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August 26, 2011

PJM Membership / Stakeholders

Re: Triennial Review RPM VRR Curve and its Key Parameters

Dear PJM Members:

In accordance with its tariff, PJM has reviewed the shape and certain key parameters of the Variable Resource Requirement Curve ("VRR Curve") that is used to clear the Reliability Pricing Model ("RPM") auctions and, based on that review, recommends certain changes to the curve and those parameters. These recommendations are the initiation a tariff-prescribed process of stakeholder and PJM Board review, with any tariff changes resulting from that process for use in next year's Base Residual Auction ("BRA") to be filed with the Federal Energy Regulatory Commission ("FERC") by December 1, 2011.

Specifically, section 5.10(a) of Attachment DD of the PJM Open Access Transmission Tariff ("Tariff") requires that PJM conduct a review, for the Delivery Year beginning June 1, 2015, of 1) the shape of the VRR Curve;¹ 2) the Cost of New Entry ("CONE") values for each CONE Area used in the VRR Curve;² and 3) the method to calculate the net Energy and Ancillary Services revenue ("EAS") offset used in the VRR Curve.³ PJM's review of the VRR Curve is to be "based on simulation of market conditions to quantify the ability of the market to invest in new Capacity Resources and to meet the applicable reliability requirements on a probabilistic basis."⁴

If PJM determines changes are needed, it must post its recommended changes to the VRR Curve, CONE values, or EAS method on or before September 1 in order for the changes to be considered for filing to be applicable for the next Base Residual Auction, in this case for the 2015-16 Delivery Year. PJM must then "review the recommendation[s] through the stakeholder process to solicit stakeholder input."⁵ PJM Members then have until the October 31 preceding such BRA to "vote to endorse the proposed modification, to propose alternate modifications or to recommend no modification."⁶ The PJM Board then shall consider proposed modifications, and PJM will file any approved modifications with FERC by the December 1 preceding the BRA.

The BRA for the 2015-16 Delivery Year will be held in May 2012. Accordingly, as PJM has previously advised its membership, PJM retained an independent consultant, The Brattle Group ("Brattle"), to review the VRR Curve, CONE values, and EAS method. The Brattle Group has prepared a detailed and comprehensive report setting forth its analysis and

¹ See Tariff Attachment DD, section 5.10(a)(iii).

² *Id.*, section 5.10(a)(vii)(C).

³ *Id.*, section 5.10(a)(vii)(D).

⁴ *Id.*, section 5.10(a)(iii).

⁵ *Id.* See also *id.* at section 5.10(a)(vii)(C), (D).

⁶ *Id.*, section 5.10(a)(iii)(C).

recommendations for changes in these areas. That report entitled "Second Performance Assessment of PJM's Reliability Pricing Model" and dated August 26, 2011 has been posted on PJM's Web site. PJM has reviewed the report, and recommends stakeholder consideration of certain of its recommendations, as described below.

A. VRR Curve Shape

Consistent with the Tariff, Brattle conducted detailed probabilistic modeling, similar to that used in 2005 and 2006 to help design the current VRR Curve, to gauge how well the curve would facilitate investment in new capacity and satisfy applicable reliability requirements. Brattle concluded that there was no compelling reason to make comprehensive changes to the VRR Curve, which currently is designed in accordance with Tariff-specified pairings of price (based on fractions or multiples of Net CONE) and quantity (based on fractions or multiples of the Reliability Requirement). Brattle also recommended against developing a different VRR Curve slope for small LDAs, for reasons detailed in the report. However, Brattle recommended that PJM make two changes to the VRR Curve to address performance risks they identified in order to ensure resource adequacy:

- Raise "point 1" on the VRR Curve (corresponding to the shortage condition of clearing three percentage points below the Installed Reserve Margin) to at least 0.5 times CONE above "point 2" (possibly to 1.0 times CONE above point "2") on the curve to avoid deterring needed supply offers when capacity is below the reliability target; and
- Confirm that Net CONE estimates can't be less than zero for purpose of determining "point 2" and "point 3" of the VRR Curve.

PJM has reviewed the Brattle analysis and probabilistic simulations and proposes the following changes. PJM chose the higher end of the Brattle recommended range for "point 1" because of concern raised by Brattle that the historic EAS offset method reduces RPM performance and because this level has higher performance in the probabilistic simulation results. Therefore PJM proposes to:

- Raise "point 1" on the VRR Curve (corresponding to the shortage condition of clearing three percentage points below the Installed Reserve Margin) to at least 1.0 times CONE above "point 2" on the curve to avoid deterring needed supply offers when capacity is below the reliability target; and
- Confirm that Net CONE estimates can't be less than zero for purpose of determining "point 2" and "point 3" of the VRR Curve.

B. Cost of New Entry

Similar to prior studies used to set the CONE values for RPM, Brattle conducted detailed "bottom-up" analyses of the fixed costs to install and operate a new combustion turbine plant and a new combined cycle plant in each CONE Area in the PJM Region. Brattle relied on the experienced design-build firm CH2M Hill to prepare the "plant-proper" construction cost estimate, and the plant operations firm The Wood Group to develop an estimate of the plants' fixed operations and maintenance expenses.

Brattle concludes that PJM should continue to rely on a representative combustion turbine plant configuration as the "Reference Resource" to set the marginal capacity cost in the PJM Region. Brattle further concludes, based on its detailed estimates, that the gross CONE

estimate can be reduced slightly for each CONE Area, to the following recommended values for the 2015-16 Delivery Year (based on a nominal levelized project cost recovery method:

\$134.00/kW-year for Eastern MAAC;
\$123.70/kW-year for Southwest MAAC;
\$123.50/kW-year for the Rest of RTO;
\$130.10/kW-year for Western MAAC; and
\$111.00/kW-year for Dominion.

PJM finds these estimates reasonable and well-supported by Brattle's analysis, and adopts these values as its recommended CONE values for the 2015-16 Delivery Year.

PJM notes that Brattle also states a preference for using a real levelized project cost recovery method to estimate the CONE values. However, Brattle's recommendation that PJM adopt a real levelized costing approach is expressly conditioned on PJM also adopting Brattle's recommended forward-looking EAS estimating method. As discussed below, PJM is not proposing to adopt that EAS recommendation. Moreover, FERC recently endorsed the nominal levelized approach.⁷ PJM therefore is not recommending a shift to the real levelized approach at this time.

C. EAS Method

While Brattle concludes that RPM overall is properly designed and performing well, they concluded that the current EAS method, which estimates how much revenue the hypothetical Reference Resource would have earned on average had it been in service in PJM for the prior three calendar years, overstates likely energy revenues, and therefore understates Net CONE. Brattle recommends that PJM instead adopt a forward-looking or equilibrium EAS revenue estimating method. However, if PJM determines to retain a historic estimating method, Brattle recommends that PJM calibrate the current methodology to better reflect actual EAS margins.

Upon review of the Brattle report, PJM agrees that the current EAS estimating method over-estimates actual margins, and therefore must be improved. PJM therefore recommends that the peak-hour dispatch assumptions currently used to estimate the EAS offset for the combustion turbine Reference Resource should be revised to reflect that such a resource is likely to be committed and clear at times in the day-ahead energy market, and earn day-ahead revenues, and not uniformly receive revenues (as assumed today) based only on real-time prices. The current EAS method dispatches the Reference Resource combustion turbine in four distinct blocks of four hours of continuous output for each block from the peak-hour beginning with the hour ending 0800 EPT through to the hour ending 2300 EPT for any day when the average real-time LMP is greater than, or equal to, the cost to generate (including the cost for a complete start and shutdown cycle) for at least two hours during each four-hour block.

⁷ *PJM Interconnection, L.L.C.*, 135 FERC ¶ 61,022, at PP 49-51 (2011).

Instead of relying exclusively on real-time prices in this process, PJM recommends modification to the EAS offset calculation method as follows:

PJM proposes to model both the day-ahead energy market commitment and real-time energy market dispatch such that the Reference Resource combustion turbine is first dispatched against day-ahead LMPs and receives net energy market revenues based on day-ahead LMPs if day-ahead LMPs support such dispatch. If day-ahead LMPs are not sufficiently high enough to support dispatch of the Reference Resource combustion turbine for any four-hour block, then the resource is dispatched against real-time LMPs and receives net energy market revenues based on real-time LMPs if real-time LMPs support such dispatch. The proposed approach more closely mimics the actual commitment and dispatch of generation resources.

PJM does not adopt, however, Brattle's recommendation for a forward-looking or equilibrium method of estimating EAS revenues. PJM and its stakeholders expended considerable time and effort attempting to develop a forward EAS estimate, and failed to achieve an acceptable approach. Energy price forecasts made as many as four years in advance are inherently uncertain. The forecast could draw upon various types of forward market data and indices, making the forecast method potentially very complicated, but the choices made on such data sources, and adjustments to such data, are necessarily arbitrary, and it is not clear how much such approaches mitigate the inherent uncertainty. Given these uncertainties, forward estimating methods kindle difficult debates on possible post-facto adjustments to clearing prices based on actual energy revenues. For these reasons, PJM is not persuaded to pursue a possible forward EAS estimating method at this time.

In accordance with the Tariff, PJM looks forward to reviewing these recommendations with stakeholders and receiving their input and possible alternative recommendations. Should you have any questions with regard to this matter, please do not hesitate to contact me.

Sincerely,



Andrew L. Ott
Senior Vice President – Markets

cc: PJM Board of Managers
Dr. Joseph Bowring, Monitoring Analytics, LLC