included in cost-based energy market offers. We find it reasonable to allow Market Sellers to recover costs associated with electric production in the energy market.

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[67] As we have explained, PJM cannot impose, through a manual provision, a limitation that is inconsistent with the terms of its Tariff and Operating Agreement. Decisions regarding whether an item should be placed in a tariff or in a business practice manual are guided by the Commission's "rule of reason" policy, under which provisions that "significantly affect rates, terms, and conditions" of service, are readily susceptible to specification, and are not generally understood in a contractual agreement must be included in the tariff, while items better classified as implementation details may be included only in the business practice manual. *See Energy Storage Ass'n v. PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,296 (2018) ("[P]rovisions that 'significantly affect rates, terms, and conditions' of service, are readily susceptible of specification, and are not generally understood in a contractual agreement must be included in the tariff, while items better classified as implementation details may be included only in the business practice manual."); *Midwest Indep. Trans. Sys. Operator, Inc.*, 98 FERC ¶ 61,137, at 61,401 (2002), *clarification granted*, 100 FERC ¶ 61,262 (2002) ("It appears that the proposed Operating Protocols could significantly affect certain rates and services and as such are required to be filed pursuant to Section 205."). *See, e.g.*, *Public Serv. Comm'n of N.Y. v. FERC*, 813 F.2d 448, 454 (D.C. Cir. 1987) (holding that the Commission properly excused utilities from filing policies or practices that dealt with only matters of "practical insignificance" to serving customers)).

43. The IMM's argument rests on the assumption that because major maintenance costs are not incurred at the time of production, they are not short-run marginal costs, and, therefore, should be recovered through the capacity market. We disagree. The wear and tear of operating a resource is typically based on the number of starts or run hours, and the maintenance intervals can be influenced by resource output levels. As such, it is reasonable to assume that some maintenance costs are incurred as the result of operating the resource, even if such costs are not incurred immediately at the time of production. We thus decline to adopt the IMM's preferred definition of includable energy market costs (i.e., what the IMM identifies as short-run marginal costs), which would not include variable maintenance costs that are incurred as a direct result of electric production and thus would be too restrictive. We find that the list of costs that may be included in the Maintenance Adder that we direct to be incorporated in Schedule 2 of the Operating Agreement, as discussed below, provides sufficient clarity regarding what constitutes an allowable energy market cost.

44. Regarding concerns over Market Seller discretion and the potential double recovery of certain major maintenance costs in both the energy and capacity markets, we find that PJM addressed these concerns in the Tariff amendment that PJM submitted with its Deficiency Letter Response, which excludes "variable costs that are directly attributable to the production of energy" from a resource's capacity market Avoidable Cost Rate.[68] We find that this clarification is sufficient to mitigate concerns over Market Sellers' having discretion as to where to recover variable costs.

45. Regarding concerns raised by the IMM that a Market Seller could, despite PJM's Tariff amendment, seek to recover variable costs in the capacity market because capacity market offers made below the default offer cap do not require unit-specific information, we find that this concern is beyond the scope of this proceeding. This proceeding addresses the disparate treatment of resource types with respect to costs includable in energy market offers, and clarifies the market through which all resource types recover certain variable costs. However, nothing in this order negates the importance of sufficient monitoring to prevent a Market Seller from seeking double recovery of costs through the energy market and capacity market.

46. We disagree with the IMM's concern that PJM's filing is inconsistent with the *SPP* order. SPP's mitigated offers, which are submitted by Market Sellers, are similar to the cost-based offers in the energy market that Market Sellers in PJM submit. In the *SPP* order, the Commission found "mitigated start-up offers and mitigated no-load offers to be a just and reasonable means of addressing concerns over the recovery of costs

[68] PJM Deficiency Letter Response at 3.

resulting from the gradual deterioration of resources' operating equipment."[69] The Commission also found that "SPP's proposed approach to cost recovery for major maintenance will help ensure that resource operators have the proper incentives to offer their resources into the market and to follow commitment and dispatch instructions."[70] While we acknowledge regional and market-design differences, and recognize that Market Sellers in PJM recover variable costs not directly attributable to the production of electricity through the capacity market, we agree that allowing variable costs that are directly attributable to the production of energy to be recovered in energy market offers in PJM will similarly improve incentives to follow commitment and dispatch instructions. Further, we find PJM's proposal reasonable in that it clarifies that all resource types, including CC and CT resources, can include major maintenance costs in their cost-based offers in the energy market, and such costs are excluded from their Avoidable Cost Rate in the capacity market.

2. Revisions to Schedule 2 of the Operating Agreement

a. PJM's Filing

47. PJM maintains that its existing Tariff and Operating Agreement are unduly discriminatory because they treat CC and CT resources differently from other generation by not permitting CC and CT resources to include maintenance adders in their cost-based offers. As a result, PJM proposes to include the following definitions for Operating Costs and Maintenance Adders in Schedule 2 of the Operating Agreement:

> Operating Costs are expenses related to consumable materials used during unit operation and may include lubricants, chemicals, limestone, trona, ammonia, acids, caustics, water injection, activated carbon for mercury control, and demineralizers usage.[71]
>
> Maintenance Adders may include expenses incurred as a result of electric production and can be a function of starts and/or run hours. Allowable

[69] *SPP*, 165 FERC ¶ 61,026 at P 16.

[70] *Id*. P 17.

[71] *See* proposed revisions to section 1.1(d), Schedule 2 of the Operating Agreement.

expenses include repair, replacement, inspection, and overhaul expenses including variable long term service agreement expenses.[72]

b. Comments and Protests

48. The IMM states that Manual 15 and Schedule 2 of the Operating Agreement include rules related to maintenance costs, but they do not use consistent terminology or provide clear, consistent guidance to users. The IMM further states that Schedule 2 of the Operating Agreement lists incremental maintenance costs, peak-prepared-for maintenance costs, and Maintenance Adders, without defining the meaning and purpose of each. The IMM explains that Manual 15 provides for the inclusion of maintenance costs in energy market cost-based offers and provisions for maintenance costs based on FERC's Uniform System of Accounts (FERC Accounts), which predate Regional Transmission Organization/Independent System Operator (RTO/ISO) markets. The IMM further explains that maintenance cost calculations rely on a 10 to 20 year history of maintenance costs intended to capture multiyear maintenance cycles, and points out that Schedule 2 of the Operating Agreement makes no mention of FERC Accounts or 20 year cost histories.[73]

49. The IMM argues that PJM has not demonstrated that any specific language in Schedule 2 of the Operating Agreement is unjust, unreasonable, or discriminatory. Rather, the IMM asserts, Manual 15 is the problem. The IMM contends that PJM filed its proposal under section 206 of the FPA because it failed to receive the necessary stakeholder support to make PJM's preferred changes under section 205. The IMM also argues that stakeholders' opposition is evidence that it is widely understood that the rules in Manual 15 significantly affect rates and therefore implies that these rules belong in the Tariff or Operating Agreement. The IMM states that, under the rule of reason, all of the relevant details for cost development should be included in the PJM Tariff, because they are core to market power mitigation and directly affect the rates paid by customers.[74]

50. The IMM argues that PJM's proposed revisions to Schedule 2 of the Operating Agreement do not provide clarity to market participants. The IMM states that Manual 15 requires Market Sellers to use the 10 or 20 year maintenance expense history to comply

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[72] *See* proposed revisions to section 1.1(e), Schedule 2 of the Operating Agreement.

[73] IMM First Protest at 9; IMM Second Protest at 9.

[74] IMM First Protest at 25; IMM Second Protest at 25 (citing *Energy Storage Ass'n v. PJM Interconnection, L.L.C.*, 162 FERC ¶ 61,296 (2018); *Cal. Indep. Sys. Operator Corp.*, 119 FERC ¶ 61,076, at P 656 (2007)).

with PJM's interpretation of Schedule 2 of the Operating Agreement. The IMM states that, based on a review of Market Sellers' maintenance costs, some costs are not short-run marginal costs because they are not directly related to electric production, and cites, as examples, the costs of maintenance of building structures, replacement of equipment not directly involved in power production, maintenance supervision and labor, spare parts, and insurance. The IMM argues that PJM has not provided lists of compliant and noncompliant costs sufficient to permit Market Sellers to review their maintenance account items or sufficient to permit the Commission to make a compliance determination.[75]

51. The IMM argues that the term Maintenance Adder is redundant given that cost items currently defined in Schedule 2 of the Operating Agreement include "Peak-prepared-for maintenance cost" and "incremental maintenance cost." The IMM also argues that the term Maintenance Adder does not change section 6.4.2(1)(ii) of the Operating Agreement that allows only incremental costs to be included in cost-based energy offers. The IMM therefore argues that the term Maintenance Adder should be rejected by the Commission.[76]

52. The IMM states that PJM proposes the new term "Operating Costs" while leaving the existing term "Other incremental operating costs" undefined. The IMM argues that the Commission should direct PJM to include one properly defined operating cost component.[77]

c. Deficiency Letter Response

53. In its Deficiency Letter Response, PJM clarifies that major maintenance costs for inspection and overhaul, for all resources types, manufacturers, and vintages, include repair, replacement, or refurbishment related to turbine diaphragm, turbine blades, casing, bearings, and seals. PJM also clarifies that, for gas turbines, major maintenance costs would include compressor blades and hot gas path inspection. PJM further clarifies that, for steam turbine resources of all manufactures and vintages, major maintenance costs would include various nozzle and valve repairs.[78]

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[75] IMM First Protest at 28; IMM Second Protest at 28.

[76] IMM First Protest at 26; IMM Second Protest at 26.

[77] IMM First Protest at 29; Second Protest at 29.

[78] PJM Deficiency Letter Response at 4.

54. PJM also explains that it proposes revisions to Manual 15 to include additional details on the definition of allowable maintenance expenses:

> 2.6.1 Allowable Maintenance Expenses
>
> Maintenance Costs are expenses incurred as a result of electric production. Allowable expenses can include repair, replacement, inspection, and overhaul expenses related to the [*sic*] but not limited to following systems – steam turbine, gas turbine, generator, boiler, heat Recovery Steam generators (HSRG) , main steam, feed water, condensate, condenser, cooling towers, transformers, controls, and fuel systems, etc.
>
> Maintenance Costs that cannot be included in a unit's cost-based offer are preventative maintenance and routine maintenance on auxiliary equipment like buildings, HVAC, compressed air, closed cooling water, heat tracing/freeze protection, and water treatment. Typically if the system is needed to remain in-service when the unit is not in operation expenses related to it cannot be included in a unit's cost based offer.[79]

55. PJM further explains that Market Sellers that utilize FERC Accounts 512 (Maintenance of Boiler Plant), 513 (Maintenance of Electric Plant) and 553 (Maintenance of Generating and Electric Plant) can include all maintenance costs in those accounts, including major maintenance costs in the energy market, as long as the costs are directly related to electric production and have removed straight time labor.[80]

d. Additional Comments

56. The IMM argues that PJM's assertion that it can correctly categorize maintenance costs based on whether they result from electric production is incorrect, as all maintenance costs result from electric production. The IMM argues that PJM has not provided a workable, transparent proposal for categorizing maintenance costs as appropriate for inclusion in energy market and capacity market cost-based offers. The IMM states that PJM uses various terms referring to various types of maintenance that occur at a power plant without defining those terms.[81]

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[79] PJM Deficiency Letter Response at 6.

[80] Straight time labor is a fixed cost that is typically included in a Market Seller's capacity offer. PJM Deficiency Letter Response at 5.

[81] IMM Answer to the PJM Deficiency Letter Response at 2-3.

57. The IMM argues that PJM's list of 11 major maintenance costs provided in its Deficiency Letter Response does not provide a detailed list of costs, by resource type, that PJM proposes to allow in cost-based offers in the energy market. The IMM argues that PJM's list omits maintenance costs for other parts of the power plant, such as cooling towers, fuel and water pumps, emissions reduction catalyst equipment, and replacement of filters and cartridges.[82]

58. The IMM reiterated its request to have PJM include only one definition for operating costs included in Schedule 2 of the Operating Agreement.[83]

e. Commission Determination

59. As discussed above, we accept PJM's Tariff revisions to clarify that all resource types are prohibited from recovering variable maintenance costs that are directly attributable to the production of electricity in their Avoidable Cost Rate in the capacity market. In addition, we find unjust and unreasonable PJM's current Operating Agreement, because the definitions of Maintenance Adders and Operating Costs fail to provide sufficient clarity with respect to permissible cost components of cost-based energy market offers.

60. While we agree with PJM that providing a list of allowable costs included under the Maintenance Adders and Operating Cost rubric will aid Market Sellers, we also agree with the IMM that PJM's proposed list of maintenance costs in Schedule 2 of the Operating Agreement is unjust and unreasonable because it does not provide a sufficient level of clarity. For example, certain maintenance costs associated with electric production are absent from PJM's proposed list, which may lead to confusion as to whether or not they are recoverable. We agree with the IMM that PJM should provide clear, consistent guidance to market participants about the types of costs that can be included in cost-based energy market offers. As specified in Appendix A, and as discussed below, we direct PJM to submit a compliance filing within 30 days of the date of this order, to revise Schedule 2 of the Operating Agreement to provide clear guidance regarding permissible components of cost-based offers. We find PJM's proposed Operating Agreement revisions, with the further revisions detailed below and reflected in Appendix A, to be just and reasonable.

61. The IMM argues that PJM should include a single, properly defined operating cost component in Schedule 2 of the Operating Agreement, in order to avoid confusion. We agree. In order to correct this deficiency, we direct PJM to revise its Operating

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[82] IMM Answer to the PJM Deficiency Letter Response at 8-11. The IMM bases this list of a previous version of Manual 15 dating back to 2011.

[83] *Id*. at 18.

Agreement as shown in Appendix A, to only include in section 1.1 a single operating cost component of cost-based offers. In order to effectuate this change, we direct PJM to remove "incremental fuel cost," and "other incremental operating costs" from the list of permissible components of cost-based offers to section 1.1 of Schedule 2. The term "other incremental operating costs" refers to the calculation of a unit-specific energy market opportunity cost. We therefore direct PJM to add "Opportunity Costs" to section 1.1 of Schedule 2. We further direct PJM to create a new section "5: Opportunity Costs" and move the Opportunity Cost-related provisions from section 1.1 into this new section.

62. We also require PJM to create a new section, "1.2 Application of Cost Components to Three-Part Cost-Based Offers," as Schedule 2 does not detail which part of the three-part offer costs should be applied. We find that this new section will provide additional clarity to market participants about how to account for each cost component and prevent confusion. This section should include the categories of costs applicable to a Market Seller's three-part cost-based offer, as listed in Appendix A.

63. To ensure that the broader definitions of "Maintenance Adder" and "Operating Costs" are correctly understood by all market participants, we also require PJM to move these definitions from section 1.1 into section 4 of Schedule 2 of the Operating Agreement. PJM must include section "4.1 Maintenance Adders" and section "4.2 Operating Costs" with the appropriate definitions of these two terms as discussed below, making clear that the lists of Maintenance Adders and Operating Costs do not preclude a Market Seller from including other maintenance and operating costs not included on the list.

64. In its Deficiency Letter Response, PJM provides a list of major maintenance costs that could be recovered by a Market Seller in a cost-based offer. We find that this information provides a clear, non-exhaustive list of costs that could be considered Maintenance Adders. We also agree with the IMM that this list should include other costs, such as costs related to cooling towers, fuel and water pumps, emissions reduction catalyst equipment, and replacement of filters and cartridges. Therefore, we require PJM to include additional cost items in section 4.1, as detailed in Appendix A, in its compliance filing.

65. In its Deficiency Letter Response, PJM also specifies that major maintenance costs are based on a 10 or 20 year history of such costs. PJM further clarifies that Operating Costs may be calculated based on a fixed or rolling average of values from one to five years in length, reviewed (and updated if changed) annually, or a rolling average from 12 to 60 months in length, reviewed (and updated if changed) monthly. In order to memorialize these specifications in the Operating Agreement, we require PJM to add this provision to section "4.1 Maintenance Adders & Operating Costs" and section "4.4 Review of Maintenance Adders & Operating Costs," as shown in Appendix A, in its compliance filing.

66. We also direct PJM to revise the section related to the review of Maintenance Adders and Operating Costs, section 4.4, to require Market Sellers to specify the maintenance history years on which their Maintenance Adders are based. PJM should revise this section as shown in Appendix A in its compliance filing.

67. Finally, PJM should renumber the provisions in the former section 5 as section 6: Penalty Provisions. We direct PJM to make a compliance filing within 30 days of the date of this order to include these revisions in Schedule 2 of the Operating Agreement.

3. Offer Markups

a. Comments and Protests

68. The IMM provides data to show that many fossil fuel resources have negative markups, i.e., their market-based offers are lower than their cost-based offers.[84] According to the IMM, this demonstrates that market-based offers "reveal actual unit marginal costs" and that the current rules permit the inclusion of costs in cost-based offers that are not short-run marginal costs. The IMM argues that PJM's proposal would "exacerbate this issue."[85] The IMM further states that PJM mitigates offers of sellers with market power to the lesser of the market-based or cost-based offer and, therefore, generating units that fail the Three Pivotal Supplier test may have their offers set to a level greater than the competitive level and be committed on noncompetitive offers, resulting in prices that are affected by market power. The IMM argues that overstated maintenance costs can also be a mechanism for the exercise of aggregate market power when markets are tight.[86] The IMM alleges that PJM, through its annual review process, has approved variable operation and maintenance costs that exceeded the IMM's benchmark of $0.25 per MWh, and that 77 CT units had variable operation and

[84] The IMM states that approximately 28 percent of gas units offered in the PJM market in 2017 had negative maximum markup. Of the coal and oil units offered in the PJM market, nearly 41 percent and 53 percent, respectively, had maximum negative markups. The IMM First Protest at 11-13.

[85] IMM Second Protest at 14.

[86] *Id*.

maintenance costs that were greater than 100 times the IMM's benchmark.[87] The IMM also provides variable operating and maintenance figures for CC units.[88]

69. The IMM explains that the purpose of cost-based offers is to prevent the exercise of market power in the energy market. The IMM argues that the effectiveness of market power mitigation in delivering competitive market outcomes is based entirely on cost-based offers as the measure of the competitive offer level. The IMM postulates that the effect of maintenance costs on uplift is in the tens of millions of dollars per year, in addition to the approximately $950 million impact calculated as due to the variable operation and maintenance component of LMP, which does not include the effect of economic withholding.[89] The IMM argues that PJM's practice of allowing cost-based offers to exceed competitive levels calls into question the presumption that the RTO market power mitigation plan adequately mitigates market power.[90]

b. Commission Determination

70. We find that the IMM's concerns over market power or offer markups to be beyond the scope of this filing. We note that in the Hourly Offers proceeding, the Commission approved a penalty structure that will be applicable in the event that a Market Seller has submitted a cost-based offer that does not comply with Schedule 2 of the Operating Agreement or the Cost Development Guidelines in Manual 15.[91] To the

[87] *Id*. at 15. For these 77 units, the amount for variable operating and maintenance is only listed as more than $25/MWh, without an upper bound. The IMM states that the average variable operating and maintenance costs for CTs was $48.42/MWh, but the number is skewed due to high outliers.

[88] IMM First Protest at 16. The average variable operating and maintenance cost for CC units was $3.59/MWh. The IMM uses different variable operating and maintenance cost ranges than those used for CTs to show the number of units in each range.

[89] IMM First Protest at 20. The IMM calculates the $950 million figure by doubling the $474 million for the first six months of 2018.

[90] *Id*. The IMM references the Commission's Market Based Rate Authority program, which allows a market seller in an RTO/ISO to rely on the existing market power mitigation of that market to sufficiently protect against the exercise of market power.

[91] *PJM Interconnection, L.L.C.*, 155 FERC ¶ 61,282, at P 63; February 2017 Order, 158 FERC ¶ 61,133 at P 5.

extent that concerns over market power arise from inaccurate offers, PJM and the IMM have existing tools, including penalty provisions, for addressing such concerns.

The Commission orders:

(A) PJM's proposed revisions, in Docket No. ER19-210-001, are hereby accepted, effective April 15, 2019, as discussed in the body of this order.

(B) PJM's proposed revisions, in Docket Nos. EL19-8-000 and EL19-8-001, are hereby accepted, subject to the revisions discussed in the body of this order, effective April 15, 2019.

(C) PJM is hereby directed to submit a compliance filing, within 30 days of the date of this order, as discussed in the body to this order.

By the Commission. Commissioner McNamee is not participating.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.

Appendix A

Modification to Schedule 2 of the PJM Operating Agreement

1.1 Permissible Components of Cost-based Offers.

(a) For generating units powered by boilers
Firing-up cost
Peak-prepared-for maintenance cost

(b) For generating units powered by machines
Starting cost from cold to synchronized operation

(c) For all generating units
~~Incremental fuel cost~~
No-load cost during period of operation
Fuel Cost
Emission allowances/adders
Maintenance Adders
~~Incremental~~ Labor cost
Operating costs
Opportunity Costs
Ten percent adder
~~Other incremental operating costs~~

~~(a) For a generating unit that is subject to operational limitations due to energy or environmental limitations imposed on the generating unit by Applicable Laws and Regulations, the Market Participant may include a calculation of its "other incremental operating costs" an amount reflecting the unit-specific Energy Market Opportunity Costs expected to be incurred. Such unit-specific Energy Market Opportunity Costs are calculated by forecasting Locational Marginal Prices based on future contract prices for electricity using PJM Western Hub forward prices, taking into account historical variability and basis differentials for the bus at which the generating unit is located for the prior three year period immediately preceding the relevant compliance period, and subtract therefrom the forecasted costs to generate energy at the bus at which the generating unit is located, as specified in more detail in PJM Manual 15. If the difference between the forecasted Locational Marginal Prices and forecasted costs to generate energy is negative, the resulting Energy Market Opportunity Cost shall be zero. Notwithstanding the foregoing, a Market Participant may submit a request to PJM for consideration and approval of an alternative method of calculating its Energy Market Opportunity Cost if the standard methodology described herein does not accurately represent the Market Participant's Energy Market Opportunity Cost.~~

~~(b) For a generating unit that is subject to operational limitations because it only has a limited number of starts or available run hours resulting from (i) the physical equipment limitations of the unit, for up to one year, due to original equipment manufacturer recommendations or insurance carrier restrictions, or (ii) a fuel supply limitation, for up to one year, resulting from an event of Catastrophic Force Majeure, the Market Participant may include a calculation of its "other incremental operating costs" an amount reflecting the unit-specific Non-Regulatory Opportunity Costs expected to be incurred. Such unit-specific Non-Regulatory Opportunity Costs are calculated by forecasting Locational Marginal Prices based on future contract prices for electricity using PJM Western Hub forward prices, taking into account historical variability and basis differentials for the bus at which the generating unit is located for the prior three year period immediately preceding the period of time in which the unit is bound by the referenced restrictions, and subtract therefrom the forecasted costs to generate energy at the bus at which the generating unit is located, as specified in more detail in PJM Manual 15. If the difference between the forecasted Locational Marginal Prices and forecasted costs to generate energy is negative, the resulting Non-Regulatory Opportunity Cost shall be zero.~~

~~(c) All fuel costs shall employ the marginal fuel price experienced by the Member. Reading as follows:~~

~~(d) Operating Costs are expenses related to consumable materials used during unit operation and may include lubricants, chemicals, limestone, trona, ammonia, acids, caustics, water injection, activated carbon for mercury control, and demineralizers usage.~~

~~(e) Maintenance Adders may include expenses incurred as a result of electric production and can be a function of starts and/or run hours. Allowable expenses include repair, replacement, inspection, and overhaul expenses including variable long term service agreement expenses.~~

1.2 Application of Cost Components to Three-Part Cost-based Offers.

A cost-based offer, as defined in section 1.2, Schedule 1 of the Operating Agreement, is a three-part offer consisting of Start-up Costs, No-load Costs, and the Incremental Energy Offer. Consistent with the definitions in the Operating Agreement, under "Operating Agreement § 1, Definitions":

"Start-Up Costs" shall mean the unit costs to bring the boiler, turbine and generator from shutdown conditions to the point after breaker closure which is typically indicated by telemetered or aggregated state estimator megawatts greater

than zero and is determined based on the cost of start fuel, total fuel-related cost, performance factor, electrical costs (station service), start maintenance adder, and additional labor cost if required above normal station manning. Start-Up Costs can vary with the unit offline time being categorized in three unit temperature conditions: hot, intermediate and cold.

"No-load Cost" shall mean the hourly cost required to create the starting point of a monotonically increasing incremental offer curve for a generating unit.

"Incremental Energy Offer" shall mean offer segments comprised of a pairing of price (in dollars per MWh) and megawatt quantities, which must be a non-decreasing function and taken together produce all of the energy segments above a resource's Economic Minimum. No-load Costs are not included in the Incremental Energy Offer.

The following lists the categories of cost that may be applicable to a Market Participant's three-part cost-based offer:

(a) For Start-up Costs
Fuel cost
Emission allowances/adders
Maintenance Adders
Operating Costs
Labor costs

(b) For No-load Costs
Fuel cost
Emission allowances/adders
Maintenance Adders
Operating Costs

(c) Incremental Costs in Incremental Energy Offers
Fuel cost
Emission allowances/adders
Maintenance Adders
Operating Costs
Opportunity Costs

(d) All fuel costs shall employ the marginal fuel price experienced by the Member.

2. FUEL COST POLICY

* * *

3. EMISSION ALLOWANCES/ADDERS

* * *

4. MAINTENANCE ADDERS & OPERATING COSTS

4.1 Maintenance Adders

Maintenance Adders are expenses directly related to ~~may include expenses incurred as a result of~~ electric production and can be a function of starts and/or run hours. Allowable expenses may include repair, replacement, and major inspection and overhaul expenses, including variable long term service agreement expenses. Maintenance Adders are calculated as the 10 or 20 year average cost of a unit's maintenance history. The major inspection and overhaul costs listed below in sections (a)-(c) are not exhaustive. A Market Seller may include costs in cost-based offers if those costs are similar to the costs outlined in this provision, so long as they are variable costs that are directly attributable to the production of electricity.

(a) Major inspections and overhauls of gas turbine and steam turbine generators include, but are not limited to, the following costs:

- turbine blade repair/replacement;
- turbine diaphragm repair;
- casing repair/replacement;
- bearing repair/refurbishment;
- seal repair/replacement and generator refurbishment;
- heat transfer replacement and cleaning;
- cooling tower fan motor and gearbox inspection;
- cooling tower fill and drift eliminators replacement;
- Selective Catalytic Reduction and CO Reduction Catalyst replacement;
- Reverse Osmosis Cartridges replacement;
- air filter replacement;
- fuel and water pump inspection/replacement;

(b) Major maintenance of gas turbine generators directly related to electric production include, but are not limited to:

• compressor blade repair/replacement;
• hot gas path inspections, repairs, or replacements.

(c) Major maintenance of steam turbine generators directly related to electric production include, but are not limited to:

• stop valve repairs;
• throttle valve repairs;
• nozzle block repairs;
• intercept valve repairs.

(d) Maintenance Costs that cannot be included in a Market Seller's cost-based offer are preventative maintenance and routine maintenance on auxiliary equipment like buildings, HVAC, compressed air, closed cooling water, heat tracing/freeze protection, and water treatment.

4.2 Operating Costs

(a) Operating Costs are expenses related to consumable materials used during unit operation and include, but are not limited to, lubricants, chemicals, limestone, trona, ammonia, acids, caustics, water injection, activated carbon for mercury control, and demineralizers usage. These operating costs not exhaustive. A Market Seller may include other operating costs in cost-based offers so long as they are operating costs that are directly attributable to the production of energy.

(b) Operating Costs may be calculated based on a fixed or rolling average of values from one to five years in length, reviewed (and updated if changed) annually, or a rolling average from twelve to sixty months in length, reviewed (and updated if changed) monthly.

4.3 Labor Costs

Labor costs included in cost-based offers are limited to start-up costs for additional staffing requirements and do not include straight-time labor costs. Straight time labor expenses may be included under an Avoidable Cost Rate in the RPM auction.

4.~~1~~4 Review of Maintenance Adders & Operating Costs.

(a) Maintenance Adders and Operating Costs must be submitted and reviewed at least annually by PJM and be changed if they are no longer accurate. Maintenance Adders and Operating Costs cannot include any costs that are included in the generation resource's Avoidable Cost Rate pursuant to Tariff, Attachment DD, section 6.8(c).

(b) Market Sellers must specify the maintenance history years utilized in calculating Maintenance Adders during the annual review.

(c) Market Sellers must specify the years used to calculate Operating Costs during the annual review. Market Sellers that elect to use a six month to twelve month rolling average must submit these costs for a monthly review.

(~~b~~d) Market Sellers may submit Maintenance Adder and Operating Costs information to PJM and the Market Monitoring Unit as part of the information it submits during the annual Fuel Cost Policy review process, described in Operating Agreement, Schedule 2, section 2.6. The basis for the Market Monitoring Unit's review is described in Tariff, Attachment M-Appendix, section II.A.2. PJM shall consult with the Market Monitoring Unit, and consider any input and advice timely received from the Market Monitoring Unit, in its determination of whether to approve Maintenance Adders and Operating Costs.

5. OPPORTUNITY COSTS

(a) For a generating unit that is subject to operational limitations due to energy or environmental limitations imposed on the generating unit by Applicable Laws and Regulations, the Market Participant may include ~~in the~~ a calculation of its "~~other incremental operating costs~~ Opportunity Costs" which is an amount reflecting the unit-specific Energy Market Opportunity Costs expected to be incurred. Such unit-specific Energy Market Opportunity Costs are calculated by forecasting Locational Marginal Prices based on future contract prices for electricity using PJM Western Hub forward prices, taking into account historical variability and basis differentials for the bus at which the generating unit is located for the prior three year period immediately preceding the relevant compliance period, and subtract therefrom the forecasted costs to generate energy at the bus at which the generating unit is located, as specified in more detail in PJM Manual 15. If the difference between the forecasted Locational Marginal Prices and forecasted costs to generate energy is negative, the resulting Energy Market Opportunity Cost shall be zero. Notwithstanding the foregoing, a Market Participant may submit a request to PJM for consideration and approval of an alternative method of calculating its Energy Market Opportunity Cost if the standard methodology described herein does not accurately represent the Market Participant's Energy Market Opportunity Cost.

(b) For a generating unit that is subject to operational limitations because it only has a limited number of starts or available run hours resulting from (i) the physical equipment limitations of the unit, for up to one year, due to original equipment manufacturer recommendations or insurance carrier restrictions, or (ii) a fuel supply limitation, for up to one year, resulting from an event of Catastrophic Force Majeure, the Market Participant may include ~~in the~~ a calculation of its "~~other~~

~~incremental operating costs~~ Opportunity Cost" which is an amount reflecting the unit-specific Non-Regulatory Opportunity Costs expected to be incurred. Such unit-specific Non-Regulatory Opportunity Costs are calculated by forecasting Locational Marginal Prices based on future contract prices for electricity using PJM Western Hub forward prices, taking into account historical variability and basis differentials for the bus at which the generating unit is located for the prior three year period immediately preceding the period of time in which the unit is bound by the referenced restrictions, and subtract therefrom the forecasted costs to generate energy at the bus at which the generating unit is located, as specified in more detail in PJM Manual 15. If the difference between the forecasted Locational Marginal Prices and forecasted costs to generate energy is negative, the resulting Non-Regulatory Opportunity Cost shall be zero.

6. PENALTY PROVISIONS (Renumbered)

* * *

Appendix B

Tariff Records Filed
PJM Interconnection, L.L.C.
FERC FPA Electric Tariff
Intra-PJM Tariffs

Docket No. ER19-210-001

OATT ATT DD.6, OATT ATTACHMENT DD.6. MARKET POWER MITIGATION, 21.1.0.

Docket No. EL19-8-000

OA SCHEDULE 2, OA SCHEDULE 2, 7.0.0 .

Appendix C

ER19-210-001
List of Intervenors

American Electric Power Service Corporation (AEP)
AES Corporation (AES)
American Municipal Power Inc. (AMP)
Calpine Corporation (Calpine)
Delaware Division of the Consumer Advocate (Delaware Consumer Advocate)
Dominion Resources Services, Inc. (Dominion)
Duke Energy Corporation (Duke)
East Kentucky Power Cooperative, Inc. (EKPC)
Electric Power Supply Association (EPSA)
Exelon Corporation (Exelon)
First Energy Service Company (First Energy)
Independent Market Monitor for PJM (PJM IMM)
LS Power Associates, L. P. (LS Power)
Maryland Public Service Commission (Maryland Commission)
Morgan Stanley Capital Group. Inc. (Morgan Stanley)
New Jersey Board of Public Utilities (New Jersey Board)
NRG Power Marketing LLC (NRG)
Old Dominion Electric Cooperative (ODEC)
PJM Industrial Customer Coalition (PJM ICC)
PJM Power Providers Group (P3)
Public Citizen, Inc. (Public Citizen)*
Rockland Electric Power (Rockland)
Starwood Energy Group Global, L.L.C. (Starwood Energy)
Southern Maryland Electric Cooperative, Inc. (SMECO)*

* motions to intervene out-of-time

EL19-8-000
List of Intervenors

American Electric Power Service Corporation (AEP)
AES Corporation (AES)
American Municipal Power Inc. (AMP)
Calpine Corporation (Calpine)
The Dayton Power and Light Company (Dayton)
Delaware Division of the Consumer Advocate (Delaware Consumer Advocate)
Direct Energy Business, LLC (Direct Energy)

Dominion Resources Services, Inc. (Dominion)
Duke Energy Corporation (Duke)
East Kentucky Power Cooperative, Inc. (EKPC)
Electric Power Supply Association (EPSA)
Exelon Corporation (Exelon)
First Energy Service Company (First Energy)
Illinois Commerce Commission (Illinois Commission)
LS Power Associates, L. P. (LS Power)
Maryland Public Service Commission (Maryland Commission)
Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM (IMM)
Morgan Stanley Capital Group. Inc. (Morgan Stanley)
New Jersey Board of Public Utilities (New Jersey Board)
NRG Power Marketing LLC (NRG)
Old Dominion Electric Cooperative (ODEC)
Organization of PJM States, Inc. (OPSI)
PJM Industrial Customer Coalition (PJM ICC)
PJM Power Providers Group (P3)
PJM Utilities Coalition (PJM Coalition)
Public Citizen, Inc. (Public Citizen)*
Public Utilities Commission of Ohio (Ohio Commission)
Rockland Electric Power (Rockland)
Starwood Energy Group Global, L.L.C. (Starwood Energy)
Southern Maryland Electric Cooperative, Inc. (SMECO)*

* motions to intervene out-of-time