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***Demande conjointe relative à la fixation de taux de rendement
et de structures de capital, R-4156-2021***

FERC
DOCKET ER14-2940-000

149 FERC ¶ 61,183
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Cheryl A. LaFleur, Chairman;
Philip D. Moeller, Tony Clark,
and Norman C. Bay.

PJM Interconnection, L.L.C.

Docket No. ER14-2940-000

ORDER CONDITIONALLY ACCEPTING TARIFF REVISIONS SUBJECT TO
COMPLIANCE FILING

(Issued November 28, 2014)

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1. On September 25, 2014, PJM Interconnection, L.L.C. (PJM) submitted proposed changes to its Open Access Transmission Tariff (OATT), pursuant to section 205 of the Federal Power Act (FPA),¹ to revise certain of the pricing elements used to clear its capacity market auctions.² Specifically, PJM proposes changes to its capacity market demand curve, the Variable Resource Requirement (VRR) Curve, and VRR Curve cost inputs, including the cost of new entry (CONE) by a representative new power plant, and the energy and ancillary services revenues that such a plant would be expected to earn through its participation in the PJM markets.

2. For the reasons discussed below, we conditionally accept PJM's proposed tariff changes, subject to PJM submitting a compliance filing within 30 days of the date of this order.

I. Background

3. PJM's existing capacity market construct was implemented by PJM in 2006 to ensure resource adequacy at reasonable cost through the use of an annual auction.³ PJM's base residual auctions are conducted three years prior to the start of a given

¹ 16 U.S.C. § 824d (2012).

² See PJM OATT, Attachment DD.

³ *PJM Interconnection, L.L.C.*, 117 FERC ¶ 61,331 (2006) (*PJM 2006 Order*).

delivery year based on auction parameters designed to meet forecasted system demand, plus reserves, during peak periods.

4. To establish the auction clearing price, PJM utilizes the VRR Curve in combination with a supply curve. The supply curve is based on capacity suppliers' sell offers. Because this clearing mechanism is based on underlying market assumptions which may be subject to change, PJM conducts triennial reviews to examine and make recommendations regarding PJM's going-forward assumptions, including both the parameters and shape of the VRR Curve.⁴ PJM notes that, consistent with its prior triennial reviews, it retained an independent consultant, the Brattle Group (Brattle) to conduct the required simulation analyses and related assessments.⁵

5. In the Brattle VRR Curve Report, Brattle evaluated these issues, relying on probabilistic simulations of PJM's capacity auction outcomes. Specifically, Brattle utilized a Monte Carlo simulation model to estimate the distribution of capacity market price and quantity outcomes under various demand curve shapes.⁶

6. Brattle used these results to determine whether PJM's existing VRR Curve would meet PJM's resource adequacy and other capacity market design objectives, including: (i) an average loss of load expectation of 1-event-in-10-years for the system as a whole and a 1-event-in-25-years loss of load expectation for PJM's Locational Deliverability

⁴ *Id.* § 5.10(a)(iii). This is the second comprehensive review, as required on a triennial basis; hereafter, the reviews will be quadrennial. *Id.* PJM's first triennial review filing was addressed by the Commission in January 2012. *See PJM Interconnection, L.L.C.*, 138 FERC ¶ 61,062 (2012) (2012 Triennial Review Order). In addition, PJM commissioned a comprehensive review of its VRR Curve in 2008 in response to a complaint proceeding, as addressed by the Commission in a series of orders. *See PJM Interconnection, L.L.C.*, 124 FERC ¶ 61,272 (2008) (order establishing a technical conference) (2008 Capacity Market Review Order).

⁵ Brattle produced two reports: (i) the Triennial Review of PJM's Variable Resource Requirement Curve (Brattle VRR Curve Report); and (ii) Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM (Brattle CONE Report). *See* PJM filing at Attachments D and E.

⁶ The Monte Carlo simulation method is a probabilistic analysis based on simulation of variables (e.g., supply, demand, import limits, etc.). The performance attributed to each simulated VRR Curve (i.e., its performance against the 1-event-in-10-years standard) is the average of 1,000 different simulations.

Areas;⁷ (ii) a loss of load expectation falling below a 1-event-in-5-years standard, or 1 percent below PJM's Installed Reserve Margin (IRM);⁸ (iii) resiliency to changes in market conditions, administrative parameters, and other uncertainties, as balanced against the goal of avoiding over-procurements; and (iv) mitigation of price volatility and the avoidance of conditions susceptible to the exercise of market power.

7. Based on its review, Brattle concluded that PJM's existing VRR Curve would not satisfy these objectives and failed to achieve resource adequacy on a long-term average basis, at both the region-wide level and localized levels. Specifically, Brattle found that the average loss of load expectation across all years would be 0.12, or 1.2 events in 10 years at the region-wide level, with reliability falling below a 1-event-in-5-years loss of load expectation in 20 percent of all years.

8. The Brattle CONE Report also reviewed PJM's existing CONE parameters. According to the report, CONE (or Gross CONE) represents the first-year total net revenue (net of variable operating costs) that a representative new generation resource would need in order to recover its capital investment and fixed costs, given reasonable expectations about future cost recovery over its economic life. Under PJM's OATT, this representative new generation resource, or Reference Resource, is defined as a combustion turbine power plant configured with two General Electric Frame 7FA turbines.⁹ PJM's OATT also establishes separate CONE estimates for each of five CONE Areas, as defined in relation to PJM's transmission owner zones.¹⁰ In the Brattle CONE Report, Brattle reviewed and updated the technical specifications of the Reference

⁷ Under PJM's planning standards, generation adequacy within a Locational Deliverability Area is tested under a 1-event-in-25-years standard, given that the loss of load expectation of individual zones within PJM is additive to the region-wide loss of load expectation of 1-event-in-10-years. The 1-event-in-10-years standard is a reliability standard established by ReliabilityFirst Corporation and the North American Electric Reliability Corporation (NERC). See NERC Standard BAL-502-RFC-02.

⁸ The IRM for a particular delivery year is the amount of installed capacity that will provide an acceptable level of reliability consistent with the PJM Reliability Principles and Standards. See PJM Reliability Assurance Agreement, § 1.68; PJM, *Manual 18: PJM Capacity Market* § 2.1.1 (July 2014), available at <http://www.pjm.com/~media/documents/manuals/m18.ashx>.

⁹ PJM OATT, Attachment DD, § 2.58.

¹⁰ *Id.* § 5.10(a)(iv)(A) (listing the transmission owner zones by geographic CONE regions and regional CONE values).

Resource, identified an appropriate site within each CONE Area for construction of the Reference Resource, and then based its assumptions on a project entering service by June 1, 2018.¹¹

II. Proposed Revisions

9. As summarized more fully below, PJM proposes: (i) a revised shape for its VRR Curve; (ii) elimination of CONE Area 5;¹² (iii) updated Gross CONE values for CONE Areas 1 through 4, representing reductions from PJM's currently-effective values;¹³ (iv) a region-wide Gross CONE set as the simple average of the CONE Area 1 through 4 values;¹⁴ (v) a replacement of PJM's existing inflation index; and (vi) a better reflection of relevant zonal conditions in its location-specific Net CONE values. Except as otherwise noted below, PJM's proposed tariff changes adopt Brattle's recommendations.

III. Notice of Filing and Responsive Pleadings

10. Notice of PJM's filing was published in the *Federal Register*, 79 Fed. Reg. 44,021 (2014), with interventions and protests due on or before October 16, 2014. Notices of intervention and timely-filed motions to intervene were submitted by the entities listed in

¹¹ PJM notes that, under the triennial review requirement set forth in its OATT, it is required to assess the appropriateness of its CONE values, as applicable to the 2018-19 delivery year.

¹² Specifically, PJM proposes to merge this area (comprised of Dominion's service territory), with CONE Area 3 (an area which PJM refers to as "Rest of RTO"). See proposed PJM OATT at Attachment DD, § 5.10(a)(iv)(A). PJM asserts that this reconfiguration is appropriate, given that a CONE for this area has never been used for determining a locational VRR Curve.

¹³ These values would be revised as follows: (i) \$132,200/MW-year for CONE Area 1 (as reduced from the existing \$156,881/MW-year); (ii) \$130,300/MW-year for CONE Area 2 (as reduced from the existing \$146,348/MW-year); \$128,900/MW-year for CONE Area 3 (as reduced from the existing \$143,670/MW-year); and (iv) \$130,300/MW-year for CONE Area 4 (as reduced from the existing \$150,718/MW-year). PJM, *2017-18 Planning Period Parameters* (June 4, 2014), available at <http://www.pjm.com/~media/markets-ops/rpm/rpm-auction-info/2017-2018-planning-period-parameters.ashx>.

¹⁴ The simple average of the initial CONE Area values is \$130,425.

the Appendix to this order.¹⁵ A motion to intervene out-of-time was submitted on October 24, 2014 by Panda Power Generation Infrastructure Fund, LLC (Panda).

11. Answers were submitted on October 31, 2014 and November 17, 2014, by the PJM Power Providers Group (P3); on November 6, 2014, by PJM; on November 17, 2014, by PSEG Companies (PSEG); on November 21, 2014, by the Maryland Public Service Commission (Maryland Commission) and American Municipal Power Association, Inc., et al. (PJM Load Group);¹⁶ and on November 25, 2014, by American Electric Power Service Corporation, et al.¹⁷ (Public Utilities Coalition).

12. Comments and/or protests were submitted by the Electric Power Supply Association (EPSA); the Public Utilities Commission of Ohio (Ohio Commission); Exelon Corporation (Exelon); P3; PSEG; the Maryland Commission; the Public Utilities Coalition; Monitoring Analytics, LLC, acting as PJM's independent market monitor (Market Monitor); the PJM Load Group; and the Illinois Commerce Commission (Illinois Commission).

IV. Procedural Matters

13. Pursuant to Rule 214 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.214 (2014), the notices of intervention and timely, unopposed motions to intervene serve to make the entities that filed them parties to this proceeding. In addition,

¹⁵ The abbreviated names and/or acronyms by which these entities are referred to in this order are also noted in the Appendix.

¹⁶ Joined by: American Public Power Association; the Consumer Division of West Virginia; the Delaware Public Service Commission; the Division of the Public Advocate for the State of Delaware; Duquesne Light Company; the Maryland Office of People's Counsel; New Jersey Board of Public Utilities; New Jersey Division of Rate Counsel; the Office of the Ohio Consumers' Counsel; the Office of the People's Counsel for the District of Columbia; Old Dominion Electric Cooperative; the Pennsylvania Office of Consumer Advocate; PJM Industrial Customer Coalition; Public Power Association of New Jersey; Rockland Electric Company; Southern Maryland Electric Cooperative, Inc., and North Carolina Electric Membership Corporation (NC Cooperative). In addition, NC Cooperative filed a separate protest.

¹⁷ Joined by: The Dayton Power and Light Company; FirstEnergy Service Company; Duke Energy Ohio, Inc.; and East Kentucky Power Cooperative, Inc.

given the early stage of these proceedings and the absence of undue prejudice or delay, we grant the unopposed, late-filed intervention submitted by Panda.

14. Rule 213(a)(2) of the Commission's Rules of Practice and Procedure prohibits an answer to a protest and an answer to an answer unless otherwise ordered by the decisional authority. We will accept the answers submitted by P3, PJM, PSEG, the Maryland Commission, the PJM Load Group, and the Public Utilities Coalition, because they have provided information that has assisted us in our decision-making process.

V. Discussion

15. For the reasons discussed below, we conditionally accept, subject to compliance, PJM's proposed tariff revisions, to become effective December 1, 2014, as requested. In the 2012 Triennial Review Order, the Commission addressed PJM's submission of a Brattle comprehensive review, along with PJM's proposed tariff changes.¹⁸ Among other things, the Commission held that, because PJM's Gross CONE updates raised material issues of disputed fact, this aspect of PJM's filing would be accepted and suspended for a maximum five-month period. Subject to a compliance filing, the Commission accepted PJM's proposals addressing the VRR Curve, the offset relating to revenues from the energy and ancillary services markets, and related changes. Other aspects of PJM's filing were rejected.

16. In the instant filing, PJM again proposes revisions and updates to its auction parameters, as based on the evolving market conditions and related developments discussed below. Intervenors challenge these proposed revisions and request rejection of PJM's filing and/or the establishment of hearing and settlement judge procedures.¹⁹

A. VRR Curve

17. The VRR Curve connects price points, which are stated as multiples or fractions of the Net CONE, on the price axis, and quantity points, as represented by PJM's target reliability requirement, on the quantity axis.

¹⁸ 2012 Triennial Review Order, 138 FERC ¶ 61,062 at P 2 (accepting in part, rejecting in part, and suspending tariff provisions, and establishing hearing and settlement judge procedures).

¹⁹ See P3 protest at 13, 20; PSEG protest at 20, 23; and NC Cooperative protest 24-25.

18. The shape of the VRR Curve is determined by reference to a price cap, PJM's Installed Reserve Margin, and Net CONE. Specifically, the current shape of the VRR Curve is represented, from left to right, by four line segments: (i) a price cap (the greater of Gross CONE or 1.5 times Net CONE) forming a horizontal line segment, as applicable when cleared capacity is three percent, or more, below the IRM; (ii) Net CONE, as plotted at a point where the cleared quantity of capacity is at the IRM, plus one percent; (iii) Net CONE times 0.2, as plotted at a point where the cleared quantity of capacity is at the IRM, plus five percent; and (iv) a vertical segment where cleared capacity exceeds the IRM by five percent, dropping to the point where price equals zero.

1. PJM's Proposal

19. PJM proposes three updates to the VRR Curve: (i) extending the VRR Curve's horizontal line segment (the greater of Gross CONE or 1.5 times Net CONE price cap) from the IRM-3 percent position to the IRM-1 percent position;²⁰ (ii) adjusting the curve so that it is convex in shape, not concave; and (iii) shifting the entire curve to the right by one percent.

20. PJM states that the chief objective of its VRR Curve is to procure enough capacity to maintain resource adequacy. PJM states that, to meet this objective, its VRR Curve must satisfy, on average, a loss of load expectation of no more than 1-event-in-10-years. PJM adds that, while its resource adequacy objective must be met, its VRR Curve design should also avoid excessive price volatility and susceptibility to market power abuse. PJM argues that adopting a flatter, i.e., less steep, VRR Curve serves these objectives by limiting the price effect of withholding supply. PJM notes, however, that prices should reflect year-to-year changes in market conditions, with prices allowed to increase more rapidly as reserve margins decrease. PJM asserts that the threat of diminished reliability must be met by a correspondingly stronger price signal.

21. PJM states that, in the Brattle VRR Curve Report, Brattle assessed the performance of the VRR Curve on both qualitative and quantitative bases. With respect to its quantitative analysis, Brattle modeled the performance of VRR Curve designs using a Monte Carlo simulation model to assess the probabilities that various alternative curve designs would also meet PJM's applicable reliability requirements. Based on this analysis, Brattle concluded (and PJM agrees) that PJM's current VRR Curve does not

²⁰ The amount of capacity can be represented as a percentage added to or subtracted from the IRM (e.g., IRM-3 percent). See PJM OATT, Attachment DD, § 5.10(a)(i); see also PJM, *Manual 18: PJM Capacity Market* § 3.4 (July 2014), available at <http://www.pjm.com/~media/documents/manuals/m18.ashx>.

result in sufficient investment in capacity resources to meet PJM's reliability requirement. Specifically, PJM notes that while its capacity market construct assumes that PJM's auctions will, on average, result in a loss of load expectation of 1-event-in-10-years, PJM's existing VRR Curve falls short of this goal, with an expectation that load will be lost 1.2 times in 10 years. PJM adds that its existing VRR Curve also produces a relatively high (20 percent) frequency of reliability outcomes below 1-event-in-5-years.

22. With respect to its qualitative analysis, Brattle: (i) compared the overall shape of the curve against estimates of the incremental value of reliability at different reserve margins; (ii) considered whether the curve should be more, or less, steep when the capacity auction clears short of the target reserve margin; and (iii) reviewed the degree of variability in capacity supply and demand and its effects on price volatility.

23. PJM states that the current shape of its VRR Curve is represented by a steep, IRM+5 percent segment (which PJM refers to as concave, from the perspective of the intersection of the X- and Y-axes) and the less steep IRM+1 percent segment, which PJM refers to as convex.²¹ PJM asserts that the concave curve is problematical, given that it does not match with the incremental value of capacity in avoiding a failure to serve load. PJM argues that, while the marginal value of capacity as reserve margins increase is convex, PJM's existing concave VRR Curve assigns lesser value to marginal movements on the low-reserves part of the curve than it does to the same movement on the high-reserves part of the curve.

24. PJM states that the relatively flat shape of the VRR Curve along the IRM+1 segment (in the low-reserve margin area) puts PJM at risk of low-reliability scenarios (i.e., those in which capacity reserves fall below an acceptable level). To reduce this risk, PJM proposes to extend the VRR Curve's horizontal line segment from its existing terminus, at IRM-3 percent, to IRM-1 percent. PJM states that allowing higher clearing prices in this low-reserves area will enhance its auctions' ability to attract supply offers and thus minimize low-reliability outcomes. PJM further states that this revision will ensure that PJM exhausts all in-market options to obtain capacity before resorting to any out-of-market options that could result in uplift payments.²²

²¹ See PJM, *Triennial Review of VRR Curve Shape* at 6 fig.2, available at <http://www.pjm.com/~media/committees-groups/task-forces/cstf/20140630/20140630-item-04c-vrr-curve-background.ashx>.

²² PJM notes, for example, that it is required to conduct a Reliability Backstop Auction, if it clears below IRM-1 percent for three consecutive years. See PJM OATT, Attachment DD, § 16.3(a). Capacity procured in a Reliability Backstop Auction is allocated to customers and recovered through uplift payments. *Id.* § 16.4.

25. PJM also recommends that the VRR Curve be shifted to the right by one percent. PJM notes that while Brattle's recommendation (proposing only an extension of the horizontal segment to IRM-1 percent and the adoption of a convex curve) can be expected to fall short of the 1-event-in-5-years loss of load expectation 13 percent of the time, PJM's recommendation (adopting both the Brattle recommendation and a rightward shift of the VRR Curve) cuts this incidence almost in half, falling short of the 1-event-in-5-years standard only seven percent of the time. PJM states that, given the possibility for continuing significant variations in the supply offered into its capacity auctions, it is prudent to adopt a VRR Curve that is more resilient in the face of supply shocks or other stresses. Dr. Sotkiewicz explains that PJM is "facing fast changing and uncertain market, policy and legal conditions," including:

[i] approximately 26,000 MW of generation retirements from 2009 to 2016 due to the Mercury and Air Toxics Standards and the emergence of low-cost shale gas; [ii] continued improvements in the efficiency and economies of scale in combined cycle gas technology; [iii] the recent D.C. Circuit Court decision [vacating] Order No. 745[;] and [iv] uncertainty regarding the manner in which states will implement the [Environmental Protection Agency's] Greenhouse Gas Rule and the resulting changes in resource configuration.²³

Dr. Sotkiewicz states that the impact of these shocks could not be modeled by Brattle using the historical data since most of these will affect the capacity market in the future.

26. PJM acknowledges that, under its recommendation, capacity procurement costs are projected to rise by approximately one percent, on average, as compared to the cost increase attributable to the Brattle recommendation. Specifically, the Brattle VRR Curve Report shows that capacity costs would increase from approximately \$20.21 billion as procured by Brattle's recommended VRR Curve to \$20.383 billion as procured by PJM's proposed curve, on average over the long-term. PJM asserts, however, that this cost increase is reasonable (and relatively modest over the long-term), given the corresponding increase in reliability that its proposed redesign produces, the current and expected changes in PJM's resource base (and their attendant risks), and the potential for underestimation of Net CONE.²⁴

²³ PJM filing, Attachment C (Aff. of Dr. Paul M. Sotkiewicz at P 11).

²⁴ PJM asserts that if its Net CONE input underestimates the true entry costs of a new plant by 20 percent, the loss of load expectation under PJM's existing VRR Curve

(continued ...)

27. PJM argues that its proposed VRR Curve, while producing moderately higher clearing prices than the curve recommended by Brattle, will still reflect lower prices as compared to the capacity demand curves recently approved by the Commission for ISO New England Inc. (ISO-NE) and the New York Independent System Operator, Inc. (NYISO).²⁵

2. Protests and Comments

28. Comments generally supportive of PJM's proposed revisions to the VRR Curve shape were submitted by the Market Monitor, the Public Utilities Coalition, P3, PSEG, EPSA, Exelon, and the Ohio Commission. Protests opposing PJM's proposed VRR Curve revisions were filed by the Maryland Commission, the PJM Load Group, and NC Cooperative.

29. The Market Monitor asserts PJM's proposed changes are based on appropriate principles, including an appropriate reliability measure. The Ohio Commission and the Public Utilities Coalition submit that PJM's proposed shift of the VRR Curve to the right should result in reduced price volatility and provide more stable and adequate revenues for capacity resources. The Ohio Commission asserts that, while clearing prices should reflect year-to-year changes in market conditions, these clearing prices should not be so volatile that generation owners cannot make economic decisions to maintain or build new power plants.

30. The Public Utilities Coalition notes that, for the 2015-16 delivery year, as compared to the 2016-17 delivery year, a relatively small increase in supply (3,500 MW of mostly non-firm transmission imports) caused the auction clearing price to plummet by over 50 percent (from \$136/MW-day to \$59/MW-day), while clearance volumes and reserve margins (and thus reliability) were actually rising. The Public Utilities Coalition notes that reduced volatility risk will lower capital costs and thus lower PJM's Gross CONE values over the long-run. The Public Utilities Coalition notes that, currently, PJM's VRR Curve is nearly vertical, meaning that there is no positive marginal benefit

would jump to 3.7 events in 10 years. PJM states that, under these circumstances, PJM would fall short of the 1-event-in-10-years standard 69 percent of the time and would fall short of the 1-event-in-5-years standard approximately 50 percent of the time.

²⁵ See PJM filing at 20-21 (citing *ISO New England Inc.*, 147 FERC ¶ 61,173, at P 29 (2014) (*ISO-NE Demand Curve Order*); *New York Independent System Operator, Inc.*, 146 FERC ¶ 61,043 (2014) (*NYISO Demand Curve Order*)).

for an additional unit of capacity and no negative marginal benefit for fewer units of capacity.

31. EPSA argues that PJM's existing VRR Curve does not properly reflect the varying importance of procuring capacity as the system becomes shorter or longer, i.e., that the VRR Curve is not sufficiently responsive to changing conditions. EPSA agrees with PJM that the changes to the VRR Curve, as proposed, strike a prudent balance between cost and reliability.²⁶

32. Exelon points to recent market changes highlighting the need for PJM's capacity market auctions to attract needed investment. Exelon notes, for example, that in the winter of 2014, each of the regional electricity markets operating in the mid-Atlantic and eastern seaboard experienced significant outages, while resource adequacy in PJM, in particular, was less reliable than expected. Exelon further cites the impact that recent environmental rules will have on unit retirements. In addition, Exelon cites pending uncertainties related to the status of demand response resources.²⁷ Exelon argues that these market changes underscore the need for PJM's fundamental market elements, including its VRR Curve, to support reliability by providing the right price signals to support investment.

33. Exelon agrees with PJM that, while PJM's capacity market has generally been reliable since its inception, the VRR Curve is now susceptible to an unacceptable level of price volatility. Exelon also agrees that the appropriate solution is the adoption of a downward sloping convex curve, as well as by the rightward shift of the VRR Curve, as proposed.

34. P3 agrees that, in addition to the VRR Curve changes recommended by Brattle, PJM's proposed rightward shift of the VRR Curve is also appropriate. P3 asserts that this proposed one percent shift should be viewed as a minimum requirement. Specifically, P3 asserts that, even with this shift, Brattle predicts that PJM will fail to meet a 1-event-in-10-years standard 16 percent of the time and fail to meet a 1-event-in-5-years standard seven percent of the time.

35. PSEG asserts that the VRR Curve will not meet PJM's 1-event-in-10-years standard unless it is right-shifted two percent further than Brattle proposes and one percent further than PJM proposes for the region-wide curve. PSEG also recommends an

²⁶ See also Ohio Commission comments at 4.

²⁷ See also EPSA comments at 3.

additional rightward shift for the Locational Deliverability Area curves for the Mid-Atlantic Area Council (MAAC) region and the Eastern-MAAC (EMAAC) region. PSEG argues that these additional shifts are required such that the likelihood of failing to achieve PJM's target reliability standard is statistically remote. To achieve this objective, PSEG recommends the use of a maximum acceptable tolerance factor of 10 percent in interpreting the relevant probabilistic studies. PSEG asserts that Brattle's Monte Carlo model should reflect the Reliability *First* reliability standard applicable to PJM, i.e., the requirement that PJM meet the 1-event-in-10-years standard every year.

36. The Public Utilities Coalition argues that, in addition to the VRR Curve changes proposed by PJM, additional improvements should be made by eliminating PJM's existing 2.5 percent short-term resource procurement target, or "holdback."²⁸ The Public Utilities Coalition asserts that holding back 2.5 percent (and thus shifting the VRR Curve to the left by this amount) suppresses clearing prices. The Public Utilities Coalition further asserts that shifting the VRR Curve to the right, as PJM proposes, only partially corrects for these artificially lower prices. The Public Utilities Coalition concludes that PJM's holdback requirement leads to under-investment, premature retirements, and decreased reliability.

37. The Maryland Commission characterizes, as unreasonable, the three modifications to the VRR Curve proposed by PJM. The Maryland Commission notes that the first two changes, which are supported by Brattle (and which are summarized above), will increase costs to end-users by \$43 million, as estimated by Brattle. The Maryland Commission adds that Brattle estimates that the third change (the rightward shift of the VRR Curve) will have an additional cost impact of \$173 million. The Maryland Commission also states that, collectively, PJM's proposed VRR Curve changes will increase costs by approximately \$1.5 billion per year, as based on PJM's simulation analyses for PJM's last three auctions.²⁹

²⁸ In PJM's base residual auction, the hold-back reduces the amount of capacity that PJM seeks to procure by 2.5 percent of PJM's reliability requirement, in order to procure this capacity from shorter lead-time resources in PJM's incremental auctions. See PJM OATT, Attachment DD, §§ 2.65A, 2.41D, and 2.41E. By deferring a portion of the procurement target, the holdback acts to shift the VRR Curve to the left by 2.5 percent of the PJM reliability requirement.

²⁹ See also NC Cooperative protest at 15 (noting that PJM's proposal, as applied to PJM's last three auctions, would have resulted in average annual cost increase for consumers of \$1.47 billion). According to PJM's application of the proposed VRR Curve to previous auctions, procurement costs would increase from approximately \$9.7

(continued ...)

38. The Maryland Commission also challenges Brattle's Monte Carlo analysis. First, the Maryland Commission asserts that Brattle's analysis requires the Commission to adopt, without support, a new, enhanced reliability standard. In particular, the Maryland Commission challenges PJM's reliance on asserted market uncertainties, including the asserted uncertainty surrounding coal plant retirements, and that PJM's demand response programs may be eliminated. The Maryland Commission argues that the future of PJM's demand response programs will take some time to resolve and may only require the substitution of a revised mechanism, not the elimination of the product itself. With respect to coal plant retirements, the Maryland Commission asserts that, while 26,000 MW of such capacity is expected to retire over the next three years, PJM has added 17,065 MW of gas-fired generation over the last three years.

39. Second, the Maryland Commission asserts that Brattle's analysis employs inflated simulated shocks to system stability, based on over-stated load forecasts, unexpected generation outages, and Gross CONE miscalculations. The Maryland Commission adds that none of the curves analyzed by Brattle failed to maintain continued service during the course of the shock; the Maryland Commission asserts that, instead, the only difference among these scenarios was the magnitude of reserve maintained after generation had been applied to overcome the unexpected effects of the shock.

40. Third, the Maryland Commission asserts that Brattle's analysis ignores PJM's ability to address supply shortfalls through the use of its incremental auctions.³⁰ The Maryland Commission concludes that the Brattle Monte Carlo analysis does not support the asserted inadequacy of PJM's existing concave demand curve to acquire an adequate supply of capacity to serve PJM's reliability needs.

billion to \$11.1 billion, \$5.5 billion to \$6.5 billion, and \$7.5 billion to \$9.2 billion for delivery years 2015-16, 2016-17, and 2017-18, respectively. *See id.* at 16; PJM, *BRA VRR Curve Simulation Results Post* (Aug. 2014), available at <http://www.pjm.com/committees-and-groups/closed-groups/cstf.aspx>.

³⁰ PJM conducts three incremental auctions to allow for replacement resource procurement, increases and decreases in resource commitments due to reliability requirement adjustments, and deferred short-term resource procurement. A Conditional Incremental Auction may be conducted if a major transmission line is delayed and results in the need for PJM to procure additional capacity in a Locational Deliverability Area to address the corresponding reliability problem. *See* PJM Manual 18, *PJM Capacity Market* § 5.7 (July 2014).

41. The PJM Load Group argues that PJM's VRR Curve recommendations will increase costs for consumers without providing any offsetting benefits.³¹ The PJM Load Group also challenges the studies on which these recommendations are based. Specifically, the PJM Load Group challenges PJM's proposed redefinition of the resource adequacy standard as used in combination with PJM's proposed use of a new simulation model, i.e., PJM's proposal to reject its prior 1-event-in-10-years reserve margin level standard in favor of a loss of load expectation, used in combination with a static Monte Carlo simulation model. The PJM Load Group argues that, consistent with Brattle's prior analyses for PJM, a consideration of average target reserve margin over time is appropriate.³²

42. The PJM Load Group argues that the Monte Carlo model relies on a single isolated year to simulate long-term conditions, without regard to the real-world market dynamics that affect both supplier and consumer behavior. The PJM Load Group further argues that the Monte Carlo model fails to account for year-to-year changes in supply and demand dynamics and fails to account for the actual interplay between these forces within the simulated year. The PJM Load Group adds that PJM's reliance on a three-year-forward loss of load expectation fails to account for a variety of factors that occur between the auction year and the delivery year that effectively reduce reliability risk in the delivery year and which have historically demonstrated more than sufficient actual reserves to meet system requirements.³³

43. NC Cooperative asserts that PJM's proposed changes to the VRR Curve will not address the reliability concerns presented by the extreme weather events last winter, when 40,000 MW of capacity on PJM's system failed to start. NC Cooperative argues that, while these concerns were real, the underlying cause had nothing to do with the

³¹ The PJM Load Group's arguments are supported by the affidavit testimony of its consultant, James F. Wilson, which is appended to its protest. *See also* NC Cooperative protest at 3.

³² *See* PJM Load Group protest (Aff. of J. Wilson at PP 36-40). The Maryland Commission adds that historically, the chosen reliability standard employed in PJM to assess the utility of the VRR Curve has been a 1-event-in-10-years *reserve margin* level, meaning that the three-year forward capacity auctions should, on average, clear reserve margins exceeding the target reliability reserves.

³³ *See also* NC Cooperative protest at 9 (arguing that the VRR Curve is producing more than adequate revenues and is fulfilling the objectives of PJM's capacity market construct, as evidenced for each of the 11 delivery years for which the base residual auction has been run).

amount of capacity available. NC Cooperative notes, for example, that approximately half of the failures were attributable to gas-fired resources, which were due, in turn (and in part) to the inability of these resources to procure fuel, the high cost of fuel during extreme winter conditions, and inadequate gas pipeline infrastructure.

44. NC Cooperative also challenges PJM's reliance on the VRR Curve approaches adopted by NYISO and ISO-NE. NC Cooperative argues that PJM's market design is sufficiently different to warrant its own methodology. NC Cooperative notes, for example, that while NYISO's capacity market relies on a one-month forward procurement design, PJM's capacity market utilizes a three-year forward-looking design, which it argues, is a period long enough to allow for the addition of new resources, if needed. With respect to ISO-NE's capacity market, NC Cooperative points out that ISO-NE relies predominantly on gas-fired resources, as opposed to PJM's more diverse resource base.

3. Answers

45. P3, in its October 31, 2014 answer, responds to the arguments raised by the PJM Load Group and the Maryland Commission in opposition to PJM's proposed changes to the VRR Curve (which P3 supports). P3 argues that PJM's proposed changes strike a reasonable balance between reliability and cost.

46. PJM, in its answer, responds to the PJM Load Group's argument that, in assessing the VRR Curve, a consideration of PJM's average target reserve margin over time, i.e., the IRM, is appropriate, consistent with Brattle's two prior reviews, but not loss of load expectation over time. PJM argues that Brattle, in its Monte Carlo simulations, considered both average target reserve margin loss and average loss of load expectation. PJM further argues that considering expectations of how often load is lost in assessing the reliability of a VRR Curve is appropriate, consistent with the NERC standard it is required to follow. PJM adds that meeting its target reserve margin on average would not necessarily maintain reliability, where load is lost on a too-frequent basis.

47. PJM also responds to the Maryland Commission's argument that Brattle's analysis relies on an enhanced, but unwarranted, reliability standard, resulting in a loss of load expectation of 0.6 events in 10 years. PJM argues that achieving a target average loss of load expectation is not the only relevant consideration in choosing a just and reasonable VRR Curve. PJM asserts that, in addition to this consideration, it was also appropriate to consider the extent to which the VRR Curve, in any individual year, resulted in a 1-event-

in-5-years (or worse) loss of load expectation. PJM adds that the Commission expressly accepted the use of this standard in the *ISO-NE Demand Curve Order*.³⁴

48. PJM also responds to the argument made by the Maryland Commission and the PJM Load Group regarding Brattle's asserted failure to consider incremental auction capacity in assessing PJM's loss of load risks. PJM argues that the VRR Curve and the operation of its base residual auction should not be designed in a way that cannot satisfy the full extent of PJM's reliability standard. PJM adds that none of Brattle's prior studies for PJM considered the availability of capacity via PJM's incremental auctions. PJM also challenges the assumption that accounting for supply and demand conditions during the post-base residual auction period would necessarily improve the resulting loss of load expectation.

49. PJM also responds to PSEG's argument in favor of a further rightward shift of the VRR Curve, i.e., the argument that Brattle's Monte Carlo model should reflect the fact that PJM is required to meet the 1-event-in-10-years standard every year. PJM argues that while it plans its system every year to meet the Reliability *First* requirement, the issue here, in designing an appropriate capacity demand curve, focuses on other considerations, recognizing that, in some years, capacity levels committed through the market will be higher, or lower, than PJM's target reserve margin. PJM asserts that, as such, the target of a 1-event-in-10-years loss of load expectation *on average* was an appropriate model to be used by Brattle, consistent with the standard accepted by the Commission in the *ISO-NE Demand Curve Order*.³⁵

50. PJM also responds to the Maryland Commission's argument that PJM's proposed VRR Curve changes will increase costs by approximately \$1.5 billion per year, as based on PJM's simulation analyses. PJM argues that these sensitivity analyses involved the recalculation of prior-year auction prices based on hypothetical assumptions, as supplied by PJM's stakeholders, and should not be relied upon here. PJM argues that these simulations are not a reflection of how PJM's market will actually operate, given the fact that higher prices can be expected to induce more supply. PJM asserts that the best evidence regarding the incremental cost of a reliability outcome, as identified by Brattle's model, is the cost outcome identified by the model itself, which showed that the VRR Curve, as revised under PJM's proposal, would increase annual procurement costs by only \$173 million, or less than one percent, compared to Brattle's recommendation.

³⁴ See PJM answer at 10 (citing *ISO-NE Demand Curve Order*, 147 FERC ¶ 61,173 at P 29).

³⁵ *Id.* at 16 (citing *ISO-NE Demand Curve Order*, 147 FERC ¶ 61,173 at P 30).

51. PSEG, in its answer, responds to PJM's apparent assertion that the 1-event-in-10-years standard can be met by achieving that standard *on average* over many years. PSEG notes that, notwithstanding this assertion, PJM acknowledges that applying an average could mask adverse reliability outcomes in some of the modeling scenarios Brattle examined, each of which could be thought of as a distinct delivery year. PSEG argues that, as such, a reliance on an average is flawed, given that an extreme adverse outcome can be offset by an equally favorable outcome. PSEG assert that, in place of this methodology, PJM should be required to use a standard reflecting the allowance of a 10 percent failure rate.

4. Commission Determination

52. For the reasons discussed below, we accept PJM's proposed revisions to its VRR Curve as just and reasonable. As an initial matter, we find persuasive PJM's argument that the proposed VRR Curve is reasonably needed for PJM to achieve an acceptable level of reliability, given evolving market conditions. Specifically, we find credible Dr. Sotkiewicz's explanation that, due to anticipated changes to PJM's resource base that could not be modeled using historical data, PJM appropriately accounted for this modeling inadequacy and the underlying potential for supply shifts with a more conservative VRR Curve, i.e., with a VRR Curve that will result in the procurement of additional capacity.³⁶

53. The Maryland Commission objects to the potential cost impact attributable to PJM's proposed revisions to its VRR Curve. We note that Brattle estimates that PJM's proposed VRR Curve will cost an additional one percent, or \$216 million, on average over the existing curve – which fails to meet the minimum reliability standard – or 0.86 percent, or \$173 million, on average over Brattle's VRR Curve.³⁷ As PJM notes, the curve recommended by Brattle is expected to fall short of the low-reliability 1-event-in-5-years level 13 percent of the time, while the curve proposed by PJM is expected to fall short of that standard only seven percent of the time.³⁸ We find that the increase in costs, less than 1 percent on average over the long-term, is reasonable, on balance, given the increase in reliability.

³⁶ See *supra* P 25 (citing anticipated market changes).

³⁷ Brattle VRR Curve Report at 69 tbl.14.

³⁸ *Id.*

54. With regard to the Maryland Commission's concern that Brattle's Monte Carlo analysis promotes the use of an enhanced reliability standard that has not been supported by the asserted market uncertainties on which it is based, we note that the Monte Carlo analysis is simply a tool by which price, quantity, and reliability outcomes can be simulated. We further note that Brattle used historical PJM offer prices and quantities, and simulated deviations from expected supply and demand conditions calibrated to market conditions observed in PJM.

55. The Maryland Commission and the PJM Load Group also argue that Brattle's Monte Carlo analysis fails to support the asserted inadequacy of PJM's existing VRR Curve because it fails to account for PJM's ability to procure additional capacity between the base residual auction and the delivery year, via PJM's incremental auctions. The PJM Load Group argues that the Monte Carlo model erroneously relies on a single year to simulate long-term conditions. We note, however, that the purpose of the base residual auction is to procure sufficient capacity to meet PJM's reliability requirement for the relevant delivery year, after accounting for self-supply, in accordance with applicable resource adequacy standards.³⁹ Moreover, incremental auctions are available as contingencies should an unexpected change occur, not as part of PJM's fundamental resource adequacy planning.⁴⁰ As such, Brattle appropriately based its analysis on PJM's underlying need to meet its reliability requirement with the capacity it procures during its base residual auction. Brattle's analysis found, in this regard, that use of PJM's existing VRR Curve would result in 0.121 events per year, and thus would not meet the minimum 0.1-events-per-year standard.⁴¹ We emphasize, again, that anticipated changes to PJM's resource base could not be fully modeled, and that it would be an unacceptable outcome for the base residual auction to fall short of reasonable reliability objectives.

³⁹ See PJM OATT, Attachment DD, § 2.5.

⁴⁰ *Id.* § 2.34 (Incremental Auctions . . . shall be held for the purposes of . . . allowing [PJM] to reduce or increase the amount of committed capacity secured in prior auctions for such Delivery Year if, *as a result of changed circumstances or expectations* since the prior auction(s), there is, respectively, a significant excess or significant deficit of committed capacity for such Delivery Year, for the PJM Region or for an [Locational Deliverability Area].") (emphasis added).

⁴¹ ReliabilityFirst Corporation has established a Commission-approved 1-event-in-10-years loss of load standard, which applies to PJM. This standard is alternately referred to as being equal to, on average, 0.1 events per year, or 1-event-in-10-years. See NERC Standard BAL-502-RFC-02; *see also Planning Res. Adequacy Assessment Reliability Standard*, Order No. 747, 134 FERC ¶ 61,212, at P 31 (2011).

56. We further note that, in the *ISO-NE Demand Curve Order*, the Commission found that ISO-NE's proposed demand curve design reasonably balances the multiple objectives identified in that proceeding, including the need to reduce price volatility, prevent the exercise of market power, minimize frequency of low reliability events, and avoid falling below a 1-event-in-5-years standard in any individual time period.⁴² While the Commission noted that ISO-NE's curve met the 1-event-in-10-years standard in that case, the 1-event-in-5-years standard is a relevant benchmark.⁴³

57. We also reject PSEG's argument that an additional rightward shift of the VRR Curve is required (beyond that proposed by PJM) such that the likelihood of failing to meet PJM's target reliability standard will be statistically remote. The Commission has not required such a standard. PSEG further argues that PJM's VRR Curve must be shown to meet the 1-event-in-10-years standard each year rather than on average, as proposed by PJM. We disagree. PJM's proposal utilizes a reliability standard that we have previously accepted as appropriate.⁴⁴

58. Finally, we reject, as beyond the scope of this proceeding, the Public Utilities Coalition's proposed elimination of PJM's existing 2.5 percent short-term resource procurement holdback, given that this tariff provision is not at issue here.⁴⁵

B. Cost of Capital

59. PJM's proposed CONE values are developed using an after-tax weighted-average cost of capital (Cost of Capital) to discount future cash flows into present values. The Cost of Capital accounts for both the cost of equity and the cost of debt (net of the tax deductibility of interest payments on debt), weighted according to the debt-to-equity ratio reflected in the capital structure.

⁴² *ISO-NE Demand Curve Order*, 147 FERC ¶ 61,173 at P 29.

⁴³ *Id.* P 13.

⁴⁴ *See ISO-NE Demand Curve Order*, 147 FERC ¶ 61,173 at P 30 (rejecting the argument that meeting the 1-event-in-10-years standard on average over time is unjust and unreasonable and that the demand curve must be designed to meet the 1-event-in-10-years standard in all years).

⁴⁵ *See PJM Interconnection, L.L.C.*, 138 FERC ¶ 61,062 at P 39 (2012) (rejecting, as beyond the scope of the proceeding, arguments addressing elements of the tariff left unrevised by PJM's section 205 filing).

1. PJM's Proposal

60. PJM proposes an 8.0 percent Cost of Capital, as developed by Brattle, based on a 60-40 debt-to-equity ratio, a pre-tax 7.0 percent cost of debt, and a 13.8 percent cost of equity. PJM explains that Brattle's recommended Cost of Capital is supported by all available reference points, including: (i) estimates for publicly-traded merchant generation companies; (ii) updated estimates for previously-traded merchant generation companies; (iii) fairness opinions for merchant generation divestitures; and (iv) analysts' estimates. PJM adds that, as part of its analysis of each publicly-traded company, Brattle estimated a return on equity using the Capital Asset Pricing Model (CAPM), cost of debt, and debt-to-equity ratio, and, from those values, determined each company's Cost of Capital. Based on the multiple reference points used, Brattle recommends an 8.0 percent Cost of Capital, which is above the individual estimates for the independent power producer (IPP) companies it examined, and within the range of estimates from investment analysis and merger and acquisition transactions that it also reviewed.

61. PJM notes that its proposed 8.0 percent Cost of Capital is identical to the discount rate used to determine ISO-NE's CONE values in May 2014 and is less than the value the Commission accepted for NYISO's estimate of the cost of adding a new combustion turbine power plant similar to PJM's Reference Resource in January 2014.⁴⁶

2. Protests and Comments

62. EPSA urges the Commission to modify the financial parameters underlying PJM's Net CONE calculations, including PJM's asserted cost of debt, cost of equity, and debt-to-equity ratio. EPSA argues that PJM's proposal is not realistic and does not reflect recent and current project development costs within the PJM region.

63. Exelon, the Public Utilities Coalition, P3, PSEG, and EPSA object to PJM's proposed Cost of Capital rate of 8.0 percent as too low.⁴⁷ Exelon argues that new entry developers typically require private equity funding, which has a higher discount rate, and that most new generation development is now occurring through special purpose

⁴⁶ PJM filing at 27 (citing *ISO-NE Demand Curve Order*, 147 FERC ¶ 61,173, at P 40 and *NYISO Demand Curve Order*, 146 FERC ¶ 61,043, at P 105).

⁴⁷ Exelon's arguments and recommendations are supported by the affidavit testimony of its consultant, The NorthBridge Group, which is appended to its protest. P3's arguments and recommendations are supported by the affidavit testimony of its consultant, PA Consulting Group, which is appended to its protest.

investment companies, which typically face even higher rates. Exelon asserts that such developers will likely require a Cost of Capital of approximately 11 percent, which falls within its recommended range of 9.0 percent to 13.5 percent. P3 argues for a rate closer to 13 percent, applying an upward adjustment to the midpoint return, noting that the Commission “has previously relied upon setting just and reasonable return metrics that are ‘halfway between the midpoint of the zone of reasonableness and the top of that zone.’”⁴⁸ P3 and Exelon also challenge Brattle’s exclusion of private equity firms from its Cost of Capital study, and note that, had these firms been included, a higher Cost of Capital would have been indicated, given that these companies are less diversified than the companies relied upon by Brattle.

64. EPISA also challenges PJM’s claim that its proposed discount rate is reasonable, in comparison to the rates accepted by the Commission for ISO-NE and NYISO. EPISA argues that the Commission has both recognized and allowed for regional differences across these markets and that while consistency is desirable, it is critical that foundational values are set correctly and reflect the specific circumstances of each market.

65. Exelon and P3 challenge PJM’s reliance on a debt-to-equity ratio of 60-40. Exelon argues that this debt-to-equity ratio cannot be supported by historical data from PJM’s past capacity auctions and should therefore be reduced. Exelon cites to the recommendation of its consultant, proposing a debt-to-equity ratio of 40-60. P3 recommends a ceiling of 56-44, but advocates a range between 45-55 and 50-50.

66. In support of its recommendation, P3 argues that PJM’s proposed debt-to-equity ratio is based, erroneously, on costs attributable to both combined cycle and combustion turbine units, while PJM’s Net CONE updates rely on combustion turbine units alone as the Reference Resource. P3 characterizes this inconsistency as significant, given its claim that the gross margin profile of a combustion turbine unit is inherently more risky than that of a combined cycle unit. P3 notes that while the debt-to-equity ratio currently being utilized by ISO-NE is 60-40, this comparatively higher debt load is attributable to a combined cycle unit that allows new-build generation to secure capacity payments for up to seven years. P3 argues that this creates a more stable revenue stream for financing, as compared to PJM, where capacity revenues can be secured for only one year.

⁴⁸ See P3 protest (Aff. of R. Hardy and M. Hepsher at 4) (quoting *Martha Coakley, et al. v. Bangor Hydro-Elec. Co.*, Opinion No. 531, 147 FERC ¶ 61,234, *order on reh’g*, Opinion No. 531-A, 149 FERC ¶ 61,032 (2014)).

67. P3 also objects to PJM's proposed pre-tax cost of debt of 7.0 percent. P3 argues that PJM's debt cost estimate utilizing PJM's proposed debt-to-equity ratio is not achievable. P3 asserts that, rather, this debt-to-equity ratio should be no higher than 50-50. P3 also argues that PJM's proposed 13.8 percent cost of equity is too low, given the risk profiles attributable to non-publicly traded merchant, new-build investors. In addition, P3 asserts that combustion turbine units have a greater reliance on capacity revenues than combined cycle units, a circumstance that implies a riskier investment. P3 argues that PJM's proposed cost of equity fails to take this risk into consideration. Based on these factors, P3 recommends a cost of equity range of 15 to 20 percent.

68. Exelon contends that PJM failed to include an additional risk premium adjustment in its proposed Gross CONE values. Exelon argues that an additional risk premium is appropriate, given the risks attributable to the market conditions that arose last winter, when 22 percent of PJM's capacity was rendered unavailable due to colder than expected temperatures. Exelon notes that to address this reliability concern, PJM is preparing a proposal designed to provide stronger performance incentives and increased operational flexibility during peak power conditions. Exelon asserts that when these changes are implemented, generation resources are likely to face significantly greater penalties. Exelon adds that, to manage this risk, generation resources will be incented to make additional capital investments and expenditures, but will also demand a greater risk premium in return.

69. The PJM Load Group argues that PJM's proposed Cost of Capital and return on equity are too high.⁴⁹ The PJM Load Group argues that these values are overstated and were developed in a manner inconsistent with Commission precedent. The PJM Load Group argues that Cost of Capital rates for PJM's proxy group report show a median level of 6.3 percent, an average level of 6.47 percent, and a 75th percentile level of 6.85 percent.⁵⁰ Based on its own analysis, the PJM Load Group proposes a 7.0 percent Cost of Capital as just and reasonable.

⁴⁹ The PJM Load Group's arguments and recommendations are supported by the affidavit testimony of its consultant, Mr. Rohrbach, which is appended to its protest.

⁵⁰ PJM Load Group protest at 12-13 & tbl.1 (citing Aff. of John S. Rohrbach; Brattle CONE Report). The PJM Load Group purported to use the same values and companies as used in the Brattle CONE Report. *Id.*

3. Answers

70. P3, in its October 31, 2014 answer, responds to the PJM Load Group's argument that a Cost of Capital in excess of 7.0 percent is too high. First, P3 argues that an 8.0 percent Cost of Capital, as proposed by PJM, is too low, based on its claim that the assumptions on which PJM relies are erroneous. Specifically, P3 asserts that PJM's proposed methodology utilized an unsupportable debt-to-equity ratio and cost of debt, and an unreasonably low cost of equity. P3 asserts that its consultants, in their affidavits, have raised disputed issues of material fact as to the appropriate cost of funds, and therefore requests that this issue be set for hearing and settlement judge procedures.

71. PJM, in its answer, challenges Exelon's Cost of Capital range of 9.0 percent to 13.5 percent, given that it was calculated using data on private equity firms.⁵¹ PJM asserts that this data cannot be verified, including: (i) Exelon's reliance on its own experience in developing two generation facilities; (ii) Exelon's consultant's previous analyses and discussions; and (iii) Exelon's discussions with two unnamed investment banks. PJM adds that while one of Exelon's consultants did utilize publicly-available information on eight recent private-equity backed projects within PJM's footprint, certain additional information regarding these firms' broader financial arrangements is absent from this record. PJM adds that to the extent this new-entry data can be relied upon, it supports PJM's proposed capital structure, since the two most recent projects (out of eight) have had a cost of debt below 7.0 percent, and debt ratios above 60 percent.

72. PJM also argues that P3's recommended Cost of Capital is based on an unsupported upward adjustment to the mid-point. PJM argues that while P3 bases this upward adjustment on the risk adjustment factors accepted by the Commission in Opinion No. 531, this asserted precedent doesn't apply here. Specifically, PJM argues that, in Opinion No. 531, the Commission approved an increase above the indicated midpoint return on equity for transmission owners in ISO-NE, based on the presence of anomalous capital market conditions over the relevant period, 2011-13.⁵² PJM asserts that, as such, Opinion No. 531 has little if any application to a new entry generation project that would not enter service before 2018.

⁵¹ In support of its Cost of Capital arguments, in its answer, PJM submits additional affidavit testimony from its consultants. *See* PJM answer at Attachment B (Aff. of Johannes P. Pfeifenberger and Bin Zhou).

⁵² *Id.* at 32 (citing Opinion No. 531, 147 FERC ¶ 61,234 at P 142).

73. PJM also challenges the 7.0 percent Cost of Capital proposed by the PJM Load Group. PJM argues that this recommendation is well below the Cost of Capital values accepted by the Commission in the *ISO-NE Demand Curve Order* (an 8.0 percent Cost of Capital) and *NYISO Demand Curve Order* (accepting Cost of Capital values ranging from 8.16 percent to 8.36 percent, depending on the applicable taxes for the relevant sub-regions).

74. PJM adds that to arrive at its recommended 7.0 percent Cost of Capital, the PJM Load Group considered only the results of a Brattle sub-proxy group, i.e., the three publicly-traded independent power producers, along with an alternative proxy group comprised of these three companies plus an additional independent power producer. PJM characterizes this analysis as limited and insufficient. Specifically, PJM argues that the PJM Load Group's analysis fails to properly account for the fairness opinions addressed by Brattle, regarding divestitures of merchant generation assets, and the merger of GenOn and NRG, two-publicly-traded merchant generation companies within the PJM region.

75. Finally, PJM notes that no empirical evidence has been presented supporting the claim that investments in combustion turbine plants are riskier than investments in combined cycle plants, and that "available evidence of the uncertainty of annual energy margins and the total of energy margins and capacity revenues earned by [combustion turbine plants] and [combined cycle plants] suggest no significant difference in risks."⁵³

4. Commission Determination

76. For the reasons discussed below, we find that PJM's proposed Cost of Capital of 8.0 percent, as supported by Brattle, is a just and reasonable estimate for the purpose of estimating Gross CONE. Brattle's methodology is transparent and its assumptions are well-supported. Because a number of IPPs do not pay dividends, a value required to perform a discounted cash flow analysis, we find Brattle's use of a CAPM to be appropriate. We also agree that Brattle's methodology provides a reasonable Cost of Capital that "captures financial market conditions and appropriately balances investor and consumer interests."⁵⁴

77. We find intervenors' proposed Cost of Capital estimates to be based on incomplete data and a misreading of Commission precedent. For example, P3 establishes a zone of reasonableness for the cost of debt, cost of equity and capital structure, and then proposes

⁵³ *Id.* at Attachment B (Aff. of Johannes P. Pfeifenberger and Bin Zhou at 15).

⁵⁴ *Id.* at Attachment B (Aff. of Pfeifenberger and Zhou at 5).

values that are in the 75th percentile of each zone to justify a 10.8 percent Cost of Capital. P3 bases this on its reading of Opinion No. 531,⁵⁵ which was specific to return on equity for transmission owners in ISO-NE, based on the unique circumstances in that proceeding (such as the capital market conditions during a particular period), and did not involve cost of debt and capital structure. These and other weaknesses in protesters' arguments do not demonstrate that the instant filing fails to meet the requirements under FPA section 205, as discussed more fully below.

78. Brattle uses an eight-member proxy group that includes publicly-traded IPPs, previously-acquired companies, and merchant generation divestitures. Brattle then calculates the Cost of Capital for each group. For publicly-traded IPPs, Brattle: (1) applied the CAPM to determine an appropriate return on equity (7.1 percent to 11.9 percent); (2) compiled the senior unsecured credit ratings for each company and examined the associated bond yields to determine the cost of debt (7.5 percent to 8.7 percent); and (3) estimated the five-year average debt-equity ratio for each merchant generation company using company 10-K reports for the value of debt and Bloomberg data for the market value of equity. The resulting Cost of Capital for publicly-traded IPPs ranged between 6.1 percent and 7.8 percent, with a simple average of 6.7 percent, and the resulting capital structure was a 60-40 debt-equity ratio.⁵⁶

79. In compiling Cost of Capital reference points, Brattle also considered investment analysts' reports for acquired companies' (ranging from 7.6 percent to 10.3 percent) and fairness opinions for merger and acquisition transactions involving merchant generation assets (ranging from 7.1 percent to 8.3 percent). The final range of Cost of Capital estimates for a generic merchant generator in PJM is 6.1 percent to 10.3 percent.⁵⁷

80. P3 argues that combustion turbine development is inherently more risky than that of a combined cycle unit. P3's claim, however, is not supported by empirical evidence. In addition, and as PJM notes in its answer, available evidence of the uncertainty of annual energy margins and the total of energy margins and capacity revenues earned by combustion turbine plants and combined cycle plants suggest no significant difference in

⁵⁵ Opinion No. 531, 147 FERC ¶ 61,234 at P 142.

⁵⁶ Additionally, Brattle updated prior estimates (e.g., financial advisor estimates for the 2012 NRG Energy Inc. merger with GenOn Energy) reflecting the February 2014 risk-free rate, which yielded Cost of Capital estimates of 6.2 percent to 11.1 percent.

⁵⁷ See PJM answer at Attachment B (Aff. of Pfeifenberger and Zhou at 4 fig.1); see also *id.* at 11.

risks.⁵⁸ In support of its claim, PJM provides an analysis of the “standard deviations of annual cash flows from energy margins and the total of energy margins and capacity market revenues for the years 2007-13 as reported by PJM’s market monitor, when normalized for the difference in [combustion turbine] and [combined cycle] CONE values, [which] are virtually identical for [combustion turbine] plants (12 percent) and [combined cycle] plants (13 percent) in PJM.”⁵⁹ PJM notes that it is therefore not at all clear that the overall investment risks are different for a combustion turbine plant versus a combined cycle plant. We find, therefore, that PJM’s use of costs attributable to combined cycle and combustion turbine units is reasonable and supported by the record.

81. We concur with Brattle that for a generic merchant project within PJM’s footprint, “the risks would be larger than for the average portfolio of independent power producers that have some long-term contracts and other hedges in place.”⁶⁰ Brattle also notes that merchant projects are able to mitigate *some* risk by arranging “medium-term financial hedging tools.”⁶¹ We find these to be reasonable assumptions that balance the interests of investors and consumers when estimating CONE for a generic merchant plant in PJM. Accordingly, we find a 1.3 percent upward adjustment from 6.7 percent to 8.0 percent, which is “near the mid-point of the range of the additional reference points,” to be just and reasonable.⁶²

82. P3 and Exelon argue that private equity investment in merchant generation, and the asserted lack of diversification that characterizes these firms, warrants PJM’s adoption of a higher Cost of Capital. However, we agree with PJM that private equity consists of portfolios of investments in many different projects in many different industries, and therefore their returns on equity are a poor proxy for determining the cost of capital for a merchant generation facility.⁶³

⁵⁸ *Id.* at Attachment B (Aff. of Pfeifenberger and Zhou at 15 tbl.3).

⁵⁹ *Id.* at Attachment B (Aff. of Pfeifenberger and Zhou at 16).

⁶⁰ Brattle CONE Report at 34.

⁶¹ *Id.* at 34.

⁶² *Id.* at 37.

⁶³ *See* PJM answer at Attachment B (Aff. of Pfeifenberger and Zhou at 14).

83. We reject, as beyond the scope of this proceeding, Exelon's request for a risk premium adjustment to account for forthcoming capacity market changes associated with PJM's Capacity Performance proposal. Exelon's request is based on a proposal that has yet to be filed with the Commission.

84. Finally, we are not persuaded by the PJM Load Group's argument that 7.0 percent is an appropriate Cost of Capital. To derive this figure, the PJM Load Group examined only a portion of Brattle's data – publicly-traded IPPs – and ignored other relevant information, such as fairness opinions for merchant generation divestitures. We do not find this incomplete analysis of Brattle's data demonstrates that 8.0 percent is not just and reasonable. Further, we note that a number of the PJM Load Group's figures are at variance with the Brattle CONE Report, its cited source.⁶⁴

a. Capital Structure

85. To determine an appropriate capital structure, Brattle relies on the five-year debt-equity ratio of each publicly-traded IPP using company 10-K reports for the value of debt and Bloomberg data for the market value of equity.⁶⁵ Such data supports a 60-40 capital structure as reasonable.

86. We find that Exelon and P3 have not shown a 60-40 debt-equity ratio to be unreasonable. Exelon suggests that a 60-percent debt leverage is too high based on its consultant's review of a 2012 Brattle analysis for the Electric Reliability Council of Texas (ERCOT), and historical capacity prices in PJM, which it argues are insufficient to cover the debt service under PJM's proposal.⁶⁶ P3 acknowledges that a 60-40 ratio was recently accepted by the Commission for ISO-NE's CONE values, but argues that ISO-

⁶⁴ The return on equity values listed by Brattle are 11.9 percent, 10.4 percent, and 7.1 percent for Calpine, NRG, and Dynegy, respectively, whereas the return on equity values listed by the PJM Load Group are 11.0 percent, 9.7 percent, and 7.2 percent. The cost of debt values listed by Brattle are 8.7 percent, 7.5 percent, and 8.7 percent for Calpine, NRG, and Dynegy, respectively, whereas the cost of debt values listed by the PJM Load Group are 8.5 percent, 7.0 percent, and 8.5 percent. Finally, the after-tax Cost of Capital values listed by Brattle are 7.8 percent, 6.1 percent, and 6.1 percent for Calpine, NRG, and Dynegy, respectively, whereas the after-tax Cost of Capital values listed by the PJM Load Group are 7.4 percent, 5.7 percent, and 6.3 percent. *Compare* PJM Load Group protest at 13 tbl.1, *with* Brattle CONE Report at 37 tbl.25.

⁶⁵ *See* Brattle 2014 CONE Report at 36.

⁶⁶ *See* Exelon protest at Attachment 1 (Aff. of NorthBridge at 5).

NE's market is materially different than PJM's market, given that it allows new-build generation to secure capacity payments for up to seven years.⁶⁷ P3 argues that Commission precedent supports a lower ratio, and suggests 56-44 as an appropriate ratio.⁶⁸

87. We are not persuaded that reliance on data for ERCOT, which, as an energy-only market, has a market structure that is different from PJM's, is instructive when contemplating an appropriate debt-equity ratio in PJM's capacity market. Among other things, generation resources in PJM rely on a combination of both capacity *and* energy market revenues. Nor do we find compelling Exelon's argument that capacity market revenues are insufficient to cover debt payments, as it ignores energy market revenues.

88. While P3 correctly notes that a 50-50 capital structure has been used in other Commission proceedings,⁶⁹ it can point to no precedent mandating such a capital structure in all cases. Here, PJM proposes a 60-40 capital structure and cites several companies operating in PJM in support of its claim that this capital structure is just and reasonable. Simply because a different capital structure was used in a different FPA section 205 filing, it does not follow that the capital structure proposed by PJM here is not just and reasonable. P3 also argues that Brattle's proposed debt-to-equity ratio is based on combined cycle and combustion turbine units and thus is inappropriate because the latter (PJM's Reference Resource) is a riskier investment. However, as we stated earlier, P3 provides no empirical evidence to support its claim. Therefore, we do not find that it supports a different capital structure. Additionally, while P3 proposes a "risk adjusted" capital structure of 50-50, its own data show that the average debt-equity ratio of new merchant projects in PJM is 58-42, which corroborates Brattle's proposed capital structure.⁷⁰ P3 does not provide an analysis that would justify why a single component of ISO-NE's market design – the option to secure capacity payments for up to seven years – should be the basis for significantly different capital structures in PJM.

⁶⁷ See P3 protest at 9 and Attachment 1 (Aff. of Ryan Hardy and Mark Repsher at P 11.d).

⁶⁸ See P3 protest at Attachment 1 (Aff. of Ryan Hardy and Mark Repsher at 11).

⁶⁹ *Id.* at 8-9 (citing *New York Independent System Operator, Inc.*, 146 FERC ¶ 61,043 (2014)).

⁷⁰ *Id.* at Attachment 2 (Aff. of James A. Heidell and Mark Repsher at 8 tbl.3, col. G and col. H).

b. Costs of Debt and Equity

89. We now turn to PJM's proposed 7.0 percent cost of debt and 13.8 percent cost of equity, as supported by the Brattle CONE Report. Brattle asserts that a representative project could reasonably couple a 7.0 percent cost of debt with a 60-40 debt-equity capital structure, which, when considered in conjunction with a return on equity of 13.8 percent results in an overall Cost of Capital of 8.0 percent.

90. P3 argues that Brattle's 7.0 percent cost of debt is too low, and identifies eight recent merchant projects in PJM and their associated debt costs in support. P3 argues that 8.5 percent is appropriate, because it is halfway between the midpoint and the top of the zone of reasonableness, "as highlighted in FERC [Opinion No.] 531."⁷¹ However, as noted previously, Opinion No. 531 made no such finding with respect to debt costs and P3's assertion to the contrary is inaccurate. Moreover, Opinion No. 531 concerned return on equity calculated using a discounted cash flow model and reflecting circumstances unique to that proceeding. Finally, P3's own data shows that since 2011, the average cost of debt for merchant projects is 7.1 percent, which corroborates Brattle's figure.⁷²

91. With respect to return on equity, P3 proposes a proxy group that includes, *inter alia*, private equity index funds with returns as high as 19.7 percent.⁷³ However, as PJM notes in its answer, private equity funds' returns on equity are a poor proxy for determining the cost of capital for a merchant generation facility because these funds "consist of portfolios of investments in many different projects in many different industries."⁷⁴ We agree, and find that a proxy group containing private equity index funds does not provide an adequate showing that the instant filing fails to meet its FPA section 205 burden.

92. Brattle explains that in order to properly estimate CONE, it needs to "quantify interest during construction and depreciable capital costs," and therefore must make specific recommendations regarding the cost of debt, cost of equity, and capital structure that are consistent with the assumption that an overall 8.0 percent Cost of Capital is

⁷¹ See P3 protest at Attachment 2 (Aff. of James A. Heidell and Mark Repsher at 5).

⁷² *Id.* at Attachment 2 (Aff. of James A. Heidell and Mark Repsher at 11 tbl.2E)

⁷³ *Id.* at Attachment 2 (Aff. of James A. Heidell and Mark Repsher at 15 tbl.3).

⁷⁴ See PJM answer at Attachment B (Aff. of Pfeifenberger and Zhou at 19).

reasonable.⁷⁵ Brattle notes that there are many combinations of these three components that would yield the same Cost of Capital and that after proposing a 60-40 capital structure and 7.0 percent cost of debt, “the third component – our recommended 13.8 percent cost of equity – could be calculated to yield an 8 percent overall [Cost of Capital].”⁷⁶

93. Having found 8.0 percent to be a reasonable Cost of Capital for a generic merchant plant in PJM, as it is near the midpoint of the range of available reference points, and also that a 60-40 capital structure and a 7.0 percent debt cost are supported by the data, we agree with Brattle that “a 13.8 percent cost of equity [is] a return commensurate with assumed leverage and what could be expected by merchant actors that are not guaranteed cost recovery[.]”⁷⁷ We find this assumption to be reasonable, and note that it is consistent with our finding that merchant generators have greater risk than publicly-traded IPPs, and therefore a Cost of Capital higher than those of IPPs – including the equity component – is justified.

94. In sum, we find PJM’s proposal, as supported by Brattle, to be based on transparent data and reasonable assumptions that balance consumer and investor interests. Accordingly, we find that 8.0 percent is a just and reasonable Cost of Capital for a generic merchant generator in PJM.

C. Labor Inputs

95. PJM’s Gross CONE values are based, in part, on an estimation of construction labor inputs, including base wage levels and fringe costs, such as taxes, benefits, and workers’ compensation.

1. PJM’s Proposal

96. PJM proposes to adopt an estimate that varies from that recommended by Brattle. Specifically, PJM proposes to utilize an estimate sponsored by the Market Monitor in connection with its preparation of its annual State of the Market Report, and based on PJM’s own review of the relevant data. PJM asserts that the Market Monitor’s estimate is supported by publicly-available data on wage rates and prior CONE studies.

⁷⁵ *Id.* at Attachment B (Aff. of Pfeifenberger and Zhou at 12).

⁷⁶ *Id.*

⁷⁷ PJM answer at 31.

97. PJM states that its labor estimate is based on a projection of labor hours and unit labor costs, by CONE Area. PJM adds that to determine the cost in 2018 dollars, an annual escalation factor of 3.75 percent was used. To verify the reasonableness of these estimates, PJM states that these estimates for CONE Area 1 were compared to the CONE Area 1 estimates provided in Brattle's second triennial review CONE Study. PJM further states that its labor estimate was appropriately weighted based on wages and anticipated fringe costs (e.g., taxes, benefits, and workers' compensation). In addition, PJM states that the resulting fringe costs and labor hours were adjusted by a productivity factor of 1.16 percent.⁷⁸

2. Protests and Comments

98. P3, EPSA, the Public Utilities Coalition, and PSEG challenge PJM's proposed labor costs. EPSA characterizes PJM's proposed costs as unsupported, and notes that PJM's claimed costs are lower than those identified by Brattle. The Public Utilities Coalition questions PJM's basis for rejecting Brattle's estimates. P3 adds that PJM's support for its proposed labor cost adjustment relies on a key input that is not a part of the record, and does not reflect the actual experience of companies engaged in construction of generating facilities within the PJM footprint, including CONE Area 1. In addition, P3 asserts that PJM's adjustment understates effective hourly wage rates, overstates reasonably expected productivity levels, and understates the basic number of hours required to construct the reference combustion turbine unit.

99. The PJM Load Group supports PJM's proposed use of the Market Monitor's labor cost inputs. The PJM Load Group asserts that the Market Monitor's estimates are superior to those relied upon by Brattle, given that they can be nearly reproduced using publicly-available data and incorporate what PJM has learned over time from both current and past CONE studies.

3. Answers

100. P3, in its October 31, 2014 answer, responds to the arguments raised by the PJM Load Group, in support of PJM's proposed labor inputs. P3 characterizes these arguments (and PJM's underlying recommendation to reject Brattle's labor inputs) as

⁷⁸ Dr. Sotkiewicz states that standard practice in estimating construction labor costs is to measure "labor productivity" by region relative to a benchmark area, and that labor productivity greater than one usually accounts for items such as regional practices that could increase the effective labor cost either through labor rates or labor hours required. PJM filing, Attachment C (Aff. of Dr. Paul M. Sotkiewicz at P 43).

unsupported. P3 concludes that Brattle's numbers are more realistic and should be utilized. In the alternative, P3 asserts that PJM's proposal raises disputed issues of material fact for which hearing procedures are required.

101. PJM, in its answer, characterizes intervenors' protest arguments as unsupported. PJM states that its proposal adopted the Market Monitor's labor inputs as part of a good faith effort during the stakeholder process to resolve differences between two credible expert CONE estimates.

102. PJM also responds to P3's arguments that PJM's proposed labor inputs fail to account for overtime costs, contain too few labor hours, and rely on an inflated productivity factor. PJM argues that P3's charges are based on its consultant's review of CONE Area 1 alone, in New Jersey, and thus cannot support a finding that PJM's overall CONE estimates for CONE Areas 2 through 5, are unjust and unreasonable. With respect to CONE Area 1, PJM challenges P3's assertions regarding overtime costs, given the contrary U.S. Bureau of Labor Statistics information on utility construction compensation in New Jersey, which includes data on overtime pay. Similarly, with respect to labor hours, PJM asserts that P3's estimates are derived from three relatively small projects for a PSEG affiliate and thus fail to account for the economies of scale reflected in PJM's estimate. With respect to an appropriate productivity factor, PJM asserts that P3's proposed factor of 1.21 (as compared with PJM's proposed factor of 1.16) would increase the overall CONE estimate for CONE Area 1 by less than 0.5 percent and thus cannot support a finding that PJM's figure is outside the zone of reasonableness.

103. P3, in its November 17, 2014 answer, responds to PJM's rebuttal arguments in its answer to intervenors' protests. P3 argues that PJM's conclusions are flawed, based on its reliance on aggregated data and use of inconsistent base case hours. P3 concludes that PJM has not justified its use of the Market Monitor's labor inputs

4. Commission Determination

104. For the reasons discussed below, we accept PJM's proposed labor cost estimates, for use in calculating PJM's Gross CONE values. Specifically, we accept PJM's use of the Market Monitor's inputs as just and reasonable.

105. As a threshold matter, we note that, in deriving these inputs, PJM considered publicly-available data on wage rates and labor estimates from its previous CONE studies. PJM also considered the publicly-available census data, as compiled by the U.S. Bureau of Labor Statistics, addressing employment and wages for utility construction workers, as adjusted for inflation, fringe benefits, and labor productivity factors.

106. PJM's proposed labor construction values closely track publicly-available data and thus have the benefit of being transparent. PJM also explains that it compared its

proposed labor cost estimates against the values developed in its 2011 CONE Study. Developing appropriate labor cost estimates requires judgment in balancing factors at play, including the validity and transparency of the data used to develop the estimates. In this instance, PJM has developed estimates that rely on, to the greatest extent possible, publicly available data and perform well when compared to labor cost estimates used in previous years.

107. We disagree with intervenors' assertion that PJM's labor inputs are unsupported. PJM's proposal reflects its careful review of the Market Monitor's labor cost estimates, including a comparison against prior labor cost estimates and public data on labor costs, and represents a reasonable alternative estimate for construction labor costs. In addition, PJM's proposed labor costs, as derived by the Market Monitor's consultants, are consistent with the labor hours and labor costs for CONE Area 1 (EMAAC), the area typically with the highest CONE estimates, as derived by Brattle's 2011 CONE Study.

108. We also disagree that PJM did not have a sufficient basis to depart from Brattle's recommendations. First, we note that PJM is not required to follow Brattle's recommendations. Moreover, PJM reviewed the market monitor's estimate of construction labor and found that it was consistent with public information on utility construction labor costs. Dr. Sotkiewicz notes that the values closely track data from the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages associated with utility construction wages, the same data PJM uses to adjust the labor portion of costs. That the data source is the same as, and will be consistent with, that used to make periodic adjustments to CONE values is a convincing justification for using the data in this case.

109. P3 takes issue with several specific aspects of PJM's proposal, including PJM's estimates relating to productivity. We agree with PJM, however, that PJM's productivity values are consistent with labor productivity factors as used in Brattle's 2011 CONE Study for CONE Areas 1, 3, and 4, but are also higher than those assumed by the 2011 CONE Study for CONE Areas 2 and 5 where the productivity factor was assumed to be "1." Given that the construction labor costs are quite close to those relied upon by the Market Monitor, we do not find that PJM's proposed labor cost estimates, including its proposed productivity levels, are unreasonable. Finally, we agree with PJM that the difference between these productivity factors is not relevant in establishing an appropriate CONE estimate.⁷⁹

⁷⁹ See PJM answer at Attachment C (Aff. of Paul M. Sotkiewicz at P 10).

D. Inflation Adjustments

110. PJM's OATT requires Gross CONE values to be adjusted annually, based on the most recent 12-month rate of change published in the Handy-Whitman Index of Public Utility Construction Costs (Handy-Whitman Index).⁸⁰

1. PJM's Proposal

111. PJM asserts that the Handy-Whitman Index has differed significantly from other measures of cost trends for electric generation plants and has likely overstated industry costs. Accordingly, PJM proposes to utilize, as a replacement index, a weighted composite index of wage, materials, and turbine costs, as published by the U.S. Bureau of Labor Statistics (BLS Composite Index).⁸¹ PJM asserts that, in comparison to the Handy-Whitman Index, its proposed use of this composite index offers greater transparency to market participants, is better tailored to the relevant cost inputs reflected in its CONE values, and tracks more closely with other independent estimates. PJM further asserts that use of the BLS Composite Index is generally consistent with the practice now followed by ISO-NE.⁸² PJM notes the Handy-Whitman Index appears to have escalated at a rate greater than is warranted, and has likely overstated costs as compared to those suggested in recent CONE studies. Specifically, the Handy-Whitman Index continued to rise during the last recession, while wages, material and turbine costs saw a flattening or decline in prices during the recession and afterward.⁸³

⁸⁰ PJM OATT, Attachment DD, § 5.10(a)(iv)(B). Beginning with the 2013-14 delivery year, the Handy-Whitman Index has been used by PJM to update its benchmark Gross CONE values. The applicable index used to adjust PJM's Gross CONE values, by CONE Area, is the most recently published 12-month change in the Total Other Production Plant Index. Within this index, PJM uses the North Atlantic Region, for CONE Areas 1, 2, and 4; the North Central Region, for CONE Area 3; and the South Atlantic Region, for CONE Area 5.

⁸¹ *Id.* at proposed § 5.10(a)(iv)(B). The BLS Composite index employs underlying cost data from the Producer Price Index and wage data from the Quarterly Census of Employment and Wages.

⁸² PJM filing at 36 (citing *ISO-NE Demand Curve Order*, 147 FERC ¶ 61,173 at P 40).

⁸³ *Id.*

2. Protests and Comments

112. Comments generally supportive of PJM's proposal were filed by the PJM Load Group. The PJM Load Group supports PJM's proposed use of the BLS Composite Index, given the substantial variance between Handy-Whitman Index assumptions of construction cost estimates for electric generation facilities and other relevant indices.

113. The Public Utilities Coalition objects to PJM's proposed change from using the Handy-Whitman Index to the BLS Composite Index. The Public Utilities Coalition asserts that the Handy-Whitman Index has been used by PJM for several years and questions a switch from this long-standing index based on the asserted relevance of data from years that have been economically turbulent. The Public Utilities Coalition states that data supplied by the Handy-Whitman Index was roughly in line with the cost estimates provided by the BLS Composite Index until the beginning of the national economic downturn in the late 2000s. The Public Utilities Coalition further argues that, by shifting to the BLS Composite Index at a time when many economic indicators are pointing towards more robust economic growth, PJM's updated CONE values may result in underestimated construction costs.

3. Answers

114. PJM, in its answer, responds to the Public Utilities Coalition argument that use of the BLS Composite Index may result in underestimated construction costs. PJM argues that the Public Utilities Coalition provides no support for its claim and thus no basis to refute Brattle's analysis.

4. Commission Determination

115. For the reasons discussed below, we accept PJM's proposal to adjust its Gross CONE values, on an annual basis, using the BLS Composite Index in place of the Handy-Whitman Index. The purpose of the CONE adjustment index is to conform Gross CONE values to year-to-year changes in capital and fixed costs, even during years that may have been economically turbulent. Unlike the Handy-Whitman Index, the BLS Composite Index takes into account three major cost categories associated with the construction of the combustion turbine reference resource: turbines, material, and labor. As Dr. Sotkiewicz explains, the proposed index matches more closely than the Handy-Whitman Index to Energy Information Administration studies on capital costs for new-build generation resources and to previous PJM triennial review CONE study values.⁸⁴ We agree with PJM that this proposed OATT revision will allow for the annual adjustments

⁸⁴ See PJM filing, Attachment C (Aff. of Dr. Paul M. Sotkiewicz at PP 50-52).

to CONE values to better reflect changes in applicable industry costs, and is just and reasonable.

E. Location-Specific Net CONE Values

116. As summarized above, the price points reflected in PJM's VRR Curve represent multiples or fractions of the Net CONE, a value calculated as Gross CONE minus energy and ancillary services revenues (EAS Offset).⁸⁵ In addition to its use of a region-wide Net CONE, for use in a region-wide VRR Curve, PJM can also establish a separate VRR Curve for constrained Locational Deliverability Areas.⁸⁶ For this purpose, PJM calculates a location-specific Net CONE for each of its CONE Areas. Under PJM's OATT, the Net CONE value for each Locational Deliverability Area is based on the zones that comprise that Locational Deliverability Area and each zone is assigned to a CONE Area.⁸⁷ PJM calculates a Net CONE value for each of the identified CONE Areas for which a Gross CONE is determined.⁸⁸ If a Locational Deliverability Area is composed of zones from more than one CONE Area, the lowest Net CONE value, as between these CONE Areas, is used for that Locational Deliverability Area.⁸⁹

1. PJM's Proposal

117. PJM proposes two changes to more closely align location-specific Net CONE values with the market conditions in the relevant Locational Deliverability Area zone or zones. First, PJM proposes to align the EAS Offset with the applicable Gross CONE for a given Locational Deliverability Area. Specifically, PJM proposes to calculate a Net CONE for each zone using the applicable Gross CONE value less the EAS Offset estimate determined for that zone.⁹⁰ To do so, PJM proposes to use the average hourly Locational Marginal Price for that zone and that zone's posted fuel pricing point, or, if

⁸⁵ See PJM OATT, Attachment DD, § 2.42. The EAS Offset is an estimate of the net revenues (or operating margins) that the Reference Resource would earn based on its participation in PJM's energy and ancillary services markets.

⁸⁶ *Id.* § 5.10(a)(ii).

⁸⁷ *Id.* § 5.10(a)(iv)(A).

⁸⁸ *Id.* § 5.10(a)(v)(B).

⁸⁹ *Id.* § 5.10(a)(ii).

⁹⁰ *Id.* at proposed § 5.10(a)(ii).

such a pricing point is not available, a fuel transmission adder appropriate to that zone from within the PJM region.⁹¹

118. PJM states that the Net CONE values for each zone will then be used to determine the Net CONE value for each Locational Deliverability Area that contains such zone. PJM proposes to use a simple average of the Net CONE values for all zones in the Locational Deliverability Area, for Locational Deliverability Areas composed of multiple zones. For zonal or sub-zonal Locational Deliverability Areas, PJM proposes to use the Net CONE calculated for that zone. PJM states that, currently, the price signals sent for modeled Locational Deliverability Areas do not best reflect the localized need for capacity in that area, but rather reflect the need for capacity on a broader scale. In addition, PJM states that its current rules do not allow for the use of EAS Offsets that are representative of the economic conditions within the modeled Locational Deliverability Area.

119. PJM also proposes that Net CONE for a Locational Deliverability Area be no less than the Net CONE determined for any other Locational Deliverability Area in which the former resides (i.e., a floor would prevent Net CONE in a sub-Locational Deliverability Area from falling below that of its parent or other higher-level area). PJM asserts that imposing such a floor should minimize the impact of underestimating a location-specific Net CONE.⁹² PJM further argues that developers will most likely build in the sub-Locational Deliverability Area given its lower net costs such that, over time, the area will be unlikely to price-separate from the parent Locational Deliverability Area. PJM adds that underestimating Net CONE in a sub-Locational Deliverability Area could result in under-procurement of needed capacity resources in that area, a result that would lead to disproportionately high reliability consequences in that area.

2. Protests and Comments

120. The Public Utilities Coalition supports PJM's proposal to align Net CONE more closely with energy conditions in each Locational Deliverability Area, but urges the Commission to require PJM to apply the same underlying logic to the Rest-of-Market area of PJM.

⁹¹ *Id.* at proposed § 5.10(a)(iv)(A). PJM notes that for its last base residual auction, PJM calculated a total of seven different Net CONE values: a region-wide Net CONE, a Net CONE for each of its five CONE Areas, and a Net CONE for the MAAC region (composed of CONE Areas 1 and 4).

⁹² *See* PJM filing, Attachment E (Aff. of Newell-Spees at 9).

121. The Public Utilities Coalition further notes that the EAS Offset currently reflected in the VRR Curve for this area is calculated based on region-wide market prices, including areas within PJM where EAS revenues are higher due to congestion. The Public Utilities Coalition asserts that suppliers in the unconstrained, Rest-of-Market region do not receive this level of revenue, a circumstance that leads to distorted Net CONE values. The Public Utilities Coalition claims that this is so, because there is an excessive offset applied to the Gross CONE in the Rest-of-Market area.⁹³

122. The Maryland Commission and the PJM Load Group object to PJM's proposed establishment of the parent-Locational Deliverability Area Net CONE as a minimum for the Net CONE for the sub-Locational Deliverability Area. The Maryland Commission argues that while this revision may produce higher prices, that rationale alone is insufficient to support PJM's proposed revision. The PJM Load Group adds that, while it supports PJM's proposed method of aligning net EAS revenue offset for a Locational Deliverability Area, PJM's proposal to set the Locational Deliverability Area Net CONE to the greater of the Locational Deliverability Area Net CONE and any parent Locational Deliverability Area Net CONE should be rejected, given that it would result in unwarranted increased payments to generators and would operate to disconnect costs and/or revenues from the areas to which they can be attributed.

123. The PJM Load Group also challenges PJM's claim that its proposal is required to reduce the risk of underestimating a location-specific Net CONE. The PJM Load Group argues that if a small Locational Deliverability Area has non-price barriers to new entry, the extra price signal will be unwarranted and future price separation cannot be assumed away. In addition, the PJM Load Group asserts that PJM's auction parameters already rely on conservative assumptions.

3. Answers

124. PJM, in its answer, responds to the PJM Load Group argument that using the parent-Locational Deliverability Area's Net CONE value for clearing a sub-Locational Deliverability Area will effectively result in excessive payments to generators, given that nested Locational Deliverability Areas have not been shown to require additional price signals. PJM argues that locational price signals are fundamental to the efficient operation of its capacity market and that the lack of such locational price signals was a

⁹³ The Public Utilities Coalition notes, for example, that for the 2017-18 delivery year, the EAS Offset for the Rest-of-Market area was \$22,423 per MW-year, while an offset based on prices that suppliers in this area would have actually expected to receive would have been only \$14,960 per MW-year.

key factor in the Commission's finding in the *PJM 2006 Order* that PJM's prior resource adequacy model was unjust and unreasonable.⁹⁴ PJM adds that the PJM Load Group's argument does not address, or otherwise refute, the rationale underlying PJM's proposal, i.e., the fact that small Locational Deliverability Areas are vulnerable to Net CONE estimation error due small sample size and idiosyncratic factors.

4. Commission Determination

125. For the reasons discussed below, we conditionally accept, subject to compliance, PJM's proposed location-specific Net CONE revisions. We accept PJM's proposed revision to calculate a Net CONE for each zone using the applicable Gross CONE value less the EAS Offset estimate determined for that zone by using the average hourly Locational Marginal Price for that zone and that zone's posted fuel pricing point, or, if such a pricing point is not available, a fuel transmission adder appropriate to that zone from within the PJM region. We also accept PJM's proposal to use the Net CONE values for each zone to determine the Net CONE value for each Locational Deliverability Areas that contains such zone.

126. We also find to be just and reasonable PJM's proposal to use a simple average of the Net CONEs for all zones in the Locational Deliverability Area for Locational Deliverability Areas composed of multiple zones. We acknowledge that the existing method may result in many single-zone Locational Deliverability Areas having a Net CONE parameter based on energy prices in a different location, which is not necessarily representative of the Locational Deliverability Area and may result in systemic discrepancies between the administratively-estimated and true developer Net CONE in these areas. For these reasons we find that using a simple average to alleviate this discrepancy is justified.

127. However, we will reject PJM's proposal to require that the Net CONE for a sub-Locational Deliverability Area be no less than the Net CONE for any other Locational Deliverability Area in which the sub-Locational Deliverability Area resides. Based on the arguments presented by PJM, we find that PJM has not demonstrated why it is just and reasonable to establish its proposed floor for Net CONE in congested sub-Locational Deliverability Areas. We agree with the PJM Load Group that this proposal could operate to disconnect costs and/or revenues from the areas to which they can be attributed, particularly given that generators in a congested area may receive higher energy market revenues than in uncongested areas, thereby warranting a larger EAS Offset in the congested area. Accordingly, we conditionally accept PJM's proposal

⁹⁴ See PJM answer at 45 (citing *PJM 2006 Order*, 117 FERC ¶ 61,331 at P 50).

subject to PJM submitting, in a compliance filing due within 30 days of the date of this order, revised tariff sheets to remove this proposal from its tariff.

128. Finally, we reject the Public Utilities Coalition's request that the Commission require PJM to apply its proposed location specific Net CONE approach to the Rest-of-Market area, i.e., to CONE Area 3. As PJM points out in its answer, before an auction is run, it is not known which Locational Deliverability Areas will price-separate, and therefore which remaining part of the region will be subject to the default PJM region rate.⁹⁵ The PJM region-wide rate should therefore take into account all potential energy revenues throughout the PJM region. The Public Utilities Coalition has failed to demonstrate how this existing tariff provision is unjust and unreasonable.

F. Levelization

129. In calculating its Gross CONE values, PJM currently utilizes a nominal levelized financial model reflecting annual project costs, including return on capital, on a levelized basis.⁹⁶ PJM proposes to retain its existing levelization approach and thus rejects Brattle's recommendation that PJM adopt a real-levelized approach.⁹⁷

1. Protests and Comments

130. The Maryland Commission objects to PJM's proposed retention of the nominal levelized financial model to determine updated CONE values. The Maryland Commission argues that this accounting methodology, as applied to Gross CONE determinations, overcharges end-users, while allowing for the over-recovery of generation costs by investors. Specifically, the Maryland Commission, citing Brattle, notes that a cost allowance included in a Gross CONE determination based on nominal

⁹⁵ See PJM answer at 51-52.

⁹⁶ The real levelized approach produces lower numbers in the early years of a project's life and higher numbers in the later years – as compared to the nominal levelized approach – by assuming that plant revenue requirements will increase each year to reflect a 2.5 percent annual increase in operating expenses. The nominal levelized approach, on the other hand, expresses the stream of payments as the same amount, regardless of inflation, and thus will not increase over the life of the project. PJM notes that the Commission has previously accepted this approach. See PJM filing at 31 (citing *PJM Interconnection, L.L.C.*, 135 FERC ¶ 61,022 (2011) (PJM 2011 Order)).

⁹⁷ PJM argues that Brattle's approach fails to account for real world risks and uncertainties that can cause project developers to hold back on their investments, if they are not assured of a satisfactory revenue stream. *Id.*

levelization is approximately 15 percent higher than the “level real” accounting method. The Maryland Commission further argues that the nominal levelized approach, which focuses on the initial year of a plant’s operation, is inconsistent with other facets of PJM’s capacity market design, including PJM’s historical EAS Offset methodology. Accordingly, the Maryland Commission urges the Commission to require PJM to adopt the “level real,” as recommend by Brattle, and as currently utilized by both NYISO and ISO-NE.

2. Answers

131. PJM, in its answer, characterizes the Maryland Commission’s objection to PJM’s proposed continued use of the nominal levelized financial modeling approach as beyond the scope of its FPA section 205 proposal.

132. PJM argues that, regardless, the Maryland Commission’s proposed use of the real-levelized approach would not address its asserted inconsistencies and inequities. Specifically, PJM asserts that use of the real-levelized approach would deprive a merchant generator of the opportunity to obtain the benefit of the relatively higher, later-life cost values available under the real-levelization approach. In addition, PJM asserts that, because both the nominal-levelized approach and the real-levelized approach are forward-looking, both approaches are equally “inconsistent” with PJM’s EAS Offsets methodology. PJM adds that the nominal-levelized approach is better suited to meet PJM’s resource adequacy goals by providing greater certainty about project revenues early in the project life and thus is more likely to attract new entry when it is actually needed.

3. Commission Determination

133. We find PJM’s continued use of nominal levelization just and reasonable, given that it reflects the Commission’s prior finding that such a method is reasonable for modeling a new entrant’s revenue streams. Contrary to the Maryland Commission’s arguments, the fact that Brattle used a different methodology does not render PJM’s choice unjust and unreasonable.⁹⁸ We note, moreover, that PJM does not propose to

⁹⁸ *PJM Interconnection, L.L.C.*, 137 FERC ¶ 61,145 at P 32 (2011) (“We found in the April 12 Order, and we continue to find here, that the nominal levelized method is a just and reasonable method of modeling a competitive bid, in part because it is a reasonable method of modeling a competitive first-year offer based upon typical cash flow streams associated with financing. We reaffirm our findings that nominal levelization is consistent with the VRR Curve parameters . . .”).

revise this provision of its OATT, so challenges to that provision are therefore beyond the scope of this proceeding.⁹⁹

G. EAS Offsets

134. To calculate a Net CONE value that accurately reflects the amount a supplier must recover in PJM's capacity market to provide revenue adequacy over time, PJM proposes to retain its existing OATT provision, which requires PJM to estimate a supplier's expected net earnings from PJM's energy and ancillary markets, as based on: (i) actual Locational Marginal Prices and fuel prices for the most recent three calendar years; (ii) the heat rate of the Reference Resource; and (iii) peak-hour dispatch.¹⁰⁰

1. Protests and Comments

135. The Market Monitor, P3, and PSEG generally support PJM's proposed continued use of EAS Offsets, as calculated on the basis of an historical rolling three-year average.¹⁰¹

⁹⁹ As noted above, where a tariff provision has been accepted as just and reasonable and is not being revised in a filing submitted for our review under FPA 205, the Commission, in addressing that filing, can exercise its authority, under FPA section 206 to change that existing tariff provision only upon a showing that the provision is unjust and unreasonable. *Northern Border Pipeline*, 74 FERC ¶ 61,214 at 61,696.

¹⁰⁰ As noted above, PJM refers to this estimate as its EAS Offset. PJM proposes to retain its existing historic net EAS Offset methodology, in place of Brattle's recommendation that options be considered for incorporating future prices for fuel and electricity into this methodology, including the option of using publicly-available futures prices. PJM states that, while it supports a forward-looking net EAS Offset approach, its stakeholders were unable to reach a consensus on any given alternative to PJM's existing mechanism. PJM adds that one recurring concern is whether forward markets, particularly three-year forward markets, have enough liquidity to permit their pricing to be used with confidence as a VRR Curve input.

¹⁰¹ The Market Monitor asserts that this methodology is appropriate, given that a reliable forward-looking approach has not yet been fully reviewed by PJM's stakeholders. The Market Monitor notes, however, that a forward-looking approach, based on market data, would be preferable because it would reflect market views of expected prices and revenues.

136. The Ohio Commission objects to PJM's proposed continued use of historical data. The Ohio Commission argues that this approach is not representative of evolving market conditions, due to a four to six year delay between the historical years and the relevant delivery year.

137. The Public Utilities Coalition supports PJM's proposed continued use of historical values for the calculation of EAS Offsets, but urges the Commission to require PJM to calculate EAS Offsets for the Rest-of-Market area of PJM based on Rest-of-Market prices. The Public Utilities Coalition argues that calculating these offsets based on total market-wide prices, as is currently done, is inappropriate, given that, for certain suppliers, these offsets are overstated. The Public Utilities Coalition claims that, as such, PJM's proposal adversely affects Rest-of-Market suppliers.

2. Answers

138. PJM, in its answer, characterizes intervenors' objections to PJM's proposed continued use of its existing approach to determining EAS Offsets as beyond the scope of its FPA section 205 proposal.

139. PJM argues that, regardless, intervenors fail to offer a viable replacement mechanism. PJM asserts that any such mechanism must be transparent, reproducible, and reliable in order to provide PJM and the market sufficient assurance that it will consistently produce just and reasonable results. PJM also responds the Public Utilities Coalition request that PJM be required to calculate EAS Offsets for the Rest-of-Market area of PJM based on Rest-of-Market prices. PJM argues that the fact that PJM's region-wide energy revenue calculation is based on energy revenues in the entire region, instead of those areas in which the Public Utilities Coalition's members do business, does not demonstrate that PJM's existing region-wide calculation is unjust and unreasonable.

3. Commission Determination

140. We reject as beyond the scope the requests made by the Ohio Commission and the Public Utilities Coalition that PJM be required to revise its existing EAS Offsets methodology. The existing historic EAS Offset calculation methodology has previously been accepted as just and reasonable, and PJM does not seek to revise it in this section 205 proceeding.

141. The Public Utilities Coalition argues that EAS Offsets for the Rest-of-Market area should be calculated based on Rest-of-Market area prices, rather than total region-wide prices.¹⁰² This method is unchanged from what is currently on file for those delivery years and, noting our precedent in *Northern Border Pipeline*, is not at issue here.¹⁰³ PJM proposes, for the 2018-19 delivery year and subsequent delivery years, to determine a Net EAS Offset each year for each zone using: (i) the average hourly Locational Marginal Prices for each zone in place of the PJM region's average hourly Locational Marginal Prices; and (ii) a posted fuel price for each zone. It is unclear, and the Public Utilities Coalition has insufficiently demonstrated, how or to what extent a specific, proposed OATT provision is unjust and unreasonable.

142. Likewise, the Ohio Commission objects to PJM's proposed continued use of historical data for EAS Offset calculations, a method that is unchanged from what is currently on file, and not at issue here.

H. Additional Issues

143. The PJM Load Group, NC Cooperative, and the Illinois Commission argue that it is premature to consider PJM's filing, citing potential, related market changes now being considered by PJM's stakeholders. The Illinois Commission asserts that there are numerous proposed and potential modifications that would directly affect the operation of PJM's capacity market, as well as possible unintended consequences of proceeding with PJM's filing here as a stand-alone proposal.

144. We reject intervenors' request that we defer ruling on PJM's filing. For the reasons discussed above, we have found that PJM's proposed tariff revisions are just and reasonable. To the extent future proposed revisions affect the provisions accepted here, parties may raise relevant arguments at that time.

¹⁰² PJM's proposed OATT revisions clarify that for the incremental auctions for delivery years 2015-16, 2016-17, and 2017-18, PJM will use the same calculations of the sub-regional EAS Offsets that were used in the base residual auctions for such delivery years and sub-regions. See PJM proposed OATT, Attachment DD at § 5.10(a)(v)(B).

¹⁰³ *Northern Border Pipeline*, 74 FERC ¶ 61,214 at 61,696.

The Commission orders:

PJM's proposed tariff revisions are hereby conditionally accepted subject to the submission of a compliance filing within 30 days of the date of this order, to become effective December 1, 2014, as discussed in the body of this order.

By the Commission.

(S E A L)

Nathaniel J. Davis, Sr.,
Deputy Secretary.

Appendix

List of Intervenors

American Electric Power Service Corporation * (Public Utilities Coalition)
American Municipal Power, Inc. * (PJM Load Group)
American Public Power Association * (PJM Load Group)
Calpine Corporation
DC Office of the People's Counsel * (PJM Load Group)
The Dayton Power and Light Company * (Public Utilities Coalition)
Delaware Division of the Public Advocate * (PJM Load Group)
Delaware Public Service Commission * (PJM Load Group)
Dominion Resources Services, Inc.
Dynegy Inc.
Duke Energy Corporation * (Public Utilities Coalition)
Duquesne Light Company * (PJM Load Group)
East Kentucky Power Cooperative, Inc. * (Public Utilities Coalition)
Electric Power Supply Association * (EPSA)
EnergyConnect, Inc.
Exelon Corporation * (Exelon)
FirstEnergy Service Company * (Public Utilities Coalition)
Illinois Commerce Commission
LS Power Associates, L.P.
Maryland Office of People's Counsel * (PJM Load Group)
Maryland Public Service Commission * (Maryland Commission)
Monitoring Analytics, LLC, acting as PJM's independent market
monitor (Market Monitor)
NRG Companies
New Jersey Board of Public Utilities * (PJM Load Group)
New Jersey Division of Rate Counsel * (PJM Load Group)
NextEra Energy Resources, LLC
North Carolina Electric Membership Corporation *
(PJM Load Group) (NC Cooperative)
Ohio Consumers' Counsel * (PJM Load Group)
Old Dominion Electric Cooperative * (PJM Load Group)
Panda Power Generation Infrastructure Fund, LLC ** (Panda)
Pennsylvania Office of Consumer Advocate * (PJM Load Group)
PJM Industrial Customer Coalition * (PJM Load Group)
PJM Power Providers Group * (P3)
PSEG Companies (PSEG)
Public Power Association of New Jersey * (PJM Load Group)
Public Utilities Commission of Ohio * (Ohio Commission)
Rockland Electric Company * (PJM Load Group)

Southern Maryland Electric Cooperative, Inc. * (PJM Load Group)
West Virginia Consumer Advocate * (PJM Load Group)

* Entities submitting protests or comments.

** Entities submitting motions to intervene out-of-time.