

173 FERC ¶ 61,244
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: James P. Danly, Chairman;
Neil Chatterjee and Richard Glick.

PJM Interconnection, L.L.C.

Docket Nos. ER19-2722-000
ER19-2722-001
ER19-2722-002

ORDER ACCEPTING IN PART AND REJECTING IN PART COMPLIANCE FILING
AND DIRECTING FURTHER COMPLIANCE

(Issued December 17, 2020)

1. On December 21, 2017, pursuant to section 206 of the Federal Power Act (FPA),¹ the Commission instituted an investigation to examine PJM Interconnection, L.L.C.'s (PJM) practices regarding the pricing of fast-start resources and whether PJM should be required to revise its Open Access Transmission Tariff (OATT) and Amended and Restated Operating Agreement of PJM (Operating Agreement) (collectively, Tariff).² On April 18, 2019, the Commission issued an Order on Paper Hearing and found that PJM's fast-start pricing practices are unjust and unreasonable because the practices do not allow prices to reflect the marginal cost of serving load, and directed PJM to revise its Tariff to implement certain changes that would result in just and reasonable rates.³ On August 30, 2019, PJM submitted proposed Tariff revisions to comply with the Commission's directives in the Order on Paper Hearing.
2. On January 23, 2020, the Commission issued an order holding PJM's fast-start pricing proceeding in abeyance until July 31, 2020 to allow PJM and its stakeholders the opportunity to consider changes to address a pricing and dispatch misalignment issue raised in the comments on PJM's compliance filing.⁴ On July 31, 2020, pursuant to

¹ 16 U.S.C. § 824e.

² *PJM Interconnection, L.L.C.*, 161 FERC ¶ 61,295 (2017) (December 2017 Order).

³ *PJM Interconnection, L.L.C.*, 167 FERC ¶ 61,058 (2019) (Order on Paper Hearing).

⁴ *PJM Interconnection, L.L.C.*, 170 FERC ¶ 61,018 (2020) (Abeyance Order).

section 205 of FPA,⁵ PJM filed proposed revisions to its Tariff in Docket No. ER20-2573-000, which PJM argued addressed the pricing and dispatch misalignment concerns identified in the Abeyance Order. On October 13, 2020, the Commission accepted PJM's FPA section 205 filing to improve pricing and dispatch alignment in Docket No. ER20-2573-000 (PJM 205 Filing).⁶ In this order we accept in part and reject in part PJM's proposed revisions to its Tariff to comply with the directives in the Order on Paper Hearing. We also direct PJM to submit a further compliance filing within 60 days of the date of this order and a one-time informational report within five months of the date of this order, as discussed below.

I. Background

A. Order on Paper Hearing

3. In the Order on Paper Hearing, the Commission found PJM's fast-start pricing practices unjust and unreasonable because the practices do not allow prices to reflect the marginal cost of serving load.⁷ The Commission directed PJM to make the following changes to its Tariff, which the Commission stated would result in rates that are just and reasonable:

- A) Implement software changes so that fast-start resources are considered dispatchable from zero to their economic maximum operating limits for the purpose of setting prices;
- B) Apply fast-start pricing to all fast-start resources instead of only block-loaded resources;
- C) Alter its real-time energy market clearing process to consider fast-start resources in a way that is consistent with minimizing production costs;
- D) Include fast-start resources' commitment costs in energy offers by implementing PJM's proposed integer relaxation approach;⁸

⁵ 16 U.S.C. § 824d.

⁶ *PJM Interconnection, L.L.C.*, 173 FERC ¶ 61,028 (2020) (205 Order).

⁷ Order on Paper Hearing, 167 FERC ¶ 61,058 at P 17.

⁸ As described by PJM, integer relaxation consists of using a separate pricing run in which a fast-start resource's commitment status is allowed to vary between zero and one, with zero representing a resource that is offline and one representing a resource that is online. See PJM Initial Brief, Docket No. EL18-34-000, at 5-8 (filed Feb. 12, 2018).

- E) Restrict eligibility for fast-start pricing to fast-start resources that have a start-up time (including notification time) of one hour or less and a minimum run time of one hour or less;
 - F) Include its fast-start pricing practices in its Tariff;
 - G) Include commitment costs in energy prices for fast-start resources in both the day-ahead and real-time markets, and include in its compliance filing a proposal to withhold uplift payments in excess of a fast-start resource's commitment costs;
 - H) Implement its proposal to use lost opportunity cost payments to offset the incentive for over-generation or price chasing.⁹
4. The Commission directed PJM to submit a compliance filing by July 31, 2019 with proposed tariff changes reflecting the above requirements. The Commission also directed PJM to file a one-time informational report by August 30, 2019 explaining how the proposed fast-start pricing tariff provisions would not raise new market power concerns.¹⁰

B. PJM's Fast-Start Pricing Compliance Filing

5. As described in more detail below, PJM proposes revisions to its Tariff that set forth its proposed fast-start pricing practices. PJM states that the proposed revisions comply with the Commission's directives in the Order on Paper Hearing. PJM also submitted a one-time informational report in Docket No. EL18-34-000 explaining why implementing the required fast-start pricing changes would not raise market power concerns.¹¹

II. Notice and Responsive Pleadings

6. Notice of PJM's compliance filing was published in the *Federal Register*, 84 Fed. Reg. 46,948 (Sept. 6, 2019), with interventions and protests due on or before

⁹ Order on Paper Hearing, 167 FERC ¶ 61,058 at P 17.

¹⁰ On July 5, 2019, PJM filed a motion requesting a one-month extension of time, from July 31, 2019 until August 30, 2019 to submit the compliance filing, and from August 30, 2019 until September 27, 2019 to submit the informational report. The Commission granted the motion requesting these extensions on July 19, 2019, and PJM filed the informational report on September 27, 2019 in Docket No. EL18-34-000.

¹¹ PJM, Informational Report, Docket No. EL18-34-000 (Sept. 27, 2019) (Informational Report).

September 20, 2019. Timely motions to intervene were filed by Monitoring Analytics, LLC, the Independent Market Monitor for PJM (Market Monitor); Old Dominion Electric Cooperative; Organization of PJM States, Inc. (Organization of PJM States); PJM Power Providers Group (P3); Exelon Corporation (Exelon); Electric Power Supply Association (EPSA); Dominion Energy Services, Inc. (Dominion); Calpine Corporation; NRG Power Marketing LLC; Vistra Companies;¹² American Municipal Power, Inc.; American Petroleum Institute; LS Power Associates, L.P.; Office of the People's Counsel for the District of Columbia; Public Service Electric and Gas Companies (PSEG Companies);¹³ Illinois Citizens Utility Board; New Jersey Division of Rate Counsel; and North Carolina Electric Membership Corporation. Notices of intervention were filed by the New Jersey Board of Public Utilities and the Maryland Public Service Commission. East Kentucky Power Cooperative, Inc., FirstEnergy Utility Companies,¹⁴ and American Electric Power Service Corporation (AEPSC)¹⁵ filed motions to intervene out-of-time.

7. Comments were filed by the Market Monitor, Indicated Parties,¹⁶ P3 and EPSA, Indicated State Commissions,¹⁷ and Vistra Companies. Joint Customer Advocates¹⁸ filed

¹² Vistra Companies consist of Vistra Energy Corp. and Dynegy Marketing and Trade, LLC.

¹³ PSEG Companies consist of PSEG, PSEG Power LLC, and PSEG Energy Resources and Trade LLC.

¹⁴ FirstEnergy Service Company is intervening on behalf of the FirstEnergy Utility Companies, which consist of Ohio Edison Company, The Cleveland Electric Illuminating Company, The Toledo Edison Company, Pennsylvania Power Company, Pennsylvania Electric Company, Metropolitan Edison Company, West Penn Power Company, Jersey Central Power & Light Company, Monongahela Power Company, and The Potomac Edison Company.

¹⁵ AEPSC is intervening on behalf of Appalachian Power Company, Indiana Michigan Power Company, Kentucky Power Company, Kingsport Power Company, Ohio Power Company, Wheeling Power Company, and AEP Energy Partners, Inc.

¹⁶ Indicated Parties consist of Dominion, Exelon, and PSEG Companies.

¹⁷ Indicated State Commissions consist of the New Jersey Board of Public Utilities and the Delaware Public Service Commission.

¹⁸ Joint Customer Advocates consist of the Illinois Citizens Utility Board, Maryland Office of Peoples Counsel, New Jersey Division of Rate Counsel, People's Counsel for the District of Columbia, PJM Industrial Customer Coalition, and West Virginia Consumer Advocate.

a protest out-of-time, and Organization of PJM States filed a motion for leave to file comments out-of-time and comments.

8. On September 27, 2019, the Market Monitor filed an answer to P3 and EPSA's comments. On October 9, 2019, PJM filed answer to the protests and comments. On October 17, 2019, P3 and EPSA filed an answer to PJM's answer. On October 18, 2019, Vistra Companies filed an answer to PJM's answer. On October 25, 2019, the New Jersey Board of Public Utilities and the Market Monitor each filed an answer to PJM's answer.

9. On May 28, 2020, PJM filed its first errata to its compliance filing in Docket No. ER19-2722-001. Notice of PJM's first errata filing was published in the *Federal Register*, 85 Fed. Reg. 34,429 (June 4, 2020), with interventions and protests due on or before June 18, 2020. None were filed.

10. On July 31, 2020, the Market Monitor filed a motion for extension of abeyance for PJM's fast-start compliance filing in Docket No. ER19-2722 until the Commission issues an order on the PJM 205 Filing. On July 31, 2020, PJM filed an answer to the Market Monitor's motion for extension of abeyance. On August 17, 2020, Exelon filed an answer to the Market Monitor's motion for extension of abeyance.

11. On October 22, 2020, PJM filed its second errata to its compliance filing in Docket No. ER19-2722-002. Notice of PJM's second errata filing was published in the *Federal Register*, 85 Fed. Reg. 68,868 (Oct. 30, 2020), with interventions and protests due on or before November 12, 2020. None were filed.

III. Discussion

A. Procedural Issues

12. The Abeyance Order ruled on procedural matters¹⁹ other than the Market Monitor's motion for an extension of the abeyance period.

13. With regard to the Market Monitor's motion for an extension of the abeyance period until the Commission's issuance of an order on the PJM 205 Filing, we find that the motion is now moot because the Commission has acted on the PJM 205 Filing in Docket No. ER20-2573-000.²⁰

¹⁹ See Abeyance Order, 170 FERC ¶ 61,018 at PP 28-29.

²⁰ 205 Order, 173 FERC ¶ 61,028.

B. Substantive Issues

14. We first address below the pricing and dispatch misalignment issue discussed in the Abeyance Order. We then turn to PJM's compliance filing, which we accept in part and reject in part. We also direct PJM to submit a further compliance filing within 60 days of the date of this order, and a one-time informational report within five months of the date of this order regarding its progress on its long-term and any related outstanding pricing and dispatch reforms.

15. As a preliminary matter, we accept the uncontested aspects of PJM's compliance filing, which we find comply with the following directives in the Order on Paper Hearing: directives A, B, C, D, E, and G. Below, we discuss PJM's compliance with directives F and H.²¹

16. However, we emphasize that in the Order on Paper Hearing, the Commission directed PJM to propose an effective date for the Tariff revisions in its compliance filing.²² Instead, PJM states that it will submit an informational filing after receipt of the Commission's order on compliance providing notice of the date on which it intends to implement fast-start pricing.²³ We direct PJM to comply with the Commission's previous Order on Paper Hearing and to include a specific proposed effective date in its further compliance filing rather than in an informational filing. The effective date should reflect PJM's estimate of when development, testing, and implementation of the software system changes will be complete.

1. Pricing and Dispatch Misalignment Issue

a. Abeyance Order

17. In response to PJM's fast-start pricing compliance filing, commenters asserted that, under its current practice, PJM uses dispatch instructions for a future market interval to assign prices to the current interval, resulting in a misalignment of prices and dispatch instructions.²⁴ PJM's compliance filing had not addressed this pricing and dispatch misalignment.

²¹ See *supra* P 2.

²² Order on Paper Hearing, 167 FERC ¶ 61,058 at P 18.

²³ PJM Transmittal at 39-40.

²⁴ Market Monitor Comments at 7-8; Joint Customer Advocates Comments at 5-6; Indicated State Commissions Comments at 8.

18. In the Abeyance Order, the Commission found that PJM may not be able to implement separate dispatch and pricing runs – as required in the Order on Paper Hearing²⁵ – in a way that is just and reasonable without first resolving the pricing and dispatch misalignment problem.²⁶ The Commission stated that “[i]f fast-start resources dispatched in a given market interval could be compensated with a price from a different market interval, prices may not accurately reflect the marginal cost of serving load.”²⁷ Moreover, the Commission found that implementing fast-start pricing could exacerbate the pricing and dispatch misalignment issue because lost opportunity cost payments may be calculated based on inaccurate prices and may not correctly compensate opportunity costs.²⁸ In addition, the Commission stated that lost opportunity cost payments could be ineffective because they may not provide correct incentives to follow dispatch.²⁹ Therefore, the Commission held PJM’s compliance proceeding in abeyance until July 31, 2020 “to allow PJM and its stakeholders the opportunity to fully consider necessary changes to address PJM’s pricing and dispatch misalignment issue in conjunction with the compliance directives of the Order on Paper Hearing.”³⁰

b. PJM Filing

19. On July 31, 2020, PJM submitted an FPA section 205 filing in Docket No. ER20-2573-000 to resolve the pricing and dispatch misalignment issue identified by the Commission in the Abeyance Order. In that filing, PJM proposed to assign prices to the same interval for which dispatch instructions are intended (i.e., roughly 10 minutes in the future). In addition, PJM indicated that as of June 22, 2020, PJM has implemented intermediate-term reforms that changed the frequency of automatically executed dispatch cases from *less than* every five minutes to every five minutes, the same frequency as PJM’s pricing software is executed. PJM also indicated that plans to explore “long-term” reforms consisting of automated SCED case approval and an assumed ramp time

²⁵ Order on Paper Hearing, 167 FERC ¶ 61,058 at P 70 (“[W]e direct PJM to implement its proposal of altering its real-time energy market clearing process to execute the cost-minimizing dispatch solution, which will produce the dispatch instructions that are sent to supply resources, and then perform a pricing run to determine prices that would not impact the dispatch instructions sent to supply resources.”).

²⁶ Abeyance Order, 170 FERC ¶ 61,018 at P 31.

²⁷ *Id.*

²⁸ *Id.*

²⁹ *Id.*

³⁰ *Id.* P 32.

shortened from 10 minutes to five minutes. Concurrently, PJM submitted an informational filing in the instant proceeding, notifying parties of that filing and requesting that the Commission act on its fast-start pricing compliance filing as soon as possible.³¹ On October 13, 2020, the Commission accepted the PJM 205 Filing.³²

c. Determination

20. We find that PJM has adequately addressed the concerns about pricing and dispatch misalignment discussed in the Abeyance Order. The PJM 205 Filing accepted by the Commission in Docket No. ER20-2573-000 will provide for the pricing and dispatch calculations to use the same set of inputs and more accurately ensure that prices match the appropriate dispatch interval. Specifically, PJM will better align pricing and dispatch intervals by assigning prices to the same interval for which dispatch instructions are intended (i.e., roughly 10 minutes in the future).³³ In addition, PJM asserts that the intermediate-term reforms implemented as of June 22, 2020, mentioned above, have reduced the fraction of dispatch cases that are never priced.³⁴ We find that, by better aligning pricing and dispatch intervals, PJM has addressed the concern in the Abeyance Order about resources dispatched in a given market interval being compensated with a price from a different market interval. Moreover, this alignment of pricing and dispatch intervals mitigates the Commission's concerns in the Abeyance Order regarding inaccurate and ineffective lost opportunity cost payments. Because PJM has addressed the issues raised in the Abeyance Order, we find that the pricing and dispatch misalignment problem should not prevent PJM from implementing separate dispatch and pricing runs in a way that is just and reasonable. However, we encourage PJM to continue to work with stakeholders on their long-term reforms, and direct PJM to submit a one-time informational report within five months of the date of this order with an update on its progress on its long-term, and any related outstanding, pricing and dispatch reforms.³⁵

³¹ PJM, Informational Filing, Docket No. ER19-2722-000, at 2-3 (filed July 31, 2020).

³² 205 Order, 173 FERC ¶ 61,028.

³³ *Id.* P 30.

³⁴ PJM, Transmittal, Docket No. ER20-2573-000, at 10-11 (filed July 31, 2020).

³⁵ This report will not be noticed for comment or require Commission action.

2. Eligibility Criteria of Fast-Start Resources

a. Compliance Filing

21. In response to the Commission's directives to apply fast-start pricing to all dispatchable fast-start resources (not only to block-loaded resources), directive B above, and to include an eligibility requirement that fast-start resources have start-up and minimum run times of one hour or less, directive E above, PJM proposes Tariff language to allow all resources that meet those characteristics to qualify as fast-start resources.³⁶ PJM proposes to make its determination about whether a resource qualifies as a fast-start resource based on the operational characteristics of the resource's technology type or attestation from the market participant that investments have been made to allow the resource to meet the criteria of a fast-start resource.³⁷ PJM argues that this approach will allow PJM to ensure resources that physically cannot meet the fast-start resource criteria will not be considered for fast-start pricing even if they submit offers that include parameters satisfying those criteria.³⁸

22. However, PJM proposes to only allow certain fast-start resources called Eligible Fast-Start Resources to set price. Specifically, PJM proposes to exclude from the definition of an Eligible Fast-Start Resource: self-scheduled resources; pseudo-tied resources that have not committed their entire output to PJM; dynamically scheduled resources; and pumped storage hydropower resources that are scheduled day-ahead by PJM in its hydro optimization tool.³⁹ PJM argues that these resources should not be allowed to set price because these resources either are not eligible to recover commitment costs, or are not scheduled by conventional means.⁴⁰

b. Protests and Comments

23. Several commenters urge the Commission to require PJM to propose Tariff language with additional detail on the definition and eligibility criteria of a fast-start resource. Indicated State Commissions and Joint Customer Advocates argue that the process by which PJM will make its determinations and the standards PJM will use are

³⁶ PJM Transmittal at 4.

³⁷ *Id.* at 4-5.

³⁸ *Id.* at 5.

³⁹ *Id.*

⁴⁰ *Id.* at 5-7.

undefined.⁴¹ According to Indicated State Commissions and Joint Customer Advocates, PJM has too much discretion in the qualification process.⁴² Indicated State Commissions argue that the determination of which resources are eligible for fast-start pricing treatment significantly affects rates and therefore must be included in the Tariff under the Commission's rule of reason.⁴³ The Market Monitor also states that PJM's compliance filings lacks details regarding whether PJM can change the fast-start status of a resource in real time, whether a change to fast-start status requires consultation with the market participant, or what reasons PJM may use in determining a change to fast-start status.⁴⁴ The Market Monitor contends that PJM's compliance filing inappropriately provides PJM discretion to define fast-start resources through an undefined and unenforceable process.⁴⁵

c. Answers

24. In response to comments that PJM's proposal gives it too much discretion, PJM asserts that its definition of eligibility protects the integrity of its market. PJM elaborates that the process it proposes to authenticate the eligibility of fast-start resources is a two-step process. In the first step, PJM will determine, based on a resource's operating characteristics, whether a resource is a fast-start resource capable of meeting the eligibility criteria. Next, PJM will determine, by looking to the additional eligibility criteria (identified above), if a resource is an Eligible Fast-Start Resource. PJM states that it chose a two-step process deliberately, and that it only has discretion in the first step of the process. PJM asserts that this discretion is necessary to prevent sellers from erroneously triggering fast-start pricing and that this process is similar to PJM's review process for synchronized reserves. According to PJM, pre-designation allows it to make determinations before the market clearing process begins, and otherwise would be too administratively burdensome to implement.⁴⁶

⁴¹ Indicated State Commissions Comments at 5; Joint Customer Advocates Comments at 7.

⁴² Indicated State Commissions Comments at 5; Joint Customer Advocates Comments at 7.

⁴³ Indicated State Commissions Comments at 5.

⁴⁴ Market Monitor Comments at 11-12.

⁴⁵ *Id.*

⁴⁶ PJM Answer at 19-22.

25. The Market Monitor reiterates its arguments that PJM's proposal gives PJM too much discretion and could be applied in a discriminatory way. PJM's proposed definition of a fast-start resource (i.e., a resource that has start-up and minimum run times of one hour or less "based on its operating characteristics"), is not a definition, according to the Market Monitor, but rather a means of giving PJM discretion. Accordingly, the Market Monitor argues that PJM should propose a full definition that includes PJM's process for determining resources are fast-start capable, and that this definition of a fast-start resource should be in PJM's Tariff.⁴⁷

d. Determination

26. Pursuant to the Commission's directive to include PJM's fast-start pricing practices in its Tariff (directive F, above), we find that PJM provided insufficient detail regarding the process for determining eligibility for fast-start resources in its Tariff, and therefore PJM has not fully complied with this directive. We agree with commenters that PJM's proposed definition, which allows the PJM Office of the Interconnection to deem a resource capable of meeting eligibility criteria based on its operating characteristics, gives PJM too much discretion, and that this process should be more clearly defined in the Tariff. Specifically, PJM must provide the standards and process by which the PJM Office of Interconnection will deem a resource capable of meeting eligibility criteria including, for example, which operational characteristics may be considered as well as the conditions under which PJM may change a resource's status as a fast-start resource. While we acknowledge that PJM may need some amount of discretion in determining eligibility in order to prevent sellers from erroneously triggering fast-start pricing, the criteria and process that PJM uses to exercise this discretion should be transparent and clearly defined in the Tariff. In response to PJM, we note that PJM's review process for synchronized reserves provides PJM with broad authority to determine which units are physically capable of providing these reserves. However, because fast-start resources are often the marginal unit and the eligibility to be considered a fast-start resource changes how that resource will affect prices, we find that fast-start resource eligibility is distinct from synchronous reserves in PJM. Consequently, we find that PJM's process for determining which fast-start resources are physically eligible should be more clearly defined in the Tariff. Therefore, we direct PJM to include in its further compliance filing, within 60 days of the date of this order, Tariff revisions that define the process PJM will use to determine whether resources are eligible to be fast-start resources, as discussed above.

⁴⁷ Market Monitor Answer at 3-4.

3. Uplift Payments

a. Compliance Filing

27. In response to the Commission's requirement for PJM to implement its proposal to use lost opportunity cost payments to offset the incentive for over-generation or price chasing, directive H above, PJM proposes to amend its market rules to implement Dispatch Differential Lost Opportunity Cost credits and Day-ahead Scheduling Reserve lost opportunity cost credits.

28. According to PJM, the implementation of separate pricing and dispatch runs requires the introduction of a new lost opportunity cost payment, the Dispatch Differential Lost Opportunity Cost credit, to ensure that resources dispatched down to accommodate the inflexibility of fast-start resources and the inclusion of commitment costs into the LMP follow PJM's dispatch instructions. PJM states that only resources that have been instructed by PJM to provide fewer megawatts of energy than the number of megawatts of energy indicated in the pricing run will be eligible to receive Dispatch Differential Lost Opportunity Cost credits. PJM explains that the Dispatch Differential Lost Opportunity Cost credit will be "the difference between the revenue above cost that a resource would have received if it operated at the expected output level from the pricing run based on the resource's parameters and the real-time LMP and the actual revenue above cost the resource earned."⁴⁸ PJM states that, in determining a resource's revenue above cost, its proposed Tariff revisions will calculate such revenue: (1) indicated by the LMP from the pricing run; and (2) resulting from following the dispatch run's instructions.⁴⁹ According to PJM, if the difference between (1) and (2) is greater than zero, then the resource receives a Dispatch Differential Lost Opportunity Cost credit equal to that difference; if the revenue above cost from (2) is greater than (1), then there is no foregone opportunity and no credit will be received.⁵⁰

⁴⁸ *Id.* at 21-22.

⁴⁹ PJM states that it will calculate the revenues resulting from following the dispatch run by subtracting (1) the lesser of the offered cost associated with the megawatts from the dispatch run or the megawatts of energy actually provided from (2) the greater of the revenues received at the megawatts from the dispatch run and the megawatts of energy actually provided. According to PJM, this will remove the incentive for price-chasing behavior because each megawatt a resource produces beyond its dispatch instructions will reduce the Dispatch Differential Lost Opportunity Cost credit. *Id.* at 22.

⁵⁰ *Id.* at 21-22.

29. PJM states that, because the Dispatch Differential Lost Opportunity Cost credit is designed to mitigate behaviors associated with being dispatched down, only pool-scheduled resources and dispatchable self-scheduled resources that are dispatched to only provide energy are eligible to receive this credit.⁵¹ According to PJM, costs associated with Dispatch Differential Lost Opportunity Cost credits will be allocated⁵² to real-time load and export transactions across the entire PJM region.⁵³

30. In addition to the Dispatch Differential Lost Opportunity Cost credit, PJM also proposes to implement a Day-ahead Scheduling Reserve Lost Opportunity Cost credit. According to PJM, a resource's Day-ahead Scheduling Reserve commitment from the dispatch run may not be supported by the Day-ahead Scheduling Reserve clearing price from the pricing run. PJM states that the associated Day-ahead Scheduling Reserve clearing price credit may not fully cover the opportunity cost associated with the provision of the Day-ahead Scheduling Reserve assignment that resulted from the dispatch run. PJM explains that this can make resources less willing to offer to provide reserves if they can earn greater revenues by providing energy. Therefore, PJM contends, the Day-ahead Scheduling Reserve Lost Opportunity Cost credit will ensure that the resource receives the same revenue opportunity it could have received if it had been assigned energy rather than reserves for the quantity of reserves it was backed down to provide in the dispatch run. PJM explains that, in calculating this credit, it first determines the resource's revenue based on its offer at the assigned megawatt value; next, it "determines the resource's Day-ahead Scheduling Reserve Lost Opportunity Cost by calculating what the resource would have earned at the day-ahead LMP for the megawatt difference between its day-ahead energy commitment and the economic megawatt value for energy in the dispatch run minus the cost of providing such energy." PJM states that if the sum of these two values is greater than the revenue the resource earned from its

⁵¹ PJM states that resources dispatched down to provide ancillary services or manually dispatched down for reliability purposes already receive opportunity cost credits for differences in revenue above cost between the dispatch run and pricing run. *Id.* at 22-23.

⁵² PJM states that the allocation methodology is similar to that done for balancing operative reserve credits for reliability, except that balancing operating reserve credits are allocated regionally. *Id.* at 23.

⁵³ PJM observes that in its initial brief submitted in EL18-34-000 in response to the December 2017 Order, it proposed to provide lost opportunity cost credits for resources dispatched down in the day-ahead market. However, PJM states that, upon further analysis, it concludes that there is no opportunity for resources to deviate from dispatch in the day-ahead market, and it is therefore not proposing such a credit here. *Id.*

Day-ahead Scheduling Reserves assignment, then the resource receives a Day-ahead Scheduling Reserve Lost Opportunity Cost credit equal to the difference.⁵⁴

31. PJM observes that, in the Order on Paper Hearing, the Commission required PJM to “withhold uplift payments in excess of a fast-start resource’s commitment costs in order to eliminate the possibility that a fast-start resource can over-recover its commitment costs.”⁵⁵ According to PJM, however, this problem can occur with all resources, not just fast-start resources. Therefore, to comply with this requirement, PJM proposes to add an offset to any resource’s day-ahead make-whole calculation that removes commitment costs recovered during real-time dispatch for that Operating Day. PJM states that in order to determine any amount of commitment costs recovered during real-time dispatch, it will calculate each resource’s Day-ahead Operating Reserve Target and its Balancing Operating Reserve Target.⁵⁶

32. PJM argues that separate dispatch and pricing runs necessitate new make-whole payments for two circumstances. PJM proposes make-whole payments designed to cover the costs for the megawatts provided in excess of a resource’s day-ahead assignment, which are not covered by the real-time LMP in a situation in which the LMP resulting from the pricing run decreased relative to the dispatch run.⁵⁷ PJM explains that, while such a make-whole payment was not explicitly directed in the Order on Paper Hearing, it is consistent with proper implementation of the distinct dispatch and pricing runs and the intent of lost opportunity cost payments.⁵⁸ PJM also proposes make-whole payments for virtual transactions, price sensitive demand, and dispatchable exports that clear in the day-ahead dispatch run, but would not clear at the day-ahead clearing price from the pricing run.⁵⁹ PJM argues that these make-whole payments are necessary because a clearing price that does not support the accepted offer price in the dispatch run makes the accepted offer uneconomic to the seller, creating unwarranted financial exposure and

⁵⁴ *Id.* at 24-26.

⁵⁵ *Id.* at 26 (citing Order on Paper Hearing, 167 FERC ¶ 61,058 at P 122).

⁵⁶ *Id.* at 26-27.

⁵⁷ *Id.* at 17-18.

⁵⁸ *Id.*

⁵⁹ *Id.* at 19.

decreases the likelihood of such offers being made in the future such that their price convergence benefits would be reduced.⁶⁰

b. Protests and Comments

i. Lost Opportunity Cost Payment Required by the Order on Paper Hearing

33. Joint Customer Advocates and the Market Monitor claim that PJM fails to mention that its proposal to pay Dispatch Differential Lost Opportunity Credits (to resources instructed by PJM to provide fewer megawatts of energy than the megawatt dispatched from the price run would otherwise indicate) would do so on a five-minute basis without regard to the overall profitability of the resource commitment over the hours in which it operated.⁶¹

34. The Market Monitor explains that a resource could earn large profit margins for hours due to fast-start prices and also receive the proposed credit. The Market Monitor contends that, consistent with PJM's current uplift structure, the credit should provide for the net of all revenues and costs for the operating day, or relevant segment of the day, if the resource following dispatch operates at a net loss.⁶²

ii. Additional Uplift Payments

35. Indicated State Commissions argue that PJM's filing lacks adequate detail for the Commission to determine whether the filing is compliant and/or just and reasonable.⁶³ Indicated State Commissions provide separate arguments for deficiencies within multiple components of PJM's proposal. Generally, Indicated State Commissions and the Market Monitor argue that certain of PJM's proposed uplift payments were not required in the Order on Paper Hearing and contradict the Commission's goal for fast-start pricing.⁶⁴

⁶⁰ *Id.* at 19-20.

⁶¹ Joint Customer Advocates Comments at 5; Market Monitor Comments at 7.

⁶² Market Monitor Comments at 6-7.

⁶³ Indicated State Commissions Comments at 1.

⁶⁴ Indicated State Commissions Comments at 4, 9; Market Monitor Comments at 2-6.

36. Further, Indicated State Commissions and Joint Customer Advocates argue that the uplift payments proposals were insufficiently vetted by stakeholders.⁶⁵ Indicated State Commissions argue that PJM's proposed uplift payments are contrary to the Commission's fast-start pricing goals because they will undermine fast-start pricing's more-accurate price signals and their ability to inform investment decisions, increase overall market surplus, and reduce uplift.⁶⁶

37. Organization of PJM States argues that the Commission should reject PJM's filing as deficient and allow time for further discussion of possible impacts from several of PJM's proposed changes, including market manipulation concerns due to PJM's proposed uplift payments to virtual transactions.⁶⁷

(a) **Make-Whole Payments to Offset the Incentive for Over-Generation**

38. Joint Customer Advocates and the Market Monitor oppose PJM's proposal to provide make-whole payments to offset the incentive for over-generation when the fast start price is lower than the dispatch run price for a flexible marginal resource because, according to Joint Customer Advocates, PJM's rules already compensate generators where revenues from the energy market do not cover their offer through Balancing Operating Reserve credits.⁶⁸ The Market Monitor argues that PJM's proposed five-minute make-whole payment would supplement the current uplift payment structure by providing additional revenue to a resource on a five-minute basis.⁶⁹

(b) **Uplift Payments to Virtual Transactions, Price Sensitive Demand and Exports**

39. Indicated State Commissions, Joint Customer Advocates, and the Market Monitor argue that PJM's proposed uplift payments to virtual transactions, exports, and reserves

⁶⁵ Indicated State Commissions Comments at 2; Joint Customer Advocates Comments at 3.

⁶⁶ Indicated State Commissions Comments at 2.

⁶⁷ Organization of PJM States Comments at 3-4.

⁶⁸ Joint Customer Advocates Comments at 5; Market Monitor Comments at 6.

⁶⁹ Market Monitor Comments at 6.

are unwarranted and out-of-scope.⁷⁰ Indicated State Commissions, Joint Customer Advocates and the Market Monitor argue that such price-signals should be sent to all market participants and that there is no reason to shield virtual transactions from these signals via PJM's proposed uplift payments. Indicated State Commissions argue that when commitment of fast-start resources makes virtual transactions, price-sensitive demand, and exports uneconomic, price signals should reveal that these participants are indeed not economic.⁷¹ Joint Customer Advocates state that the Order on Paper Hearing limits PJM to examining lost opportunity cost payments, and that this is the only type of uplift required by the Order on Paper Hearing.⁷² Joint Customer Advocates argue that, in addition to being outside the scope, full financial exposure of all market participants, including those who PJM proposes to make eligible for uplift payments, is required in order to realize the long-term benefits claimed by the Order on Paper Hearing.⁷³ In addition, Joint Customer Advocates and the Market Monitor argue that providing uplift payments to virtual transactions raises market manipulation concerns because an otherwise unprofitable virtual transaction could become profitable due to the uplift payment alone.⁷⁴ Further, the Market Monitor also states that uplift payments to virtual transactions raise market manipulation concerns because virtual transactions do not incur physical operating costs or obligations in the day-ahead market.

40. The Market Monitor disagrees with PJM's argument that not paying uplift to virtual transactions will deter the participation of virtual transactions in the day-ahead market and reduce convergence between day-ahead and real-time prices. The Market Monitor states that virtual transactions do not provide price convergence because these transactions only clear the dispatch run and not the pricing run without directly affecting prices. The Market Monitor therefore argues that there is no benefit from encouraging virtual transactions via uplift payments.⁷⁵

⁷⁰ Indicated State Commissions Comments at 1-4; Joint Customer Advocates Comments at 2-4; Market Monitor Comments at 3-4.

⁷¹ Indicated State Commissions Comments at 4.

⁷² Joint Customer Advocates Comments at 2.

⁷³ *Id.* at 4.

⁷⁴ Joint Customer Advocates Comments at 3-4; Market Monitor Comments at 4-5.

⁷⁵ Market Monitor Comments at 4.

(c) **Uplift Payments to Day-Ahead Scheduling Reserves**

41. The Market Monitor states that day-ahead scheduling reserves are similar to virtual transactions in that both have no requirement to operate in real-time and therefore, do not have an incentive to deviate from dispatch instructions. The Market Monitor therefore disagrees with PJM's proposal to provide an uplift payment that shields day-ahead scheduling reserves from fast-start prices.⁷⁶

c. **Answers**

i. **Lost Opportunity Cost Payment Required by the Order on Paper Hearing**

42. In response to commenters' concerns that PJM's lost opportunity cost payments will be provided on a five-minute basis without regard to the overall profitability of the resource commitment, PJM argues that the purpose of the uplift payments is to ensure that resources follow dispatch instructions and do not deviate for financial gain.⁷⁷ PJM states that this incentive can arise every five minutes and that netting the lost opportunity cost payments against losses in other intervals would undermine the effectiveness at muting the incentive to chase higher prices on an interval-by-interval basis. In addition, PJM claims that this methodology is consistent with other lost opportunity cost payment methodologies in PJM and with methodologies the Commission approved for ISO New England Inc. (ISO-NE).⁷⁸

ii. **Additional Uplift Payments**

43. In response to Joint Customer Advocates, the Market Monitor, and Organization of PJM States that aspects of its proposal are beyond the scope of the Order on Paper Hearing, PJM argues that each is consistent with the Order on Paper Hearing's directive. PJM argues that, if the Commission were to find any aspect of its proposal to be beyond the scope of this proceeding, the Commission should reject only those specific revisions rather than the entire filing, as PJM claims commenters request.⁷⁹

⁷⁶ *Id.* at 5.

⁷⁷ PJM Answer at 11.

⁷⁸ *Id.* at 11.

⁷⁹ *Id.* at 3, 5.

44. In its answer, the Market Monitor maintains that PJM should be required to revise its fast-start pricing proposal to check market power, deter manipulation, avoid excessive uplift and implement a transparent and enforceable definition of a fast-start resource.⁸⁰

(a) **Make-Whole Payments to Offset the Incentive for Over-Generation**

45. PJM urges the Commission to reject objections to its make-whole payment proposal and asserts that this payment is akin to a lost opportunity cost payment in reverse: it will ensure that a resource facing this circumstance simply due to the difference in prices created by fast-start pricing would not have the incentive to deviate from PJM's dispatch instruction. Thus, PJM argues, its proposed make-whole payment is consistent with the lost opportunity cost payments approved by the Commission. In addition, PJM states that the payment is similar to the payment the Commission approved in ISO-NE's fast-start pricing proposal.⁸¹

(b) **Uplift Payments to Virtual Transactions, Price Sensitive Demand and Exports**

46. PJM reiterates that uplift payments for virtual transactions, price-sensitive demand, and dispatchable exports are necessary due to the imposition of separate and distinct dispatch and pricing runs, which creates unwarranted financial exposure. PJM argues that there are no existing provisions that ensure virtual transactions, price-sensitive demand, and dispatchable exports are kept whole to their bid or offer price. PJM explains that without the uplift payments, the risk of clearing uneconomically could drive out virtual transactions along with the price convergence benefits they provide.⁸²

47. In response to the Market Monitor's concern that PJM's proposal invites market manipulation, PJM states that there is no evidence to support the Market Monitor's concern. In addition, PJM points out that the Commission has approved similar make-whole payments in the Midcontinent Independent System Operator, Inc.'s (MISO) markets and no concerns have arisen there.⁸³

⁸⁰ Market Monitor Answer at 1.

⁸¹ PJM Answer at 9-10 (citing *ISO New England Inc.*, Docket No. ER15-2716-000 (Oct. 19, 2015) (delegated order)).

⁸² *Id.* at 6-7.

⁸³ *Id.* at 7.

(c) **Uplift Payments to Day-Ahead Scheduling Reserves**

48. PJM reiterates that the uplift payments for Day-ahead Scheduling Reserve Resources are necessary due to the imposition of separate and distinct dispatch and pricing runs. In response to the Market Monitor's argument that PJM's proposed payments to Day-ahead Scheduling Reserve Resources are unnecessary because these resources have no incentive to deviate from dispatch, PJM reiterates that the point of the proposed make-whole payments is to prevent an incentive to economically withhold because they would not be indifferent to providing energy or reserves.⁸⁴

d. Determination

49. In the Order on Paper Hearing, the Commission directed PJM to implement its proposal to use lost opportunity cost payments to offset the incentive for over-generation or price chasing (directive H, above). The Commission found PJM's proposal to be a just and reasonable and an effective approach to mitigate economic incentives to chase prices.⁸⁵ We accept PJM's proposal to provide Dispatch Differential Lost Opportunity Cost credits as compliant with the Order on Paper Hearing directive to implement lost opportunity payments to offset the incentive for over-generation of price chasing. PJM's proposed Tariff revisions ensure that resources do not have an incentive to deviate from PJM's dispatch instructions.⁸⁶ The Order on Paper Hearing recognized that fast-start pricing may create an incentive to deviate from PJM's dispatch instructions in order to take advantage of higher prices that result from fast-start pricing,⁸⁷ and we find that PJM's proposal addresses this concern. Therefore, we are not persuaded by arguments made by Joint Customer Advocates and the Market Monitor that PJM's proposal to pay Dispatch Differential Lost Opportunity Credits would do so on a five-minute basis without regard to the overall profitability of the resource. We find that PJM's proposal ensures that resources follow dispatch instructions and do not deviate for financial gain.

50. We reject as beyond the scope of this proceeding PJM's proposal to provide additional uplift payments, including: make-whole payments for following dispatch instructions; uplift payments for virtual transactions, price sensitive demand, and dispatchable exports; and lost opportunity cost payments to day-ahead scheduling reserve resources. The Commission did not direct PJM to implement any of these proposed

⁸⁴ *Id.* at 8.

⁸⁵ Order on Paper Hearing, 167 FERC ¶ 61,058 at PP 17, 138.

⁸⁶ Proposed PJM Operating Agreement, Schedule 1, § 3.2.3(e-1)(i) (46.0.0).

⁸⁷ Order on Paper Hearing, 167 FERC ¶ 61,058 at P 138.

uplift payments in the Order on Paper Hearing. Compliance filings must be limited to the specific directives ordered by the Commission.⁸⁸ We therefore direct PJM to submit a compliance filing within 60 days of the date of this order removing the applicable Tariff provisions.

51. While we reject as beyond the scope of this proceeding PJM's proposal to provide additional uplift payments, we agree with PJM that the introduction of distinct dispatch and pricing runs in the day-ahead market can give rise to instances in which the associated day-ahead scheduling reserve clearing price credit may not fully cover the opportunity cost associated with the day-ahead scheduling reserve commitment obtained from the dispatch run. We also agree with PJM that fast-starting pricing may change the incentives for virtual transactions, price sensitive demand, and dispatchable exports, regardless of whether a make-whole payment is provided or not.⁸⁹ Therefore, we encourage PJM to monitor these issues and work with its stakeholders to address whether uplift payments for virtual transactions, price sensitive demand, and dispatchable exports may be needed in the future.

4. Offer Caps and Order No. 831 Compliance

a. Compliance Filing

52. In the Order on Paper Hearing, the Commission required PJM to apply the requirements of Order No. 831⁹⁰ to the Composite Energy Offers⁹¹ of fast-start resources.⁹² To comply with this requirement, PJM states that it must: (1) verify the

⁸⁸ *AES Huntington Beach, LLC*, 111 FERC ¶ 61,079, at P 60 (2005).

⁸⁹ PJM Answer at 8.

⁹⁰ *Offer Caps in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 831, 157 FERC ¶ 61,115 (2016), *order on reh'g and clarification*, Order No. 831-A, 161 FERC ¶ 61,156 (2017).

⁹¹ PJM defines Composite Energy Offer as “the sum (in \$/MWh) of the Incremental Energy Offer and amortized [s]tart-[u]p [c]osts and [n]o-load [c]osts, and for Economic Load Response Participant resources the sum (in \$/MW) of the Incremental Energy Offer and amortized shutdown costs, as determined in accordance with [the Operating Agreement and Manuals].” Proposed PJM OATT, § 1 (Definitions – C-D) (21.0.0).

⁹² Order on Paper Hearing, 167 FERC ¶ 61,058 at P 130.

reasonableness of Composite Energy Offers above \$1,000/MWh; and (2) cap Composite Energy Offers greater than \$2,000/MWh.⁹³

53. PJM proposes separate Tariff revisions to verify the reasonableness of Composite Energy Offers above \$1,000/MWh for generation resources and also economic load participant resources. For generation resources, PJM states that it proposes to apply a formulaic screen prior to market clearing to evaluate the Composite Energy Offer, which consists of the incremental energy offer, amortized start-up costs, and amortized no-load costs. PJM states that it will use the tests that already exist in its Tariff⁹⁴ to verify the reasonableness of the incremental energy offer and no-load costs. For start-up costs, PJM explains that it is proposing a formula similar to one already found in Manual 15, section 2.4.1, which determines a resource's cost-based start-up cost. PJM's proposed formula calculates the start-up cost based on Performance Factor,⁹⁵ Start Fuel,⁹⁶ Fuel

⁹³ PJM Transmittal at 29.

⁹⁴ See PJM Operating Agreement, Schedule 1, section 6.4.3. PJM Transmittal at 31. In compliance with Order No. 831, PJM implemented a formulaic screen to verify the reasonableness of incremental energy offers on a segment-by-segment basis. Verification of no-load costs are included in this formulaic screen. See *PJM Interconnection, L.L.C.*, 161 FERC ¶ 61,153, at P 18, n.34 (2017).

⁹⁵ PJM states that the Performance Factor is the ratio of actual fuel burn to either design Heat Input or other currently tested Heat Input. PJM Transmittal at 34.

⁹⁶ PJM defines Start Fuel as the “[f]uel consumed from first fire of start process to breaker closing plus fuel expended from breaker opening of the previous shutdown to initialization of the (hot) unit start-up, excluding normal plant heating/auxiliary equipment fuel requirements.” *Id.* at 32.

Cost,⁹⁷ Start Maintenance Adder,⁹⁸ Additional Start Labor,⁹⁹ Station Service Cost,¹⁰⁰ and two nested adders.¹⁰¹ With respect to these adders, PJM proposes to include a 10% adder (fuel variance adder) in the Fuel Cost component (fuel variance adder) to account for the uncertainty involved in fuel price indices, transportation costs, and other costs not explicitly modeled. In addition, PJM proposes to retain the 10% adder that is currently allowed in cost-based incremental energy offers.¹⁰²

54. PJM explains that if the incremental energy offer plus no-load costs for any segment are found to be unreasonable based on the tests that already exist in the Tariff, PJM will exclude the entire no-load cost from all segments in the Composite Energy Offer. PJM states that the incremental energy offer will then be capped at the greater of \$1,000/MWh or the offer price of the most expensive verified segment for the purposes of price-setting.¹⁰³ Similarly, PJM states that if the start-up costs are found to be unreasonable based on the proposed formula, they will be excluded from all segments of the Composite Energy Offer.¹⁰⁴ According to PJM, the exclusion of start-up and no-load costs in these circumstances is necessary due to issues related to the integer relaxation

⁹⁷ PJM states that it will use fuel prices from a geographically appropriate commodity trading hub to estimate a resource's fuel cost input. *Id.* at 34.

⁹⁸ PJM defines Start Maintenance Adder as “an adder based on all available maintenance expense history for the defined Maintenance Period regardless of unit ownership’ and is limiting the expenses to only those ‘incurred as a result of electric production.’” *Id.* at 33.

⁹⁹ PJM defines Additional Start Labor as “[a]dditional labor costs for startup required above normal station manning levels.” *Id.* at 32.

¹⁰⁰ PJM defines Station Service Cost as “station service usage (MWh) during start-up multiplied by the 12-month rolling average off-peak energy prices as updated quarterly by the Office of the Interconnection.” *Id.* at 33.

¹⁰¹ PJM's states that the formula for start-up cost is: Start-Up Cost (\$) = [(Performance Factor) x (Start Fuel) x (Fuel Cost)] + Start Maintenance Adder + Additional Start Labor + Station Service Cost] x (1 +A). *Id.* at 32.

¹⁰² *Id.* at 31-35.

¹⁰³ *Id.* at 35.

¹⁰⁴ PJM observes that this can result in an unverified Composite Energy Offer greater than \$1,000/MWh being reduced to below \$1,000/MWh. According to PJM, this ensures that LMPs are not based on costs that fail the reasonableness test. *Id.* at 36.

method. PJM explains that the integer relaxation method requires the three parts of a Composite Energy Offer – incremental energy offer, start-up costs, and no-load costs – to be modeled separately. PJM states that the cleared MWs and resulting Composite Energy Offer value at that MW amount are determined simultaneously as part of the pricing run, and therefore, any capping of a Composite Energy Offer can only be determined after the optimization is completed. PJM observes that to cap a Composite Energy Offer, PJM would be required to do so administratively to bring it under the threshold, and then it would rerun the optimization. PJM explains that this cycle can go on repeatedly, producing different solutions where another resource would need to be capped. PJM asserts that, because of the complexity of this issue, its proposal to eliminate the start-up or no-load cost would eliminate the risk of running multiple iterations of the optimization formulation.¹⁰⁵

55. For economic load response participant resources, PJM states that the Market Seller will certify to PJM its verification of the incremental and shutdown costs as part of its energy offer. In addition, PJM may require additional supporting documentation to explain such costs, and this documentation may be reviewed by PJM and/or the Market Monitor. PJM asserts that this process is similar to its current processes for reviewing the incremental energy offers of such resources.¹⁰⁶

56. With respect to Eligible Fast-Start Resources that follow market-based schedules, PJM asserts that it must, consistent with the discussion above, individually address each component of Composite Energy Offers. PJM explains that if the incremental energy offer of the market-based schedule exceeds that of its cost-based schedule, it will exclude start-up and no-load costs from the Composite Energy Offer. According to PJM, this outcome is appropriate because in cases such as this where the market-based incremental energy offer is greater than the cost-based incremental energy offer, keeping in the start-up and no-load costs could result in a market-based Composite Energy Offer greater than \$1,000/MWh, which would be greater than the cost-based energy offer. PJM states that this is contrary to the requirement of Order No. 831 that offers above \$1,000/MWh must be cost-supported to set price.¹⁰⁷ In addition, PJM states that either start-up costs or no-load costs will be excluded from market-based offers resulting in a Composite Energy Offer over \$1,000/MWh if either: (1) the start-up or no-load cost of the associated cost-based offer exceeds the reasonably expected cost; or (2) if either the start-up or

¹⁰⁵ *Id.* at 30-31.

¹⁰⁶ *Id.* at 36-37.

¹⁰⁷ *Id.* at 38 (citing Order No. 831, 157 FERC ¶ 61,115 at P 78).

no-load cost of the market-based offer exceeds the start-up or no-load cost specified on the associated cost-based offer.¹⁰⁸

57. Finally, with respect to the requirements of Order No. 831 related to the hard cap of \$2,000/MWh, PJM states that if a verified Composite Energy Offer exceeds \$2,000/MWh, it will first exclude start-up costs from the offer, and if the offer still exceeds \$2,000/MWh, then PJM will exclude no-load costs. PJM adds that if the incremental energy offer still exceeds \$2,000/MWh, then the existing rule of capping the incremental energy offer at \$2,000/MWh will apply. For economic load response participant offers that exceed \$2,000/MWh, PJM proposes to exclude amortized shutdown costs from the determination of the Composite Energy Offer and the incremental energy offer will be capped at \$2,000/MWh as necessary.¹⁰⁹

b. Protests and Comments

58. Vistra Companies object to the manner in which PJM proposes to apply the offer cap reforms adopted by the Commission in Order No. 831 to Composite Energy Offers. Specifically, Vistra Companies object to PJM's proposal to exclude start-up and/or no-load costs if a Composite Energy Offer exceeds the offer cap thresholds. According to Vistra Companies, the Commission previously determined that the offer cap reforms of Order No. 831 apply to the adjusted energy offers (which include incremental energy, start-up, and no-load costs) of fast-start resources.¹¹⁰ As such, Vistra Companies assert that PJM should treat Composite Energy Offers the same way it would treat incremental energy offers of non-fast start resources and make them subject to the offer cap reforms of Order No. 831.¹¹¹

59. Vistra Companies further argue that PJM's proposal violates the requirement in Order No. 831 that a resource's incremental energy offer be capped at the higher of \$1,000/MWh or that resource's verified cost-based incremental energy offer. Vistra Companies explain that where a resource's incremental energy offer is less than the relevant offer cap threshold of either \$1,000/MWh or \$2,000/MWh, and the Composite Energy Offer is greater than the offer cap threshold, PJM's proposal would cap the Composite Energy Offer at a value below the offer cap threshold. Vistra asserts that this

¹⁰⁸ *Id.* at 37-39.

¹⁰⁹ *Id.* at 39.

¹¹⁰ Vistra Companies Comments at 4-5 (citing *Midcontinent Indep. Sys. Operator, Inc.*, 162 FERC ¶ 61,270, at P 27 (2018) (*MISO*)).

¹¹¹ *Id.* at 3-5.

is inconsistent with the requirement in Order No. 831 that a resource's offer be capped at the greater of \$1,000/MWh or its verified cost-based offer.¹¹²

60. Vistra Companies also observe that in ISO-NE's compliance filing for Order No. 831, ISO-NE stated that it would apply the \$1,000/MWh cap to fast-start offers that are cost-verified at under \$1,000/MWh because "reducing the offer value to the cost-verified value would be equivalent to imposing cost verification below \$1,000/MWh."¹¹³ In response to PJM's argument that "complexity" requires PJM to exclude start-up and no-load costs, Vistra Companies assert that the Commission rejected similar arguments from MISO in its compliance filing for Order No. 831. Vistra Companies state that, in that filing, MISO alleged that it should not be required to apply the offer cap reforms to the offers of fast-start resources because doing so would require MISO to fundamentally alter its fast-start pricing framework.¹¹⁴

61. Vistra Companies state that they are otherwise generally supportive of PJM's compliance filing and ask the Commission to expeditiously approve it and set an implementation date as early as possible. If PJM needs time to revise its Order No. 831-related parts of its proposal consistent with any future Commission directives, Vistra Companies ask the Commission to allow PJM to implement PJM's core fast-start pricing components while PJM works to respond to any such directives.¹¹⁵

c. Answers

62. In its answer, PJM argues that its approach is consistent with Order No. 831. According to PJM, its proposal includes an offer verification process that is only triggered when a Composite Energy Offer exceeds \$1,000/MWh, and such an offer is mitigated below \$1,000/MWh only when an offer component fails the reasonableness screen. As an example, PJM states that a Composite Energy Offer may consist of an incremental energy offer of \$750/MWh, start-up costs of \$300/MWh, and no-load costs of \$150/MWh. PJM states that, under its proposal, if the start-up costs of \$300/MWh fail the screen but the others pass, the verified cost-based Composite Energy Offer would be \$900/MWh because the start-up costs are excluded. PJM argues that this is a reasonable outcome that protects the market from paying a price based on unreasonable start-up costs. PJM argues that, in order for PJM to cap that Composite Energy Offer

¹¹² *Id.* at 5.

¹¹³ *Id.* at 5-6 (citing ISO-NE, Transmittal Letter, Docket No. ER17-1565-000, at 12 (filed May 8, 2017) (compliance filing for Order No. 831)).

¹¹⁴ *Id.* at 7 (citing *MISO*, 162 FERC ¶ 61,270 at P 31).

¹¹⁵ *Id.* at 8.

at \$1,000/MWh as Vistra Companies argue, it would need to assume \$100/MWh should be added to the resource's offer with no justification for doing so or administratively set the start-up costs at the dollar difference between the resource's verified costs and \$1,000/MWh.¹¹⁶

63. In response to Vistra Companies' references to the cost verification approaches taken by ISO-NE and MISO, PJM asserts that its mitigation scheme is different. PJM states that when a Composite Energy Offer fails a screen in ISO-NE or MISO, they can rely upon pre-determined reference levels for start-up and no-load costs. PJM contends that, in contrast, its mitigation scheme does not have such predetermined values and would need to administratively assign an arbitrary value. PJM reiterates that in its market processes, the Composite Energy Offer is an output of the pricing run, not an input into the commitment, dispatch, or pricing processes. PJM asserts that if it were to decide that it needed to cap a Composite Energy Offer, which would be after the pricing run, it would need to re-run the pricing solution with the capped offer, which could lead to an interminable iterative process if another resource were to require capping. According to PJM, this would create market inefficiencies and lead to delays.¹¹⁷

64. PJM requests that, if the Commission determines that PJM must modify its proposed offer verification rules, the Commission should not delay implementation of the other fast-start pricing reforms and allow it to implement the proposed fast-start pricing rules on a temporary basis to protect the market.¹¹⁸

65. In their answer to PJM's answer, Vistra Companies assert that PJM's example illustrates the fact that its proposed verification process does not comply with Order No. 831. Reiterating that fast-start energy offers should be treated in the same manner as incremental energy offers for verification purposes under Order No. 831, Vistra Companies provide their own example using an incremental energy offer from a non-fast start resource. In their example, Vistra Companies assume that a resource's \$1,200/MWh incremental energy offer is comprised of: (1) \$750/MWh incremental fuel (commodity-only) costs; (2) \$300/MWh incremental fuel transportation costs; and (3) \$150/MWh opportunity costs. Vistra Companies observe that if the \$300/MWh incremental fuel transportation cost was the only component to fail PJM's screen, under PJM's proposal, it would cap the incremental energy offer at \$900/MWh. According to Vistra Companies, this is an unreasonable outcome because: (1) it is inaccurate to assume no incremental fuel transportation costs; (2) given that offers up to \$1,000/MWh need not be cost-based, it is hard to argue that any such an offer should nonetheless be

¹¹⁶ PJM Answer at 24-25.

¹¹⁷ *Id.* at 25-26.

¹¹⁸ *Id.* at 26-27.

capped at \$900/MWh to protect consumers from unverified costs; and (3) PJM's approach would limit an incremental energy offer that has passed the market power mitigation screens to a value below \$1,000/MWh.¹¹⁹

66. Next, Vistra Companies acknowledge PJM's explanation of the complexities associated with re-running its pricing solution to incorporate a capped offer. However, Vistra Companies assert that there must be a point either before or during the pricing run when a decision is made to ignore the unverified component of a resource's three-part offer. Therefore, Vistra Companies ask the Commission to direct PJM to either adjust the Composite Energy Offer or the unverified component of the three-part offer at the same point in the process that PJM would otherwise decide to ignore an unverified component.¹²⁰

67. Finally, Vistra Companies argue that PJM's attempt to distinguish itself from ISO-NE based on the fact that ISO-NE can apply pre-determined reference levels is irrelevant. According to Vistra Companies, ISO-NE never indicated that it replaced unverified costs with such pre-determined values, but rather that it sets the offer at \$1,000/MWh if the cost-verified offer is less than \$1,000/MWh. Therefore, Vistra Companies ask the Commission to direct PJM to ensure that Composite Energy Offers do not fall below \$1,000/MWh in such instances.¹²¹

d. Determination

68. We reject PJM's proposed Tariff revisions applying the offer cap requirements of Order No. 831 to the Composite Energy Offers under its fast-start pricing proposal.

69. In Order No. 831, the Commission required each regional transmission organization/independent system operator to: (1) cap each resource's incremental energy offer at the higher of \$1,000/MWh or that resource's verified cost-based incremental energy offer; and (2) cap verified cost-based incremental energy offers at \$2,000/MWh when calculating locational marginal prices (LMPs).¹²² In the Order on Paper Hearing, the Commission directed PJM to apply the offer cap requirements of Order No. 831 "to fast-start resources' composite energy offers, which include the resources' commitment

¹¹⁹ Vistra Companies Answer at 1-4.

¹²⁰ *Id.* at 4-5.

¹²¹ *Id.* at 5.

¹²² Order No. 831, 157 FERC ¶ 61,115 at P 77.

costs [i.e., start-up and no-load costs].”¹²³ In its fast-start pricing compliance filing, however, PJM proposes to entirely exclude start-up and no load costs from Composite Energy Offers if either is determined to be unreasonable pursuant to its proposed process for verifying Composite Energy Offers above \$1,000/MWh. If unverified start-up or no-load costs are excluded from a Composite Energy Offer that is above \$1,000/MWh, such exclusion could result in a Composite Energy Offer below \$1,000/MWh being used to calculate LMPs. Pursuant to Order No. 831, however, that unverified Composite Energy Offer should be capped at \$1,000/MWh for purposes of calculating LMPs and not below \$1,000/MWh. Therefore, we agree with the arguments raised by Vistra Companies and find that PJM’s proposal violates the Order No. 831 requirement that such offers must be capped at the *higher of* \$1,000/MWh or a resource’s verified cost-based incremental energy offer (or, in the case of PJM’s fast-start resources, the Composite Energy Offer). Similarly, PJM proposes to exclude start-up costs and then, if the offer still exceeds \$2,000/MWh, to exclude no-load costs, leading to a Composite Energy Offer being capped at an amount below \$2,000/MWh. We find that this proposal violates the Order No. 831 requirement that such offers must be capped at \$2,000/MWh for purposes of setting LMP.

70. We recognize, as PJM states, that such a proposal may be complex and may require an administrative solution. However, PJM must propose a solution that complies with Order No. 831’s requirements. Therefore, we direct PJM to submit a compliance filing within 60 days of the date of this order providing tariff revisions that: (1) cap Composite Energy Offers at the higher of \$1,000/MWh or a resource’s verified Composite Energy Offer; and (2) cap Composite Energy Offers at \$2,000/MWh for purposes of setting LMP.

71. With respect to PJM’s proposed revisions to address impacts on market-based offers above \$1,000/MWh, it appears that these rules are only necessary because PJM’s current proposal does not allow a Composite Energy Offer to be capped as a whole, but rather, requiring that individual components must be capped.¹²⁴ Given that PJM must submit the above-directed compliance filing to cap the overall Composite Energy Offer, however, we find these proposed revisions unnecessary. Therefore, we also direct PJM

¹²³ Order on Paper Hearing, 167 FERC ¶ 61,058 at P 130.

¹²⁴ PJM Transmittal at 37-38 (“However, because as described above, PJM is unable to place a cap on the overall Composite Energy Offer considered in the calculation of LMPs and instead must individually address whether each component of the three-part offer should be used in that calculation, the following rules will govern the use of Start-Up and No-load Costs in the Composite Energy Offers of market-based schedules considered for pricing purposes in both the day-ahead and real-time markets.”).

to remove its proposed revisions relating to market-based offers in the above-directed compliance filing.

5. Shortage Pricing

a. Compliance Filing

72. PJM argues that the establishment of new distinct dispatch and pricing runs creates the question of when reserve shortage pricing should be triggered. According to PJM, reserve shortage pricing should be determined only based on pricing run results because energy and reserves are jointly co-optimized and therefore should be based on the same pricing run.¹²⁵ PJM proposes revisions to its rules for reserve markets to specify that prices are established in the pricing run of the real-time market, or the day-ahead market for day-ahead scheduling reserves.¹²⁶ Additionally, PJM proposes to consolidate all shortage pricing rules into a new section 2.5.1 of Schedule 1 of the Operating Agreement.¹²⁷

b. Protests and Comments

73. The Market Monitor states that PJM's compliance filing fails to address false positive and false negative shortages. The Market Monitor explains that, under PJM's integer relaxation proposal, if PJM allows capacity between zero and the economic minimum of fast-start resources to satisfy the synchronized reserve requirement in the pricing run, the pricing run will include more capacity than the dispatch run because units will be at their economic minimum in the dispatch run. The Market Monitor argues that counting the capacity below the economic minimum as reserves would eliminate shortages in the pricing run even in situations where shortages occur in the dispatch run, leading to a false negative shortage.¹²⁸

74. The Market Monitor states that, if PJM instead does not count capacity below the economic minimum of fast-start resources to satisfy the synchronized reserve requirement in the pricing run, the pricing run converts this capacity to energy when PJM subsequently dispatches fast-start resources down below their economic minimum output. The Market Monitor further states that, if the Composite Energy Offers of fast-start

¹²⁵ *Id.* at 16.

¹²⁶ *Id.*; Proposed PJM Operating Agreement, Schedule 1, § 3.2 (46.0.0).

¹²⁷ PJM Transmittal at 16; Proposed PJM Operating Agreement, Schedule 1, § 2.5.1 (8.0.0).

¹²⁸ Market Monitor Comments at 9-11.

resources exceed the reserve penalty factors, the pricing run would result in shortage pricing but the dispatch run will not call on fast-start resources to resolve a shortage. The Market Monitor argues that a false positive shortage would arise from this situation.¹²⁹

75. Indicated State Commissions argue that PJM's method for calculating available reserves must be clarified. Indicated State Commissions are concerned that, due to PJM's reserve calculation methods, shortage pricing may be invoked when reliability conditions do not merit shortage pricing and that shortage pricing may fail to be triggered when real shortages occur. Indicated State Commissions argue that PJM should include further information in its Tariff about exchanges of information between the dispatch run and the pricing run.¹³⁰

c. Answers

76. PJM claims that the Market Monitor has an incorrect understanding of how integer relaxation works. PJM states that no additional reserve capability is created through integer relaxation, because the difference between a resource's economic minimum and economic maximum in the pricing run is always less than or equal to what that difference was in the dispatch run. PJM further explains that resources that are not capable of providing reserves in the dispatch run are not able to provide reserves in the pricing run either.¹³¹

77. In response to the Market Monitor's allegation that PJM will not dispatch a fast-start resource to resolve a shortage if its Composite Energy Offer exceeds the reserve penalty factor, thus triggering a false positive shortage, PJM states that the Market Monitor incorrectly explains the mechanics. PJM explains that it assigns a resource to provide reserves if the lost opportunity cost of the resource (LMP minus the resource's offer) is below the reserve penalty factor. According to PJM, with fast-start pricing, LMP will now be set by the Composite Energy Offer of an Eligible Fast-Start Resource, which could result in higher reserve lost opportunity costs, even from resources that are not eligible for fast-start pricing, than are experienced currently. PJM states that it believes that this is the actual issue the Market Monitor is attempting to highlight.¹³²

78. PJM states that under its current reserve market design, with no fast-start pricing, there is the potential for reserve shortages to be reflected in prices when they physically

¹²⁹ *Id.* at 10.

¹³⁰ Indicated State Commissions Comments at 7.

¹³¹ PJM Answer at 14-16.

¹³² *Id.* at 16-17.

do not exist when the system operator takes a manual action to maintain reserves that are more costly than the reserve penalty factor. PJM states that, in order for this to occur under fast-start pricing, the Composite Energy Offer would have to be marginal in the pricing run at a level that does not result in sufficient reserves available to meet the reserve requirement even though there were adequate reserves available in the dispatch run. PJM opposes the Market Monitor's proposed remedy for potential false positives as a concept that PJM rejected early on in the PJM stakeholder process as deficient, stating that raising the reserve penalty factor would be an appropriate solution if the Commission determines that the potential for false positives under fast-start pricing is a concern.¹³³

d. Determination

79. We accept PJM's proposal to trigger shortage pricing based on the results of the pricing run. As PJM explains, implementing the Commission's directive to execute a dispatch run followed by a distinct pricing run necessarily raises the question of which of these runs should trigger shortage pricing.¹³⁴ We find that triggering shortage pricing based on the outcomes of the pricing run is just and reasonable because the pricing run calculates payments for reserves and thus correctly determines whether those payments exceed the reserve penalty factor. Since the dispatch run does not include composite offers as it performs comparisons of whether triggering shortage pricing or paying reserve clearing prices to reserves is more economic, the dispatch run fails to properly address the question of whether reserves are available at a price below the shortage price. As such, it is appropriate to trigger shortage pricing based on the results of the pricing run.

80. We disagree with the Market Monitor's argument that PJM's approach will create false negatives. We agree with PJM that the integer relaxation methodology ensures that the dispatchable ranges of resources in the pricing run are less than or equal to the dispatchable ranges of resources in the dispatch run. As such, PJM's proposed pricing run cannot overcount reserves in a way that would lead to false negatives.

81. We agree with PJM's comment that PJM's approach could introduce false positives, but we find that the likelihood of such positives to be *de minimis* given the Commission's recent approval of PJM's reforms to its reserve penalty factor provisions. PJM's answer indicates that increasing the reserve penalty factor could resolve the issue of false positives. We note that the Commission's May 2020 order in Docket Nos. EL19-58 and ER19-1486 increased PJM's reserve penalty factor from \$850/MW to

¹³³ *Id.* at 17-19.

¹³⁴ PJM Transmittal at 8 (citing Order on Paper Hearing, 167 FERC ¶ 61,058 at P 70).

\$2,000/MW.¹³⁵ As such, we find that the likelihood of false positives has been significantly reduced.

6. Market Power

a. Compliance Filing

82. In response to the Commission's directive in the Order on Paper Hearing, PJM submitted an informational report explaining how the proposed fast-start pricing Tariff provisions would not raise new market power concerns. PJM states that it does not need to modify its three pivotal supplier (TPS)¹³⁶ test to account for fast-start pricing.¹³⁷ However, PJM states that a minor revision to the TPS test is warranted. Specifically, PJM proposes to clarify that the TPS test will not be executed in the pricing run because, according to PJM, market power mitigation should be performed at the time a resource is committed, which PJM argues occurs during the dispatch run and not the pricing run.¹³⁸

b. Protests and Comments

83. According to the Market Monitor, there is a different set of binding constraints in the pricing run than exists in the dispatch run.¹³⁹ Thus, the Market Monitor asserts that there exists the potential for structural market power in the pricing run that does not exist and is not identified in the dispatch run. While the Market Monitor acknowledges that the Order on Paper Hearing did not require the TPS test to be run in the pricing run, the Market Monitor argues that PJM's explicit prohibition is not required for compliance and is therefore out of scope.¹⁴⁰ In addition, the Market Monitor argues that the prohibition on executing the TPS test in the pricing run even when market power may exist presents an administrative barrier to mitigating market power and is unjust and unreasonable.

84. Several commenters agree with the Market Monitor. Indicated State Commissions and Joint Consumer Advocates argue that the Commission correctly did not require

¹³⁵ *PJM Interconnection, L.L.C.*, 171 FERC ¶ 61,153, at P 153 (2020).

¹³⁶ See PJM Operating Agreement, Schedule 1, Section 6.4.

¹³⁷ PJM Transmittal at 15.

¹³⁸ *Id.*

¹³⁹ Market Monitor Comments at 8-9.

¹⁴⁰ *Id.* at 9 (citing Order on Paper Hearing, 167 FERC ¶ 61,058 at P 128).

changes to the TPS test in the Order on Paper Hearing.¹⁴¹ Indicated State Commissions and Joint Consumer Advocates argue that PJM's proposed language prohibiting application of the TPS test in the pricing run should be rejected as out-of-scope of the Order on Paper Hearing's compliance directive.¹⁴²

c. Answers

85. The New Jersey Board of Public Utilities echoes the Market Monitor and other commenters' claims that PJM's compliance filing, answer, and informational report do not sufficiently address market power concerns and opposes language prohibiting the TPS test from being executed in the pricing run.¹⁴³

d. Determination

86. PJM's informational report filed in Docket No. EL18-34-000 explained why implementing fast-start pricing does not raise market power concerns and therefore satisfies the Commission's directive in the Order on Paper Hearing.¹⁴⁴ Based on PJM's responses in the informational report, we will take no further action with respect to market power in this proceeding. We find that the record in this proceeding does not suggest that the fast-start pricing reforms will cause new market power concerns in the PJM markets and that the issues raised in the protests and comments are instead intrinsic to PJM's existing market power mitigation practices.¹⁴⁵ As such, we find that the market power issues raised by the Market Monitor and other commenters are beyond the scope of this compliance proceeding because they relate to PJM's existing mitigation practices rather than fast-start pricing.

87. The Market Monitor argues PJM should not be permitted to prohibit execution of the TPS test in the pricing run. We find that the proposed language creates confusion about when mitigation is performed. Under its tariff, PJM's mitigation occurs at the time

¹⁴¹ Indicated State Commissions Comments at 6-7; Joint Customer Advocates Comments at 7; Market Monitor Comments at 8-9.

¹⁴² Indicated State Commissions Comments at 6-7; Joint Customer Advocates Comments at 7; Market Monitor Comments at 8-9.

¹⁴³ New Jersey Board of Public Utilities Answer at 2.

¹⁴⁴ Order on Paper Hearing, 167 FERC ¶ 61,058 at PP 128-29.

¹⁴⁵ While we do not expect fast-start pricing to trigger new market power concerns in the PJM markets, if unexpected market power concerns related to fast-start pricing were to arise in a future proceeding, PJM can address them at that time.

of commitment¹⁴⁶ instead of in the dispatch run or the pricing run. We therefore reject PJM's proposed Operating Agreement language stating that PJM's mitigation process does not apply to the pricing run.¹⁴⁷ Accordingly, we direct PJM in its further compliance filing, due within 60 days of the date of this order, to remove the proposed language in Operating Agreement Schedule 1, section 6.4.1(f)(v).

The Commission orders:

(A) PJM's compliance filing is hereby accepted in part, and rejected in part, as discussed in the body of this order.

(B) PJM is hereby directed to submit a compliance filing, within 60 days of the date of this order, as discussed in the body of this order.

(C) PJM is hereby directed to submit a one-time informational report, within five months of the date of this order, as discussed in the body of this order.

By the Commission. Commissioner Clements is not participating.

(S E A L)

Kimberly D. Bose,
Secretary.

¹⁴⁶ PJM states in this proceeding that PJM's mitigation process occurs at the time of commitment. PJM Transmittal at 15; *see also* PJM, Informational Report n.14. PJM's Operating Agreement provides that "[t]he offer on which a resource is committed shall initially be determined at the time of the commitment." PJM Operating Agreement, Schedule 1, § 6.4.1 (11.1.2).

¹⁴⁷ Proposed PJM Operating Agreement, Schedule 1, § 6.4.1(f)(v) (13.0.0) ("The three pivotal supplier test is not executed in the pricing run . . .").

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