162 FERC ¶ 61,150
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Kevin J. McIntyre, Chairman;
Cheryl A. LaFleur, Neil Chatterjee,
Robert F. Powelson, and Richard Glick.

PJM Interconnection, L.L.C. Docket Nos. ER17-775-000
ER17-775-001
ER17-775-002

ORDER ON COMPLIANCE

(Issued February 21, 2018)

1. On January 11, 2017, as amended on August 14, 2017, PJM Interconnection, L.L.C. (PJM) submitted, pursuant to section 206 of the Federal Power Act (FPA),[1] revisions to its Open Access Transmission Tariff (OATT), Amended and Restated Operating Agreement (Operating Agreement) (collectively, Tariff), and Reliability Assurance Agreement[2] to comply with the requirements of Order No. 825.[3] In this order, we accept PJM's compliance filing, subject to a further compliance filing, as discussed below.

I. Background

2. In Order No. 825, the Commission required that each regional transmission organization (RTO) and independent system operator (ISO) align settlement and

[1] 16 U.S.C. 824e (2012).

[2] PJM Interconnection, L.L.C., Intra-PJM Tariffs, OA section 1 and OA Schedule 1. The appendix lists the Tariff sections filed by PJM. Capitalized terms not otherwise defined herein have the meaning specified in the Tariff.

[3] *Settlement Intervals and Shortage Pricing in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Order No. 825, FERC Stats. & Regs. ¶ 31,384 (2016) (Order No. 825).

dispatch[4] intervals by: (1) settling energy transactions in its real-time markets at the same time interval it dispatches energy; (2) settling operating reserves transactions in its real-time markets at the same time interval it prices operating reserves;[5] and (3) settling intertie transactions[6] in the same time interval it schedules intertie transactions. The Commission also required that each RTO/ISO establish a mechanism to trigger shortage pricing for any interval in which a shortage of energy or operating reserves is indicated during the pricing of resources for that interval. The Commission did not require that RTOs/ISOs settle energy and operating reserves at the same interval, nor did it require a change to the price paid by an RTO/ISO when shortage pricing is triggered.[7]

II. Notice of Filing and Responsive Pleadings

3. Notice of PJM's filing was published in the *Federal Register*, 82 Fed. Reg. 5552 (2017), with interventions and protests due on or before February 1, 2017.

4. Timely motions to intervene were filed by Delaware Division of the Public Advocate, American Electric Power Service Corporation, Electric Power Supply Association, NRG Power Marketing LLC and GenOn Energy Management, LLC, and

[4] With respect to operating reserves, the Commission uses "dispatch" to describe the intervals at which they are acquired and priced. *Id.* n.2 (citing *Settlement Intervals and Shortage Pricing in Markets Operated by Regional Transmission Organizations and Independent System Operators*, 80 Fed. Reg. 58,393 (Sept. 29, 2015), FERC Stats. & Regs. ¶ 32,710, at P 1 (2015)).

[5] Operating reserves refer to certain ancillary services procured in the wholesale market, although they are often defined differently in each RTO/ISO. Operating reserves typically include: (a) Regulating Reserve, used to account for very short-term deviations between supply and demand (e.g., 4 to 6 seconds); (b) Spinning, or Synchronous Reserve, which is capacity held in reserve and synchronized to the grid and able to respond within a relatively short amount of time (e.g., within 10 minutes), to be used in case of a contingency, such as the loss of a generator; and (c) Non-Spinning Reserve, capacity that is not synchronized to the grid and which can take longer to respond (e.g., within 10-30 minutes) in case of a contingency. *Id.* n.3 (citing Federal Energy Regulatory Commission, Price Formation in Organized Wholesale Electricity Markets: Staff Analysis of Shortage Pricing, Docket No. AD14-14-000, at 3 n.7 (Oct. 2014), http://www.ferc.gov/legal/staff-reports/2014/AD14-14-pricing-rto-iso-markets.pdf.

[6] Intertie transactions are transactions across RTO/ISO borders, including imports, exports and wheel-through transactions. *Id.* n.4.

[7] *Id.* PP 1, 71.

PJM Power Providers Group. American Municipal Power, Inc. (AMP) and Monitoring Analytics, LLC, in its capacity as the PJM Independent Market Monitor (IMM), filed timely motions to intervene and protests.

5. On February 22, 2017, Commission staff issued a data request seeking additional information related to intertie transactions, behind-the-meter generation, energy withdrawals by generation resources, demand response, and operating reserves deviation charges. On March 27, 2017, PJM filed a response. Notice of PJM's response was published in the *Federal Register*, 82 Fed. Reg. 16,195 (2017), with interventions and protests due by April 17, 2017. The IMM filed a timely motion to intervene and comments.

6. On August 14, 2017, PJM filed an amended compliance filing correcting three errors. Notice of PJM's amendment was published in the *Federal Register*, 82 Fed. Reg. 39,423 (2017), with interventions and protests due by September 5, 2017. The IMM filed a timely motion to intervene and comments. PJM filed an answer to the IMM's comments.

7. On December 8, 2017, PJM filed a notice regarding its proposed implementation date.

III. Discussion

A. Procedural Matters

8. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2017), the timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding.

9. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.213(a)(2) (2017), prohibits an answer to a protest unless otherwise ordered by the decisional authority. We will accept PJM's answer because it has provided information that assisted us in our decision-making process.

B. Substantive Matters

10. We find that PJM's compliance filing partially complies with the requirements adopted in Order No. 825. Accordingly, we accept PJM's compliance filing to be effective May 11, 2017, subject to a further compliance filing as discussed below. We direct PJM to submit the compliance filing within 30 days of the date of this order.

1. Settlement Reform

a. Compliance Filing

11. PJM proposes a multitude of changes to its Tariff provisions that align settlement and dispatch intervals, and changes to its rules setting forth when shortage pricing is triggered. PJM explains that currently resources are dispatched in 5-minute intervals, regardless of resource type, and the real-time energy market, day-ahead energy market, regulation, synchronized reserves, and non-synchronized reserves markets are all settled on an hourly basis. PJM states that it is replacing the current hourly settlement interval applicable to the real-time energy market and ancillary services markets with a 5-minute settlement interval, based on the 5-minute locational marginal price (LMP) that PJM already calculates and 5-minute energy quantities.[8] To implement this reform, PJM proposes several changes to its market rules related to accounting and billing for real-time energy and ancillary services, such as changing or removing references to "hourly" and adding language to convert dollar-per-MW hour calculations as appropriate.[9] PJM notes that it is not proposing to change the hourly settlement interval used in its day-ahead energy market, nor is it proposing substantive changes to its day-ahead energy market rules.[10] However, PJM proposes new terminology to clarify the different intervals at which PJM will settle the real-time and day-ahead energy markets. Specifically, PJM proposes to add the term "Real-time Settlement Interval" to mean on a 5-minute basis and the term "Day-ahead Settlement Interval" to mean on an hourly basis. To streamline the description of the settlement process, PJM also proposes to add the terms "Market Participant Energy Injection" and "Market Participant Energy Withdrawal" to its Tariff.[11]

12. PJM proposes new Tariff provisions outlining the methodology for determining the revenue data for settlement for all resources, energy transactions, and loads for each real-time settlement interval.[12] This includes a provision requiring that market

[8] *Id.* at 6.

[9] *Id.* at 8-9; *see* PJM Proposed Operating Agreement, Section 1 (Definitions) and Schedule 1, §§ 1.7, 2.6A, 3.2, 3.3, 3.6, 5.1, 5.4; PJM Proposed Tariff, Schedule 4, Attachment F-1, Attachment DD.

[10] PJM Transmittal Letter at 8.

[11] PJM Transmittal Letter at 7; PJM Proposed Operating Agreement, § 1 (Definitions).

[12] PJM Transmittal Letter at 10-11; PJM Proposed Operating Agreement, Schedule 1, § 3.1A; PJM Proposed Tariff, Attachment K – Appendix, § 3.1A. PJM *(continued ...)*

participants with generation resources that have submitted revenue meter data on a 5-minute basis for such resources must continue to do so, which PJM asserts will ensure market participants cannot diminish the quality of data they provide.[13] For those generation resources for which revenue meter data can only be provided on an hourly basis, PJM proposes to determine the revenue data for settlements using real-time telemetry data or state estimator values[14] to account for generation resources' intra-hour fluctuations in output. Additionally, for resources and energy transactions for which real-time scaling data is not available and for load, PJM proposes to determine revenue data for settlements using a flat profile, i.e., an equal apportionment of the values for each 5-minute interval within the applicable period.[15]

13. PJM explains that currently intertie transactions are dispatched in accordance with North American Electric Reliability Corporation (NERC)-approved Regional Practices, typically on a 15-minute basis, and settled on an hourly basis. PJM states that it is proposing to settle intertie transactions on a 5-minute basis, while still scheduling them on a 15-minute basis, by utilizing the corresponding 5-minute LMP for that transaction interval.[16]

14. PJM proposes revisions to describe how economic load response participants are paid for load reductions under the current net benefits test. PJM explains that because LMPs will now be calculated on a 5-minute basis, the net benefits test must be calculated on a 5-minute basis rather than on an hourly basis as it is currently done. PJM asserts

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notes that revenue data for settlements determined for each real-time settlement interval will be used in calculating market participants' energy market charges, operating reserves charges, transmission congestion charges, and transmission loss charges.

[13] PJM Transmittal Letter at 11-12; PJM Proposed Operating Agreement, Schedule 1, § 3.1A(b); PJM Proposed Tariff, Attachment K – Appendix, § 3.1A(b).

[14] PJM explains that it will apply a scaling factor to adjust the scaling data up or down to ensure that the average of the 5-minute output values equals the hourly revenue meter data submitted for that resource. The scaling factor is the hourly revenue meter data divided by the average of the 5-minute scaling data. PJM Transmittal Letter at 12.

[15] PJM Transmittal Letter at 14; PJM Proposed Operating Agreement, Schedule 1, § 3.1A(d)(iii), (e) & (g); PJM Proposed Tariff, Attachment K – Appendix, § 3.1A(d)(iii), (e) & (g).

[16] PJM Transmittal Letter at 4; PJM Proposed Operating Agreement, Schedule 1, §§ 1.7.7, 2.6A; PJM Proposed Tariff, Attachment K – Appendix, §§ 1.7.7, 2.6A.

that this will ensure that economic load response participants' real-time energy transactions are settled on the same interval at which they are dispatched.[17]

15. Given Order No. 825's directive to settle energy transactions in its real-time markets at the same time interval it dispatches energy, PJM proposes to assess the performance of capacity performance resources on a 5-minute basis rather than on an hourly basis going forward. PJM states that this is appropriate because capacity performance resources are dispatched on 5-minute intervals, and accordingly the performance of such resources should be measured based on the same interval because their performance affects their market sellers' total settlement amounts.[18]

16. PJM avers that an important part of market participants' settlements are transmission congestion charges and transmission loss charges. Thus, PJM proposes revisions to describe how these charges will be calculated going forward, given the changes made to comply with Order No. 825. PJM notes that the changes to the Tariff regarding market participants' transmission congestion charges, transmission loss charges, and energy market charges only reflect the shift from calculating on an hourly basis to a 5-minute basis and there are no changes to the calculations themselves.[19]

17. PJM explains that it is making revisions to provide that each market participant's daily charges (or credits) for operating reserves in the real-time energy market will be determined based on the deviations determined for each real-time settlement interval. PJM further explains that, while deviations will be measured on a 5-minute basis, the allocation of operating reserves charges will remain on a daily basis.[20] PJM explains that it is restating the methodology for determining operating reserves charges in formulaic terms and defining each term in the equation using the new terminology developed to implement settlements on a 5-minute basis. Specifically, PJM states that each market

[17] PJM Transmittal Letter at 27; PJM Proposed Operating Agreement, Schedule 1, § 3.3A.4; PJM Proposed Tariff, Attachment K – Appendix, § 3.3A.4.

[18] PJM Transmittal Letter at 28; PJM Proposed Tariff, § 1 (Definitions), Attachment DD, §§5.5A, 6.4, 7.1, 8.2, 10A, 12; PJM Proposed Operating Agreement, § 1 (Definitions); PJM Proposed Reliability Assurance Agreement, Art. 1 (Definitions), Schedule 8.1.G(2).

[19] PJM Transmittal Letter at 15-18; PJM Proposed Operating Agreement, Schedule 1, § 5.1; PJM Proposed Tariff, Attachment K – Appendix, § 5.1.

[20] PJM Transmittal Letter at 18-19.

participant's share of the cost of operating reserves for each operating day will be based on its daily total of hourly deviations.[21]

18. PJM further states that it is making revisions to describe how regulation will be settled on a 5-minute basis. PJM specifies that a market participant with an hourly regulation obligation will now be charged the *pro rata* share of the sum of the quantity of regulation provided in each real-time settlement interval multiplied by the clearing price for all real-time settlement intervals in the hour associated with that obligation.[22]

19. PJM explains that it is also extending the change to 5-minute settlement intervals to synchronized reserves and non-synchronized reserves markets. PJM states that a market participant's charges for synchronized reserves and non-synchronized reserves will be its *pro rata* share of the sum of the quantity of synchronized reserves provided in each real-time settlement interval multiplied by the clearing price for all real-time settlement intervals in the hour associated with that obligation.[23]

20. PJM notes that implementing the settlement interval reforms will require some revisions to several agreements between PJM and neighboring balancing authorities, including the Joint Operating Agreement between Midcontinent Independent System Operator, Inc. and PJM and the Joint Operating Agreement between PJM and Duke Energy Progress. However, PJM explains that it cannot revise these agreements without consent of the other parties to each respective agreement. PJM states that it proposes to file changes to the Joint Operating Agreements, and any associated changes

[21] PJM Transmittal Letter at 19; PJM Proposed Operating Agreement, Schedule 1, § 3.2.3(h); PJM Proposed Tariff, Attachment K – Appendix, § 3.2.3(h). The share of operating reserves will be determined by the sum of A + B + C, where A is the sum of the absolute values of all the market participant's withdrawal deviations (i.e., the difference between all withdrawals scheduled for that interval in the day-ahead energy market and what actually occur during that interval in the real-time energy market) for each real-time settlement interval for that day, B is the sum of the absolute values of all the market participant's generation deviations for each real-time settlement interval for that day, and C is the sum of the absolute values of all the market participant's injection deviations for each real-time settlement interval for that day.

[22] PJM Transmittal Letter at 20-23; PJM Proposed Operating Agreement, Schedule 1, § 3.2.2; Proposed Tariff, Attachment K – Appendix, § 3.2.2.

[23] PJM Transmittal Letter at 23; PJM Proposed Operating Agreement, Schedule 1, § 3.2.3A; Proposed Tariff, Attachment K – Appendix, § 3.2.3A.

to the OATT, Operating Agreement, and/or Reliability Assurance Agreement in separate proceedings after the Commission has approved this compliance filing.[24]

b. Comments and Protests

21. The IMM generally supports PJM's compliance filing, but recommends several refinements.[25] The IMM supports PJM's requirement that generation resources that have ever submitted revenue meter data on a 5-minute basis may not submit meter data on a longer interval basis because it maintains the alignment between dispatch instructions and settlements and also limits opportunities for gaming.[26] However, the IMM argues that in order to align dispatch instructions and settlements as well as limit opportunities for gaming, dispatchable resources should be required to have metering capability that is consistent with the dispatch and pricing intervals used by PJM.[27]

22. The IMM avers that the proposed changes in section 3.1A regarding the 5-minute settlement for generation resources using 5-minute meters or profiling do not make clear the settlement interval for energy withdrawals by generation resources. The IMM asserts that the settlement interval for energy withdrawal by generators should be the same as for generation output.[28]

23. The IMM contends that PJM's proposed section 3.1A would apply hourly revenue meter data for demand response resources, even though PJM dispatches demand response resources on a 5-minute basis. Moreover, the IMM states that this exemption was not required by Order No. 825, nor was it justified in PJM's compliance filing. Further, the IMM asserts that PJM should adopt 5-minute metering requirements for demand response resources, as exists in ISO New England Inc. (ISO-NE), to ensure that dispatchers have the necessary information for reliability and that market payments to demand response resources are calculated based on interval meter data at the site of the demand reductions.[29]

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[24] PJM Transmittal Letter at 5.

[25] IMM Comments at 1.

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

[27] *Id.* at 3.

[28] *Id.* at 4.

[29] *Id.* at 4-5 (citing ISO-NE Tariff, Section III, Market Rule 1, Appendices E-1, E-2 (Demand Response)).

24. The IMM states that because PJM's proposal would result in instantaneous measurements of energy output and load in MWs, and given that the MW metric is an hourly measure when applied to settlement calculations, the Tariff should specify the division by 12 in all cases where 5-minute settlements depend on a measurement in MWs. The IMM claims that appropriate division by 12 is not consistently applied in PJM's proposed revisions. The IMM asserts that the proposed revisions should clarify the units of energy measurement and specify division by the number of intervals in the hour as necessary.[30]

25. The IMM contends that the proposed use of injections and withdrawals is an improvement to the previous language regarding operating reserves deviation charges. However, the IMM argues that it is unclear whether the inputs to the hourly deviation equation (A, B and C) have consistent units of measurement that appropriately result in hourly values. The IMM concludes that section 3.2.3(h), which discusses operating reserves deviation charges, should include a precise mathematical formulation of deviation charges with clear definitions of withdrawals and injections, units of measurement, and time periods.[31]

26. AMP states that it does not oppose the majority of changes that PJM proposes, but it does object to the changes that adversely affect the use of behind-the-meter generation to reduce a load-serving entity's exposure to charges for transmission congestion, market settlements and regulation. AMP avers that the treatment of behind-the-meter generation netting appears to be incomplete and possibly inconsistent in the proposed changes to the governing documents.[32] For example, AMP explains that in order to streamline the description of the settlement process, PJM is proposing to use shorthand definitions that eliminate the language which currently makes it explicit in the Tariff that load is measured net of the output of any behind-the-meter generation. AMP asserts that while it understands that it is PJM's intention that behind-the-meter generation netting would be implicit, load serving entities that rely on behind-the-meter generation should not be forced to rely on implication.[33] Further, AMP states that PJM's proposed language is problematic because it relegates the treatment of netting behind-the-meter generation to the PJM manuals, where stakeholders only have implicit rights to contest any future

[30] *Id.* at 5.

[31] *Id.* at 6.

[32] AMP Comments at 1-3.

[33] *Id.* at 4.

changes.[34] AMP concludes that the uncertainty PJM's proposed language would create is unintentional and should be remedied.[35]

c. Response to Data Request

27. In response to the data request for additional information relating to intertie transactions, PJM clarifies that it proposes to settle intertie transactions on a 5-minute basis. PJM specifies that under PJM's Order No. 825-compliant approach that settles transactions based on 5-minute intervals, each applicable 5-minute real-time LMP will apply to the MW value that flowed during the 5-minute timeframe.[36] PJM explains that while intertie transaction tags are scheduled on a 15-minute basis, the Interchange Distribution Calculator and system operators have the capability to make reliability-based schedule modifications that do not align with the 15-minute intervals. PJM asserts that its proposed methodology is consistent with the Commission's intertie reforms and appropriately compensates transactions at the 5-minute real-time LMP and MW value for the time period that the transaction occurred.[37]

28. PJM clarifies that energy withdrawals by generation resources will be treated as negative output, as opposed to load, for purposes of determining revenue data for settlements. PJM avers that revenue data for settlements are based on data provided by market participants for generation resources, which can be negative or positive. According to PJM, the positive data reflects energy injections (generation), whereas the negative data reflects energy withdrawals (e.g., battery charging). PJM also states that to ensure clarity, it has provided additional revisions specifying the above mentioned information.[38]

29. Regarding demand response resources, PJM explains that proposed section 3.1 specifies that once a market participant has installed equipment to provide 5-minute revenue meter data, the participant cannot elect to no longer provide such quality of data and revert back to providing hourly revenue meter data. PJM contends that, at this time,

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[34] *Id.* at 6.

[35] *Id.* at 5.

[36] PJM Response to Data Request at 2; PJM Proposed Operating Agreement, Schedule 1 (Definitions), § 2.6A; Proposed Tariff, Attachment K-Appendix, § 2.6A.

[37] PJM Response to Data Request at 2-3.

[38] *Id.* at 8; PJM Proposed Operating Agreement, Schedule 1, § 3.1A(c); Proposed Tariff, Attachment K-Appendix, § 3.1A(c).

no market participant is submitting 5-minute revenue meter data for a demand response resource. PJM clarifies that 3.1A(c) and (d) regarding the use of real-time scaling data apply only to generation resources and not to demand response resources. Further, PJM states that section 3.1A(f) applies to demand response resources and provides that such resources will be settled for each 5-minute period using the flat profile approach.[39]

30. PJM states that the current approach to operating reserves deviations only evaluates a market participant's behavior on an hourly basis aggregated to a daily value. Therefore, to comply with the Commission's directive in Order No. 825 to align settlement and dispatch intervals, PJM is proposing to extend the 5-minute settlement concept to calculating the cost of operating reserves, consistent with the revisions to the other components of a market participant's daily settlements.[40] PJM further explains that its proposed approach of determining operating reserves charges based on the deviations at the 5-minute settlement intervals that PJM dispatches its markets in real-time, will result in a more granular, accurate result.[41] PJM proposes additional revisions to make the descriptions of the formula components more clear.[42]

31. PJM states that load will continue to be measured net of the output of behind-the-meter generation. PJM explains that it did not have any intention to stop netting behind-the-meter generation. To ensure clarity that settlements will reflect behind-the-meter generation, PJM provides revised changes to the Tariff and specifically the definition of Market Participant Energy Withdrawal. PJM asserts that these changes will make the settlement rules clear that market buyers are charged for all load net of behind-the-meter generation.[43]

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[39] PJM Response to Data Request. at 9; PJM Proposed Operating Agreement, Schedule 1 (Definitions), § 3.1A (b)-(f); Proposed Tariff, Attachment K-Appendix, § 3.1A.

[40] PJM Response to Data Request at 12; PJM Proposed Operating Agreement, Schedule 1 (Definitions), § 3.2.3(h); Proposed Tariff, Attachment K-Appendix, § 3.2.3(h).

[41] PJM Response to Data Request at 15.

[42] *Id.* at 13; PJM Proposed Operating Agreement, Schedule 1, § 3.2.3(h); Proposed Tariff, Attachment K-Appendix, § 3.2.3(h).

[43] PJM Response to Data Request at 6; PJM Proposed Operating Agreement, Section 1 (Definitions) and Schedule 1, § 3.2.3(h); Proposed Tariff, Attachment K-Appendix, § 3.2.3(h).

d. Comments on Data Request Response

32. The IMM states that PJM's explanation and proposed Tariff revisions regarding withdrawal by generation resources clarifies the settlement interval that applies to withdrawals by generation.[44]

33. The IMM asserts that Order No. 825 requires settlement interval reform for all resources, including demand response resources. According to the IMM, PJM's compliance filing does not provide Tariff revisions to ensure that it would settle demand response resources with 5-minute metering capability on a 5-minute basis. The IMM avers that the fact that no demand response resources currently submit 5-minute metering data does not exempt PJM from compliance. Moreover, the IMM explains that PJM's proposed section 3.1A(f) would prevent demand response resources with 5-minute metering capability from being settled on a 5-minute basis, because it would have demand response resources submit only hourly data even when resources have 5-minute metering capability.[45] Thus, the IMM argues that if a demand response resource has 5-minute metering capability, the Tariff revisions should clarify that PJM will require such resource to provide the 5-minute data and will settle that resource on a 5-minute interval basis.

34. The IMM contends that although PJM attempted to clarify the calculation of operating reserves deviation charges, the Tariff would be more clear and precise if it employed more mathematical expressions to define calculations unambiguously. The IMM further argues that while the operating reserves deviation charge calculation was particularly confusing, it is not the only Tariff section containing settlement expressions that is "in need of edits."[46] Thus, the IMM argues that the Order No. 825 compliance proceeding presents an opportunity for the Commission to require PJM to perform a thorough review of all associated settlements specifications in the Tariff to ensure precision, accuracy, and clarity.[47]

e. PJM Amendment

35. On August 14, 2017, PJM filed an amended compliance filing correcting three errors. Specifically, PJM proposes the following: (1) to remove a reference to real-time

[44] IMM Comment to Data Request Response at 1-2.

[45] *Id.* at 2.

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

[47] *Id.* at 4.

settlement interval in Tariff, schedule 1, section 3.2.3A(g), which was inadvertently included in this section; (2) to reinsert the word "hourly" in Tariff, Attachment DD, section 5.10(v)(A), which addresses the net energy and ancillary services offset for capacity revenue in PJM; and (3) to revise the "Non-Performance Charge" rate value from an hourly value to one that is based on the number of real-time settlement intervals within an hour.[48]

f. Comment on Amendment

36. The IMM states that PJM's proposed revisions result in an incorrect calculation of non-performance charges for capacity performance resources and base capacity resources. The IMM explains that non-performance charges are calculated as the product of the performance shortfall of energy (in MWh) and a non-performance charge rate (in dollars per MWh).[49] The IMM asserts that PJM incorrectly proposes to revise the formula for the non-performance charge rate component of the calculation. The IMM argues that the change to 5-minute settlements does not necessitate changing the non-performance charge rate from a dollar-per-MWh rate to a dollar-per-MW-5-minute rate because the non-performance charge rate is still applied to each unit of energy in MWh that a resource fails to deliver during a performance assessment interval. The IMM avers that, because the change to 5-minute settlements only changes the time interval over which the performance of a resource is evaluated, PJM should instead change the "Performance Shortfall" calculation to which this rate applies. Specifically, the IMM asserts that PJM did not revise the definition of "Expected Performance" to measure the expected output of a resource over five minutes, which will result in a flaw in the non-performance charge calculation.

37. The IMM explains that PJM defines "Performance Shortfall" as the difference between expected performance and "Actual Performance."[50] The IMM states that PJM correctly updated the actual performance definition from the metered output of energy and reserves *during an hour* to the metered output of energy and reserves *during an interval* (i.e., during a 5-minute performance assessment interval) to account for the change from hourly settlements to 5-minute settlements. According to the IMM, the result is that actual performance is measured in MWh, but is scaled down appropriately to reflect energy delivered during the new 5-minute performance assessment interval. The IMM states that, for example, a resource with a 120 MW capacity commitment that delivers its 120 MW

[48] PJM August 14, 2017 Amendment at 1-2.

[49] IMM Comments at 2 (citing PJM Proposed Tariff, Attachment DD, § 10A(e)).

[50] *Id.* (citing PJM Proposed Tariff, Attachment DD, § 10A(c)).

share over a 5-minute interval will be deemed to have an actual performance of 10 MWh (i.e., 120 MWh divided by 12, because there are twelve 5-minute intervals in an hour).[51]

38. The IMM argues, however, that PJM did not make the corresponding change to the expected performance formula, which remains the product of "Resource Committed Capacity" (in MWs) and the "Balancing Ratio." The IMM explains that the existing expected performance formula was not problematic under hourly settlements because over a period of one hour, the energy (in MWh) expected to be generated by a resource operating at its unforced capacity MW level is equal to the resource's unforced capacity MW level times one hour. The IMM argues that the formula for expected performance must now be revised to divide the total by 12 to reflect that a performance assessment interval is now five minutes, rather than one hour. The IMM states that, absent such a change, the resource in the example above would have an expected performance of 120 MWh, even though it is fulfilling its capacity commitment by delivering 10 MWh. Thus, the IMM asserts, PJM's proposed changes to the non-performance charge rate formula should not be approved, and PJM should instead be directed to correctly define expected performance as unforced capacity (UCAP)[52] in MWs divided by the number of real-time settlement intervals in an hour.[53]

39. The IMM further states that PJM should update the language in section 10A(g) of Attachment DD in the Tariff that defines "Bonus Performance" calculation by replacing "hour" with "interval" to ensure accuracy of the calculation.[54]

40. The IMM also reiterates that the Tariff should specify the division by 12 in all cases where 5-minute settlements depend on a measurement in MWs. The IMM specifies that the generic section specifying that any dollar-per-MWh value in section 3.2 of schedule 1 will be divided by the number of real-time settlement intervals in the hour

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[51] *Id.* at 5.

[52] UCAP refers to "unforced capacity," which is defined as the installed capacity rated at summer conditions that is not on average experiencing a forced outage or forced derating, calculated for each Capacity Resource on the 12-month period from October to September without regard to the ownership of or the contractual rights to the capacity of the unit. PJM Manual 35 (Definitions and Acronyms), § 3 (Acronyms); PJM Reliability Assurance Agreement, Art. 1 (Definitions).

[53] IMM Comments at 4-6.

[54] A market participant's bonus performance is the difference between its actual performance and expected performance. PJM Tariff, Attachment DD, § 10A(g) (Charges for Nonperformance and Credits for Performance).

does not address this issue. The IMM contends that this language lacks precision and can lead to inconsistency in application and unintended settlements.[55]

g. PJM Answer

41. PJM responds that the IMM's example and resulting suggested change in the definition of expected performance is based on an incorrect premise that PJM is simply dividing actual performance by 12 to arrive at the actual performance in MWh terms for each 5-minute interval, which is not the case. PJM contends that PJM's proposed revisions will result in a generator's output being measured in each 5-minute interval as a MW-5-minute value, not a MWh value, which is consistent with the proposed MW-5-minute non-performance charge rate. Further, PJM states that expected performance is measured in MW-5-minute terms because it is the committed UCAP multiplied by the balancing ratio, which is also calculated every five minutes.[56]

42. PJM disputes the IMM's statement that with respect to bonus performance, PJM should have updated the language in Tariff, Attachment DD, section 10A(g) to reflect the terminology "interval" at the end of the paragraph concerning the distribution of bonus payments. PJM maintains that the section as written can be implemented properly within the 5-minute settlement construct because, taken in context, the generic reference to "hour" at the end of that provision can only mean the resources' expected performance levels during the performance assessment intervals within that hour. Additionally, PJM states that, contrary to the IMM's statements, expressing actual performance in MWs relates to the value scheduled by PJM, which is properly expressed as MWs and not MWh.[57]

h. Determination

43. We find that PJM has partially complied with the directive in Order No. 825 to settle energy transactions in PJM's real-time markets at the same time interval it dispatches energy. Accordingly, we will direct further modifications as discussed below.

44. PJM explains that, to settle transactions every five minutes, PJM requires energy data for each 5-minute interval to correspond with the 5-minute LMP. PJM also explains that because Order No. 825 does not require market participants to install metering facilities capable of providing revenue quality data every five minutes, to implement the new settlement process, PJM must determine the revenue data for settlement for all

[55] IMM Comments at 7.

[56] PJM Answer at 3-4.

[57] *Id*. at 4.

resources, energy transactions, and loads for each real-time settlement interval. PJM proposes that for those generation resources for which revenue meter data can only be provided on an hourly basis, PJM will determine the revenue data for settlements using real-time telemetry data or state estimator values to account for generation resources' intra-hour fluctuations in output. PJM further proposes that for resources and energy transactions for which real-time scaling data is not available and for load, PJM will determine revenue data for settlements using a flat profile. Additionally, PJM proposes to apply flat profiling to determine revenue data for settlements for all demand response resources.

45. The Commission stated in Order No. 825 that "[i]t is important to provide a price signal to all resources, regardless of type or capability, as this will provide proper compensation to those resources capable of responding to five-minute dispatch signals, and will incentivize such capability to those resources that do not currently have it."[58] We find that PJM's proposal may not provide a proper price signal to all resources, regardless of type or capability, because demand response resources are not treated consistently with other resources. Under PJM's proposed Tariff revisions, PJM would always determine the revenue data for settling demand response resources by applying flat profiling to hourly data regardless of whether a demand response resource provides revenue meter data on an hourly basis or every five minutes. Hence, PJM's proposal may not provide proper compensation to demand response resources capable of responding to 5-minute dispatch signals, nor would it incentivize such capability in demand response resources that do not currently have it. Therefore, we require PJM to submit a compliance filing, within 30 days of the date of this order, to modify its Tariff to remove the restriction that demand response resources will always be settled using a flat profile. We direct PJM to insert language clarifying that demand response resources will be subject to all of the applicable provisions proposed for generation resources in section 3.1A (regarding how PJM will determine Revenue Data for Settlements), as was directed in Order No. 825.

46. We also find that PJM has partially complied with the directive in Order No. 825 to settle operating reserves transactions in its real-time markets at the same time interval it prices operating reserves. PJM's proposed revision to section 3.2.2(a) of the Tariff states that a market participant will be charged "the pro rata share of the sum of the quantity of regulation provided in each Real-time Settlement Interval times the clearing price for all Real-time Settlement Intervals in the hour associated with that obligation." We find that it is unclear from this provision whether PJM is proposing to settle regulation on the same time interval that it is priced. To ensure that the Tariff is clear and complies with the directive in Order No. 825, we require PJM to submit a compliance

[58] Order No. 825, FERC Stats. & Regs. ¶ 31,384 at P 98.

filing, within 30 days of the date of this order, to modify section 3.2.2(a) to include a mathematical formula that clearly illustrates how regulation charges will be calculated and settled.

47. We find that PJM has demonstrated that settling intertie transactions every 5 minutes, even though intertie transactions are scheduled every 15 minutes, is consistent with or superior to the Commission's intertie reform. As PJM explains, its proposed methodology appropriately compensates transactions at the 5-minute real-time LMP and MW value for the time period that the transaction occurred.

48. We disagree with the IMM's assertion that dispatchable resources, including demand response resources, should be required to have metering capability consistent with the dispatch and pricing intervals used by PJM. Order No. 825 explained in response to concerns about the need to upgrade metering technology for demand response resources that "this Final Rule does not contemplate requiring any new metering capability, such as [5]-minute revenue quality metering, and that such metering is not necessary for implementation given RTOs'/ISOs' ability to create [5]-minute load and generation profiles using telemetry and hourly revenue quality data."[59] As Order No. 825 did not contemplate requiring any new metering capability, we find the IMM's comments regarding the upgrading of metering technology to be inconsistent with the directives in Order No. 825.

49. We find that PJM's explanation and clarifying Tariff revisions submitted in response to the data request adequately address concerns raised by the IMM regarding the uncertainty of inputs into the operating reserves deviation charges. While the IMM argues that PJM's proposed revisions do not consistently specify division by 12 where 5-minute settlements depend on a measurement in MWs, we find that PJM's proposed revisions sufficiently specify the division by the number of intervals in the hour.[60] Additionally, while the IMM contends that PJM should perform a thorough review of all associated settlement specifications in the Tariff to ensure precision, accuracy, and clarity, we find that the Tariff revisions are sufficient. We do, however, encourage PJM to continue to work with its stakeholders to make improvements to its Tariff.

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[59] *Id.* P 99.

[60] *See* PJM Proposed Operating Agreement, §§ 3.2, 5.1.1, 5.4.2; Proposed Tariff, Attachment K – Appendix, §§ 3.2, 5.1.1, 5.4.2 ("If a dollar-per-MW hour value is applied in a calculation under this section 3.2 where the interval of the value produced in that calculation is less than an hour, then for purposes of that calculation the dollar-per-MW hour value is divided by the number of Real-time Settlement Intervals in the hour.").

50. We find that PJM's Tariff revisions, as revised in its response to the data request, which explicitly states that market buyers are charged for all load net of behind-the-meter generation, sufficiently address AMP's concerns.

51. We find that PJM's explanation and clarifying Tariff revisions regarding how energy withdrawals by generation resources will be treated for purposes of revenue data for settlements address the IMM's concerns on this matter.

52. We agree with the IMM's suggestion to change "hour" to "interval" in the first paragraph of section 10A(g) of Attachment DD of the Tariff that defines resource bonus performance, as that change is necessary for consistency regarding the units of time measurement. However, we do not find that the IMM's proposed addition of "hour" in the definition of actual performance in section 10A(g) is necessary because the existing language – "…shall not exceed the *megawatt level* at which such resource was scheduled…"[61] – is sufficiently clear. We therefore require PJM to submit a compliance filing, within 30 days of the date of this order, to modify the first paragraph of section 10A(g) of Attachment DD of its Tariff to replace "hour" with "interval," as described above.

53. We disagree with the IMM regarding the need to modify the definition of expected performance in section 10A(c) of Attachment DD of the Tariff. To ensure that the performance shortfall – and thus the resulting non-performance charge – is determined correctly, expected performance and actual performance must be calculated in a similar manner and be expressed in like units. The IMM argues that the expected performance formula must be further revised to divide the MWh value by the number of real-time settlement intervals in an hour to accomplish this. However, we agree with PJM that such a change is unnecessary. Under PJM's proposed revisions, PJM will now evaluate a resource's performance for each 5-minute interval during a performance assessment hour. PJM will use the expected performance formula to determine an output value, in MWs, that the resource must deliver throughout any such 5-minute interval. The revised actual performance formula states that PJM will measure actual performance based on "the metered output of energy delivered…during the [i]nterval."[62] We read this to mean that PJM will determine a single output value, in MWs, for each resource during any 5-minute interval using the applicable new methodology for calculating revenue data for settlement. Therefore, both expected performance and actual performance will be expressed in terms of MWs over 5-minute intervals, and the performance shortfall will be computed accurately. Based on this understanding, we decline to require that PJM adopt the IMM's suggested revision to section 10A(c).

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[61] PJM Tariff, Attachment DD, § 10A(g) (2.0.0) (emphasis added).

[62] PJM Tariff, Attachment DD, § 10A(c) (3.0.0).

54. We also disagree with the IMM that PJM's proposed modification to the non-performance charge rate in section 10A(e) is inaccurate. While it is important that a resource's expected performance and actual performance are measured in like units, as discussed above, the non-performance charge *rate* is easily adaptable to any period of time over which resource performance is measured. For instance, there is no ambiguity in applying a non-performance charge rate of $1,800 per MWh to a performance shortfall of 10 MW over a 5-minute interval. One simply divides the non-performance charge rate by 12 to reach a penalty rate of $150 per MW-5-minute interval and multiplies that rate by the shortfall of 10 MW to reach the appropriate non-performance charge of $1,500. PJM merely proposes to incorporate this conversion into the Tariff definition of the non-performance charge rate. While this revision may not be necessary for accuracy, it will produce accurate non-performance charges, and therefore we find that it is just and reasonable.

2. Shortage Pricing Reform

a. Compliance Filing

55. PJM states that its current rules apply look-ahead algorithms to confirm that a shortage will be sustained for at least 45 minutes before shortage pricing is triggered. To comply with Order No. 825, PJM proposes Tariff revisions to ensure that shortage pricing is triggered when shortage conditions are indicated for a 5-minute period in real-time.[63]

56. PJM explains that while the majority of changes that are required to trigger shortage pricing for every real-time settlement interval in which shortage conditions occur are described in PJM's software system and manual, PJM is also making limited revisions to its Tariff. PJM states that the revisions include deleting references to false positives, or transient shortages, as well as changing references of prices being 'forecasted' by PJM's real-time security-constrained economic dispatch (SCED) to prices being 'determined.'[64]

b. Comments and Protest

57. The IMM alleges that the Commission should require documented rules and transparent reporting of operator interventions that alter the determination of shortages.[65]

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[63] PJM Transmittal Letter at 6.

[64] PJM Transmittal Letter at 24-27; PJM Proposed Operating Agreement, Schedule 1, §§ 2.2(d), 2.5; Proposed Tariff, Attachment K – Appendix, §§ 2.2(d), 2.5.

[65] IMM Comments at 6.

The IMM explains that positive[66] and negative[67] forms of bias are used in PJM market solutions and that there is little transparency and no market rule that exists to define PJM's biasing practices. The IMM explains that this impacts both the demand and supply sides of the shortage determination. Thus, the IMM claims that to support the Commission's effort to create transparency and consistency in scarcity price formation, PJM should be required to document biasing practices as used in SCED and Ancillary Services Optimizer and to report its application of biasing as part of its compliance with Order No. 825.[68]

c. Determination

58. We find that PJM has fully complied with the shortage pricing reforms required by Order No. 825. Specifically, PJM's revisions trigger shortage pricing for any shortage condition that is identified in a 5-minute period in real-time, regardless of duration. Thus, PJM has established a mechanism to trigger shortage pricing for any interval in which a shortage of energy or operating reserves is indicated during the pricing of resources for that interval, as required by Order No. 825.[69]

59. We find the IMM's request related to documentation and reporting of operator interventions to be beyond the scope of this proceeding. Further, we understand the IMM's comments regarding PJM's biasing practices to be focused on whether biasing affects the amount of reserves that PJM procures thereby changing the probability that a shortage would occur. We find this concern to be beyond the scope of this proceeding.

3. Effective Date

60. In Order No. 825, the Commission stated that it would allow 12 months from the compliance filing date for the Tariff changes implementing reforms to settlement intervals to become effective, and 120 days from that same compliance filing date for the Tariff changes implementing shortage pricing reforms to become effective.[70] Thus,

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[66] Positive biasing causes PJM to clear fewer reserves than required, increasing the likelihood of encountering a shortage. IMM Comments at 8.

[67] Negative biasing causes PJM to clear more reserves than required, decreasing the likelihood of a shortage event. IMM Comments at 8.

[68] IMM Comments at 8.

[69] Order No. 825, FERC Stats. & Regs. ¶ 31,384 at P 162.

[70] *Id.* P 205.

Order No. 825 requires the effective dates for the Tariff changes to be January 11, 2018 and May 11, 2017 respectively.

a. Compliance Filing

61. PJM requests that the Commission allow simultaneous implementation of both the shortage pricing and settlement interval reforms. PJM avers that implementing shortage pricing changes prior to the settlement interval changes would amplify the inefficiencies that are created due to real-time settlement and dispatch intervals not being aligned. PJM explains that it currently dispatches on a 5-minute interval, but settles hourly. PJM argues that if shortage pricing reforms are implemented without settlement reform, resources may be incented to ignore a dispatch instruction in order to maximize profits. According to PJM, if there are a few price spikes early in an hour that allow the market participant to predict with a high degree of certainty that the integrated hourly LMP will average higher than its cost to provide a service in a given hour, the market participant can maximize its profits by self-scheduling its resource to provide the maximum amount of energy and/or an ancillary service within the hour while ignoring PJM's 5-minute dispatch instructions. PJM argues that such behavior can result in excess supply on the system and degrade operational control. PJM emphasizes that if shortage pricing triggering and the settlement reforms are not implemented together, the Commission will risk defeating the overriding goal of Order No. 825 because market participants will have an economic incentive to engage in profit maximizing behavior during shortage conditions and ignore PJM's dispatch instructions, precisely when PJM needs market participants to follow such instructions the most.[71]

62. PJM also requests an extension of the implementation deadline for settlement interval reforms to February 1, 2018. PJM states that implementing the changes at the beginning of a month is better from PJM's perspective because it will facilitate PJM's ongoing audit testing of its billing controls for the benefit of market participants, and will ensure that the publishing of market participant's weekly and monthly bills align. Further, PJM explains that due to staffing considerations over the holidays, February 1, 2018 would be a better option than January 1, 2018.[72]

63. PJM notes that if the Commission does not issue an order by March 31, 2017, it may affect timely implementation by January 11, 2018 or February 1, 2018. Additionally, PJM states that if the Commission does not issue an order by March 31, 2017, PJM will proceed with implementing shortage pricing reforms by May 11, 2017,

[71] PJM Transmittal Letter at 29-31.

[72] *Id.* at 32-33.

instead of concurrently with the settlement interval reforms on January 11, 2018 or February 1, 2018.[73]

b. Comments

64. The IMM supports PJM's request to implement the shortage pricing and settlement reforms concurrently. The IMM states that given the expected increase in the triggering of shortage pricing due to the shortage pricing reform, the absence of 5-minute settlement reform will attenuate the incentive effect rather than strengthen it for the period from May 11, 2017 through January 11, 2018.[74]

c. PJM December 8, 2017 Filing

65. On December 8, 2017, PJM filed a notice informing the Commission of its intention to implement 5-minute settlements in its real-time energy and ancillary services markets on April 1, 2018 and not February 1, 2018. PJM states that the shift in timing is to ensure PJM and its market participants have adequate time to test the new software between PJM and each market participant's own information platforms and to address any issues prior to implementation.[75] PJM states that it has worked diligently to modify its systems in time for February 1, 2018 and anticipates completing such development in that timeframe. However, given the breadth and complexity of changes prompted by the compliance filing and the importance of ensuring a smooth transition in coordination with the systems of its market participants, PJM says that shifting the implementation date to April 1, 2018 is prudent and necessary.[76] PJM also notes that it implemented its shortage pricing reforms on May 11, 2017, as proposed in its January 11, 2017 compliance filing.

d. Determination

66. We reject PJM's request to extend the implementation deadline for its proposed shortage pricing reforms. We find that implementing the shortage pricing reforms by the required implementation date of May 11, 2017, as PJM has done, will improve market efficiencies. This is because PJM's current shortage pricing rules obscure shortages, resulting both in incorrect price signals that do not reflect system conditions and compensation that does not correlate with the value a resource provides. We agree with

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[73] *Id.* at 33.

[74] IMM Comments at 2.

[75] PJM December 8, 2017 Filing at 1.

[76] *Id.* at 2.

PJM that the shortage pricing reforms will result in more frequent pricing of shortages in PJM, therefore resulting in higher hourly integrated prices during shortages and increasing the incentive for price chasing. However, on balance, we find that the benefits of addressing PJM's unjust and unreasonable treatment of shortage conditions effective May 11, 2017, outweigh the increased opportunity for market participants to deviate from PJM's dispatch instructions during this limited period of time. Therefore, we require PJM to submit a compliance filing, within 30 days of the date of this order, to modify its Tariff sheets to reflect May 11, 2017, as the effective date for the shortage pricing reform revisions.

67. We accept PJM's proposed April 1, 2018 implementation deadline as it applies to the settlement reforms because, as PJM explains, it will ensure a smooth transition in coordination with the systems of PJM's market participants. We find that PJM's explanation justifies the extension from January 11, 2018 to April 1, 2018. Therefore, we require PJM to submit a compliance filing, within 30 days of the date of this order, to modify its Tariff sheets to reflect April 1, 2018, as the effective date for the settlement reform revisions.

The Commission orders:

(A) PJM's compliance filing is hereby accepted, subject to condition, effective May 11, 2017, and April 1, 2018, as described above.

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

By the Commission.

(S E A L)

Kimberly D. Bose,
Secretary.

APPENDIX

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

C-D, OATT Definitions – C-D, 11.0.0.

E-F, OATT Definitions – E - F, 11.0.0.
O-P-Q, OATT Definitions – O – P - Q, 15.0.0.
OATT Definitions – R - S, OATT Definitions – R - S, 11.0.0.
T-U-V, OATT Definitions – T – U - V, 11.0.0.
SCHEDULE 4, OATT SCHEDULE 4, 2.0.0.
ATTACHMENT F-1, OATT ATTACHMENT F-1, 5.0.0.
OATT ATT K APPX Sec 1.7, OATT Attachment K Appendix Sec 1.7 General, 17.0.0.
OATT ATT K APPX Sec 1.10, OATT Attachment K Appendix Sec 1.10 - Scheduling, 28.0.0.
OATT ATT K APPX Sec 2.2, OATT Attachment K Appendix Sec 2.2 General, 7.0.0.
OATT ATT K APPX Sec 2.4, OATT Attachment K Appendix Sec 2.4 Determination of Energy, 3.0.0.
OATT ATT K APPX Sec 2.5, OATT Attachment K Appendix Sec 2.5 Calculation of Real-time, 5.0.0.
OATT ATT K APPX Sec 2.6A, OATT Attachment K Appendix Sec 2.6A Interface Prices, 4.0.0.
OATT ATT K APPX Sec 3.3, OATT Attachment K Appendix Sec 3.3 - Market Sellers, 6.0.0.
OATT ATT K APPX Sec 3.3A, OATT Attachment K Appendix Sec 3.3A Economic Load Response, 10.0.0.
OATT ATT K APPX Sec 3.5, OATT Attachment K Appendix Sec 3.5 Other Control Areas, 2.0.0.
OATT ATT K APPX Sec 3.6, OATT Attachment K Appendix Sec 3.6 Metering Reconciliation, 3.0.0.
OATT ATT K Appx Sec 5.1, OATT Attachment K Appendix Sec 5.1 Transmission Congestion, 6.0.0.
OATT ATT K Appx Sec 5.4, OATT Attachment K Appendix Sec 5.4 Transmission Loss Charge, 6.0.0.
OATT ATT K APPX Sec 8.6, OATT Attachment K Appendix Section 8.6 – Emergency Operation, 1.0.0.
OATT ATT K APPX Sec 8.8, OATT Attachment K Appendix Section 8.8 – Market Settlements, 2.0.0.
ATTACHMENT DD.5.5A, OATT ATTACHMENT DD.5.5A Capacity Resource Types, 3.0.0.
OATT ATT DD.5.10, OATT ATTACHMENT DD.5.10 Auction Clearing Requirements, 21.0.0.
OATT ATT DD.6, OATT ATTACHMENT DD.6. MARKET POWER MITIGATION, 14.0.0.
ATTACHMENT DD.7, OATT ATTACHMENT DD.7. GENERATION RESOURCE RATING TEST FAILUR, 2.0.0.
OATT ATT DD.8, OATT ATTACHMENT DD.8. CAPACITY RESOURCE DEFICIENCY CHARGE, 6.0.0.
ATTACHMENT DD.10A, OATT ATTACHMENT DD.10A CHARGES FOR NON-

PERFORMANCE AND CREDI, 3.0.0.
ATTACHMENT DD.12, OATT ATTACHMENT DD.12. QUALIFYING TRANSMISSION UPGRADE COMPL, 2.0.0.
C-D, OA Definitions C - D, 12.0.0.
E-F, OA Definitions E - F, 7.0.0.
I-L, OA Definitions I - L, 11.0.0.
O-P, OA Definitions O - P, 13.0.0.
Q-R, OA Definitions Q - R, 7.0.0.
S–T, OA Definitions S – T, 11.0.0.
OA Schedule 1 Sec 1.7, OA Schedule 1 Sec 1.7 General., 16.0.0.
OA Schedule 1 Sec 1.10, OA Schedule 1 Sec 1.10 - Scheduling, 29.0.0.
OA Schedule 1 Sec 2.2, OA Schedule 1 Sec 2.2 General., 7.0.0.
OA Schedule 1 Sec 2.4, OA Schedule 1 Sec 2.4 Determination of Energy Offers, 3.0.0.
OA Schedule 1 Sec 2.5, OA Schedule 1 Sec 2.5 Calculation of Real-time Prices., 5.0.0.
OA Schedule 1 Sec 2.6A, OA Schedule 1 Sec 2.6A - Interface Prices, 4.0.0.
OA Schedule 1 Sec 3.3, OA Schedule 1 Sec 3.3 - Market Sellers, 5.0.0.
OA Schedule 1 Sec 3.3A, OA Schedule 1 Sec 3.3A - Economic Load Response Participants, 10.0.0.
OA Schedule 1 Sec 3.5, OA Schedule 1 Sec 3.5 - Other Control Areas, 2.0.0.
OA Schedule 1 Sec 3.6, OA Schedule 1 Sec 3.6 - Metering Reconciliation, 3.0.0.
OA Schedule 1 Sec 5.1, OA Schedule 1 Sec 5.1 Transmission Congestion Charge, 6.0.0.
OA Schedule 1 Sec 5.4, OA Schedule 1 Sec 5.4 Transmission Loss Charge Calcu, 6.0.0.
OA Schedule 1 Sec 8.6, OA Schedule 1 Sec 8.6 - Emergency Operations, 5.0.0.
OA Schedule 1 Sec 8.8, OA Schedule 1 Sec 8.8 - Market Settlements, 8.0.0.
RAA ARTICLE 1, RAA ARTICLE 1 -- DEFINITIONS, 21.0.0.
RAA SCHEDULE 8.1.G, RAA SCHEDULE 8.1.G-Capacity Resource Performance, 6.0.0.
L-M-N, OATT Definitions – L – M - N, 12.1.0.
OATT ATT K APPX Sec 3.1, OATT Attachment K Appendix Sec 3.1 Introduction, 2.1.0.
OATT ATT K Appx Sec 3.2, OATT Attachment K Appendix Sec 3.2 - Market Buyers, 38.1.0.
M-N, OA Definitions M - N, 8.1.0.
OA Schedule 1 Sec 3.1, OA Schedule 1 Sec 3.1 - Introduction, 2.1.0.
OA Schedule 1 Sec 3.2, OA Schedule 1 Sec 3.2 - Market Buyers, 37.1.0.