

**PJM's Comments regarding  
the 2008 State of the Market Report  
Issued by the Independent Market Monitor**



4.7.2009

PJM Interconnection

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## Introduction and Purpose

On March 11, 2009, Monitoring Analytics, the Independent Market Monitor for PJM (IMM) released the 2008 State of the Market Report (SOM Report).<sup>1</sup> Overall, the IMM concluded the results of PJM's Markets were competitive during 2008 with the exception of the Regulation Market in which no conclusions were reached by the IMM regarding competitiveness.

PJM is steadfastly committed to the ongoing development and operation of robust, competitive wholesale electricity markets. The operation of competitive wholesale markets is integral to reliable grid operation and provides substantial benefits to customers. Moreover, competitive wholesale markets provide an effective means for integrating demand response, renewable energy resources and smart grid technologies, as well as meeting the challenges of emissions reduction policies. PJM concurs with the IMM's overall observations as to the competitiveness of the various PJM markets. PJM is committed to working with the IMM to ensure that PJM markets remain free from market power abuse and remains committed to robust market monitoring procedures and market power mitigation rules in fostering competitiveness and open access. Overall, PJM hopes this paper provides additional context as part of a constructive dialogue concerning the issues and the conclusions set forth in the SOM Report.

PJM's comments address three major points of emphasis:

1. Elaborate on, and reinforce, the conclusions reached by the IMM in the SOM Report that the results of the PJM Markets were competitive, and LMPs are driven by fuel prices and demand rather than market power;
2. Emphasize, in concert with the IMM, PJM's continued commitment to robust market power mitigation policies that prevent the exercise of market power, and ensure competitive market outcomes; and
3. Provide PJM's perspective regarding bidding behavior and offer capping, demand response, scarcity pricing, ancillary service markets, and market power mitigation among other areas of interest.

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<sup>1</sup> See *2008 State of the Market Report for PJM: Volume 2 Detailed Analysis*, March 11, 2009 (2008 SOM Report) at [http://www.monitoringanalytics.com/reports/PJM\\_State\\_of\\_the\\_Market/2008/2008-som-pjm-volume2.pdf](http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2008/2008-som-pjm-volume2.pdf).

The SOM Report provides information, as has been customary, on the load-weighted average LMP and the relationship of load-weighted average LMP to fuel prices and underlying demand. While the load-weighted average LMP was high in 2008, the SOM Report is clear that the reason for these LMP levels rested on the close link to underlying fuel prices and not market power. Within this context, PJM also provides some additional detail regarding the general bidding behavior of suppliers in the PJM Energy Market, which provide strong evidence of competitive behaviors and outcomes.

Within the context of market power mitigation and offer capping, the SOM Report explains that offer capping in the PJM Energy Markets occurs in only one percent of unit hours or less. A closer examination of offer capping shows it is location and technology specific as it occurs in zones known to be subject to transmission constraints. These data emphasize the importance of locational price signals for both real-time operation and long-term investment. PJM highlights information provided in the SOM Report showing how RPM is resulting in revenue adequacy for new entry combined cycle gas facilities that will enhance both reliability and competitiveness in these zones subject to transmission constraints. .

Additionally, the SOM Report also addresses areas of the PJM market design that continue to garner much attention at FERC and in the PJM stakeholder process: demand response and scarcity pricing. In the case of demand response, the SOM Report discusses issues that may lead the casual reader to believe there is widespread gaming of demand response. PJM wishes to clarify in greater detail the changes that have already been made to address the issues highlighted by the IMM and some proposed changes that will further provide incentives that would deter the behavior discussed in the SOM Report.

With regard to the SOM Report recommendations with respect to scarcity pricing, PJM is largely in agreement with the IMM recommendations in this area. While PJM concurs with the general method recommended by the IMM and the need to ensure that any scarcity revenues collected by RPM capacity resources offset RPM costs, PJM also enumerates guiding principles and real-time operational rationales behind the need to reform scarcity pricing.

Finally, PJM provides clarification regarding conclusions and issues addressed by the IMM regarding the PJM Ancillary Service Markets. While the IMM could not draw any conclusions regarding the competitiveness of market outcomes in the Regulation Market in 2008, PJM notes the average market clearing offer price was \$11.94/MWh in 2008 despite a market power mitigation mechanism of only a \$100/MWh offer cap and no must-offer requirements. Moreover, PJM shows that using the cost-based offers that were required after December 1, 2008, almost 80 percent of offers were at or below cost during the January to November period. This supports the statement made by the IMM that the majority of regulation offers were already competitive, and as a result PJM believes that the Regulation Market outcomes were competitive. PJM agrees with the IMM that the implementation of the Three Pivotal Supplier Test and cost-based offer mitigation in the Regulation Market which commenced on December 1, 2008 should address any remaining uncertainty about potential market power issues in this market.

## **PJM is Steadfast in its Commitment to Robust Market Mitigation Policies**

In the SOM Report, the IMM recommends the retention and/or application of the Three Pivotal Supplier Test (TPST) or other market power screens to determine when markets are structurally non-competitive.<sup>2</sup> Moreover, to prevent the exercise of market power when there is a finding of structurally non-competitive markets, the IMM recommends continuing the offer capping of units at their marginal cost. The markets where the TPST and/or offer capping based on marginal or incremental cost are in effect are:<sup>3</sup>

- The Day-Ahead and Real-Time Energy Markets;
- The Synchronized Reserve Market;
- The Regulation Market as of December 1, 2008; and
- The RPM Capacity Markets.

In addition to the addition of the TPST and offer capping at marginal cost for Regulation, the FERC lifted offer capping exemptions that had existed for congestion on the four major interfaces within PJM (West, Central, East, and AP South), and on 56 generating units that had “construction exemptions” as had been recommended by the IMM in the 2007 SOM Report.<sup>4</sup> Additionally, the IMM recommends extension of the TPST and offer capping to the Day-ahead Scheduling Reserve Market (DASR) that commenced operation on June 1, 2008. PJM has provided responsive comments to all of the IMM recommendations as an appendix at the end of this document.

PJM agrees with the IMM that there is a continuing need for robust market mitigation rules to prevent the exercise of market power and ensure efficient, competitive outcomes in PJM's Markets, while providing appropriate price signals when new investment is necessary. PJM supports the implementation in 2008 of the recommendations made by the IMM in the 2007 SOM Report, as these provide further assurances to market participants and other interested stakeholders that the results in PJM's Energy and Ancillary Service Markets are competitive. Moreover, PJM supports the use of the TPST and marginal cost offer capping in the DASR Market with appropriate adjustments to fit the DASR context. Competitive results are ensured through a market power mitigation strategy that caps offers of suppliers when they are found to possess

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<sup>2</sup> 2008 SOM Report at 2.

<sup>3</sup> TPST is not used to trigger offer capping in the Synchronized Reserve Market. Offers are always subject to offer caps of cost plus \$7.50/MWh. See PJM OATT, Attachment K-Appendix, Section 1.10.1A (j).

<sup>4</sup> See 123 FERC ¶ 61,169 (2008). Units with construction exemptions were not subject to market power mitigation based upon the expectation that they would not be subject to mitigation when they were constructed. For a history and discussion of the construction exemption see 123 FERC ¶ 61,169 (2008) at Para. 34-45.

structural market power as determined by the TPST.<sup>5</sup> In the context of scarcity, PJM and the IMM are in concurrence that revision to the scarcity pricing mechanism be designed such that market power mitigation need not be suspended during scarcity conditions in order to reach prices that signal scarcity.

### **LMP is Driven by Fuel Prices and Demand**

The load-weighted average LMP in 2008 was \$71.13/MWh as reported in the SOM Report.<sup>6</sup> However, the 2008 load-weighted average LMP fuel-cost adjusted to 2007 fuel prices was only \$51.79/MWh, which is almost \$10/MWh lower than the 2007 load-weighted average LMP of \$61.66/MWh.<sup>7</sup> The decrease in load-weighted average LMP expressed in 2007 fuel prices from 2007 to 2008 can be largely explained by the decrease in average load of 81,681 MW in 2007 to 79,515 MW in 2008.<sup>8</sup> Absent the observed reduction in load, the load-weighted average LMP would have been even higher in 2008 than it was. A graphical explanation can be seen in Figure 1. The demand and supply from 2007, Demand 2007 and Supply 2007 are represented by solid lines, and the demand and supply in 2008, Demand 2008 and Supply 2008 are represented by dashed lines. Since the physical supply characteristics were essentially unchanged, the shift up in supply from 2007 to 2008 is due to increased fuel prices. The load-weighted average LMP for each year is represented by the intersection of supply and demand for each year respectively. Had fuel prices remained at 2007 levels, Supply 2007, with the demand in 2008, the fuel-cost adjusted LMP is at the intersection of Supply 2007 and Demand 2008 resulting in the \$51.79 fuel-cost adjusted LMP cited in the 2008 SOM Report.

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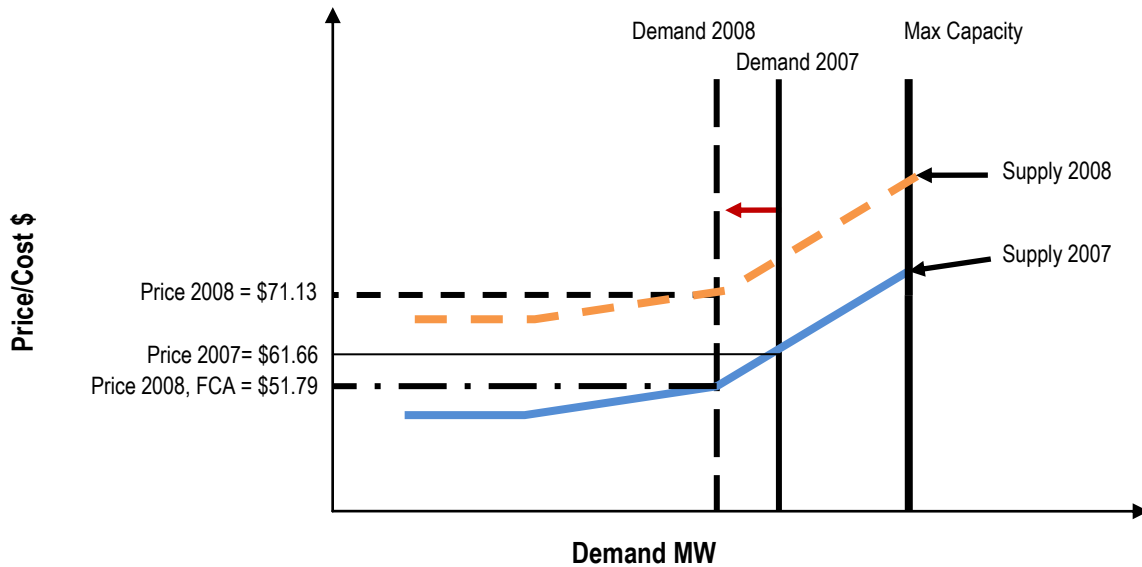
<sup>5</sup> If a market participant possesses structural market power, this does not mean that participant has exercised market power or even has an incentive to exercise market power. Rather structural market power is an indication of a tight supply demand balance and/or a high concentration in ownership. See *PJM's Comments Regarding the 2007 State of the Market Report Issued by the PJM Market Monitoring Unit* April 11, 2007 at <http://www.pjm.com/documents/~media/documents/reports/comments-2007-som-report.ashx> at p.3-5.

<sup>6</sup> 2008 SOM Report, Table 2-53 at 54.

<sup>7</sup> 2008 SOM Report at 59-60.

<sup>8</sup> 2008 SOM Report at 43. Supply resources essentially remained the same in 2008 as 2007, see 2008 SOM Report at 7.

Figure 1 - Decrease in demand mitigates increase in fuel cost



While the fuel-cost adjusted LMP tells part of the story with regard to the relationship between LMP levels and fuel prices, there were significant changes in fuel prices throughout 2007 and 2008. In 2008 in particular, fuel prices rose precipitously during the first half of the year to record or near record levels, and fell just as quickly to levels not seen in several years in the case of natural gas. The trend of load-weighted monthly average LMP throughout 2008 follows the pattern of fuel prices. This is to be expected in a competitive market as prices will rise when production costs rise (such as fuel prices), all else equal. Prices will likewise fall as fuel prices fall, all else equal. This correlation is clearly seen in the performance of PJM's Energy market. Monthly load-weighted average LMP ranged from approximately \$64/MWh to \$70/MWh from January through May, spiked to just over \$100/MWh in June and \$97/MWh in July, slid back to \$75/MWh and \$70/MWh in August and September before settling at just over \$50/MWh during October through December. Figure 2 shows the relationship between a fuel price index based on the percent of hours various fuels are on the margin and load-weighted average LMP from January 2007 to January 2009.<sup>9</sup>

<sup>9</sup> The fuel index is based on the percent of hours the coal, gas, and oil were reported to be on the margin in the 2007 State of the Market Report, Volume 2: Detailed Analysis (2007 SOM Report) at [http://www.monitoringanalytics.com/reports/PJM\\_State\\_of\\_the\\_Market/2007/2007-som-volume2.pdf](http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2007/2007-som-volume2.pdf), Table 2-32 at 33. Fuel data is from the Energy Information Administration. The natural gas prices are monthly average wellhead price prices found at <http://tonto.eia.doe.gov/dnav/ng/hist/n9190us3m.htm>, the monthly average petroleum prices are West Texas Intermediate crude prices found at <http://tonto.eia.doe.gov/dnav/pet/hist/rwtcM.htm>, and coal prices are monthly NYMEX Future prices for Central Appalachian coal found at <http://www.eia.doe.gov/cneaf/coal/page/nymex/current.xls> and <http://www.eia.doe.gov/cneaf/coal/page/nymex/historical.xls>.

Figure 2 - PJM LMP vs Fuel Price Index

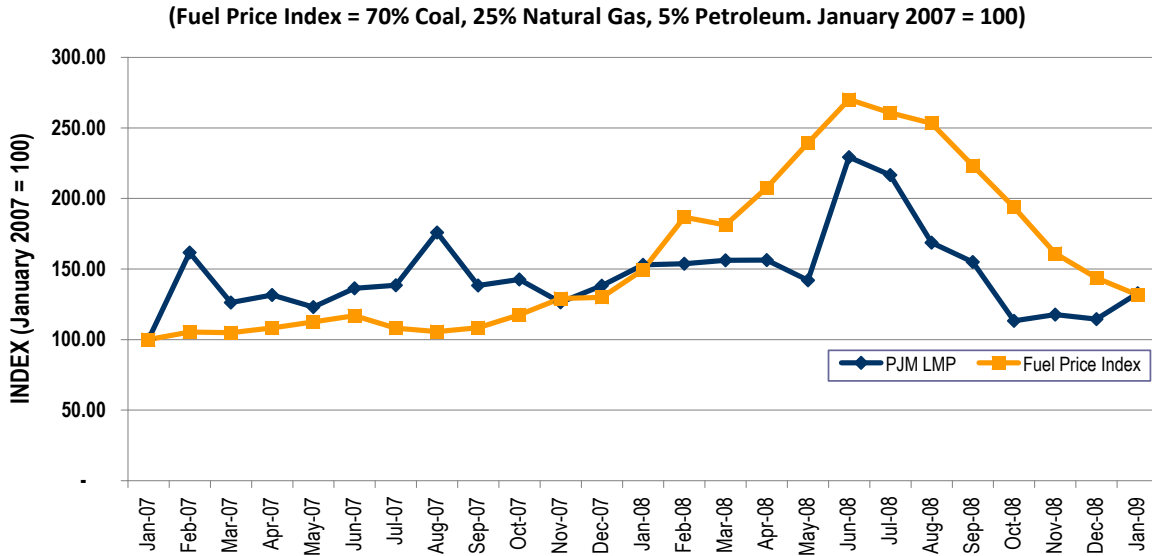


Figure 2 clearly shows how LMP and fuel prices move together. The small spikes upward in the PJM LMP index in February and August 2007 are due to high levels of load for energy in those months. The small dips down in November 2007 and May 2008 show low levels of load for energy. As fuel prices began to rise during the first five months of 2008, LMP trended slightly upward. The large fuel price increases of June and July track with the large spike in LMP. From August through the end of the year, as fuel prices trended down, LMP did as well.

### LMP is Determined through Competitive Bidding Behavior

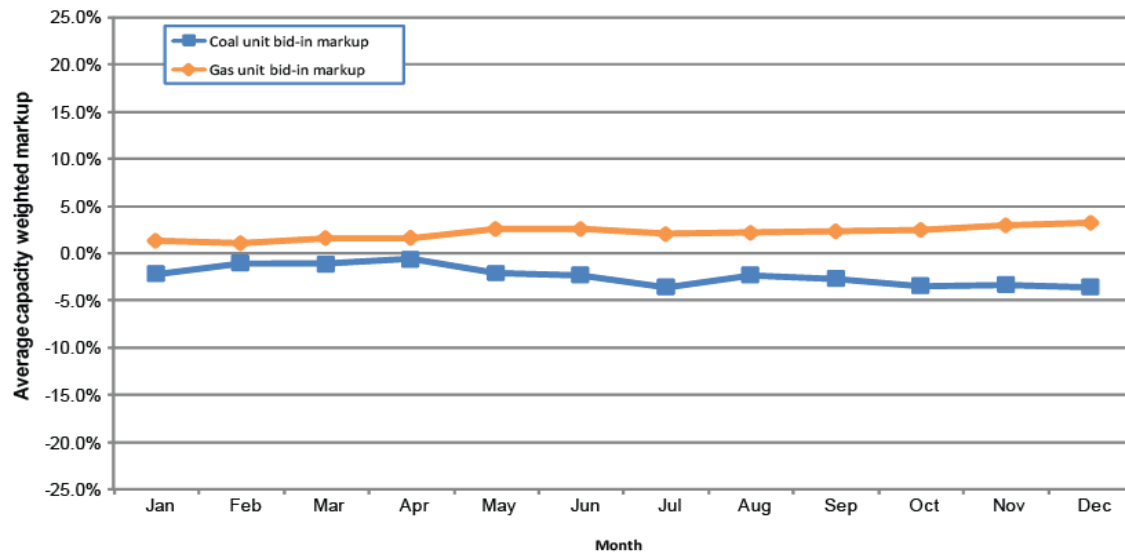
In the SOM Report, the IMM concludes that the results of the PJM Energy Markets are competitive and that the mark-up component of load weighted average LMP of only three percent is strong evidence of competitive behavior.<sup>10</sup> Moreover, the SOM Report shows that the mark-up component of LMP is negative on average at LMP below \$60/MWh, encompassing 55 percent of all hours in 2008.<sup>11</sup> PJM has examined the mark-up behavior of coal units and gas units regardless of whether they were on the margin or not. The mark-up indices for coal and gas units below were computed for coal- and gas-burning

<sup>10</sup> 2008 SOM Report at 8. PJM has previously noted, and the IMM has previously acknowledged, there are issues with calculating the mark-up component of LMP using only marginal units and not performing a full re-dispatch of the system. See *PJM's Comments Regarding the 2007 State of the Market Report Issued by the PJM Market Monitoring Unit* April 11, 2007 at 12-14.

<sup>11</sup> 2008 SOM Report Table 2-41 at 39.

units at their maximum economic output, and weighted by the MW quantity of their offer. Figure 3 shows that coal units, on a consistent basis, were on average offering just below their costs. This finding is consistent with the mark-up component of LMP being negative for LMP less than \$60/MWh as in these hours coal units are most likely to be on the margin and setting price.<sup>12</sup> Gas units on average are bidding at just over their marginal costs as shown in Figure 3. The positive mark-up on average could be attributed to cost-based offers, not including opportunity costs related to run-time restrictions due to hard caps on emissions, starts, or heat input dictated by applicable regulatory rules or restrictions of operating permits.<sup>13</sup> FERC has recently issued an order requiring PJM make a compliance filing by July 31, 2009 to include provisions in its tariff to explicitly include such opportunity costs in cost-based offers.<sup>14</sup> In either case the overall mark-up bidding behavior of coal and gas units is in a tight band of +/- 0.04, providing strong evidence of marginal cost bidding behavior demonstrating that PJM's Energy Markets are very competitive. Moreover, there does not seem to be any significant changes in bidding behavior on average by fuel type following the lifting of offer capping exemption by FERC on May 17, 2008. While the lifting of these exemptions provides greater assurances that outcomes in PJM's Energy Markets are competitive, it appears that bidding behavior was already competitive prior to the lifting of those exemptions and remained so following the lifting of the offer capping exemptions.

**Figure 3 – Capacity weighted markup index – Calendar year 2008**



<sup>12</sup> This kind of bidding behavior is not surprising for coal units they want to ensure they run through off-peak hours because there are opportunity costs for shutting down and starting up again that can be avoided by running a few hours just below cost. See *PJM's Comments Regarding the 2007 State of the Market Report Issued by the PJM Market Monitoring Unit* April 11, 2007 at 11-12.

<sup>13</sup> See *PJM's Comments Regarding the 2007 State of the Market Report Issued by the PJM Market Monitoring Unit* April 11, 2007 at 11-12. Also see Report of PJM Interconnection, L.L.C. pursuant to the FERC May 16, 2008 Order in EL08-47, September 5, 2008 at 24 found at <http://www.pjm.com/Media/documents/ferc/2008-filings/20080905-el08-34.pdf>.

<sup>14</sup> 126 FERC ¶ 61,145 at para. 48.

## Offer Capping Statistics Provide Evidence of Market Competitiveness and the Necessity of Locational Price Signals through LMP and RPM

According to the SOM Report, market-wide offer capping of generating units was limited to 0.2 percent of unit hours in the Day-ahead Energy Market and 1.0 percent of units hours in the Real-time Energy Market.<sup>15</sup> Of the units that are frequently offer capped, only seven units with greater than 400 hours of operation (less than five percent of all available hours in a year) are offer capped more than ten percent of their run hours.<sup>16</sup>

PJM has run a more granular analysis of offer capping by location and by unit type to show where and to what types of units offer capping is taking place. Recall that offer capping in the PJM Energy Market only occurs with a finding of structural market power as determined by the TPST, which is only run when there are binding transmissions constraints in the PJM Energy Market. Additionally, offer capping is only applied to units which are not yet running based on economics at the direction of PJM. Table 1 shows offer capping statistics by locational delivery area (LDA) and unit type.<sup>17</sup> Table 1 shows combustion turbines (CTs) are the most offer capped unit type as a percentage and occurs primarily in EMAAC, SWMAAC, and WMAAC. Not coincidentally, these areas observe a great deal of congestion associated with west-to-east flows across PJM. This is reinforced in Table 2 showing the prevalence of frequently mitigated units, or units that are offer capped more than 60 percent of run hours, in EMAAC and SWMAAC.<sup>18</sup> While steam units are rarely offer capped, this is not a concern as most steam units are coal and as has been discussed above, the bidding behavior of coal units is strongly competitive with mark-ups that are on average negative.

**Table 1 - Offer capping statistics by area - Calendar year 2008**

LDA	CT		Steam		Diesel	
	Offer capped MW	Offer capped run hours	Offer capped MW	Offer capped run hours	Offer capped MW	Offer capped run hours
EMAAC	23.1%	22.9%	0.1%	0.4%	3.4%	8.9%
RTO	5.5%	5.6%	0.0%	0.1%	3.3%	1.8%
SWMAAC	49.6%	53.1%	0.4%	0.6%	3.3%	1.8%
WMAAC	64.3%	52.0%	0.4%	0.6%	22.5%	2.5%

<sup>15</sup> 2008 SOM Report Table 2-5 at 18.

<sup>16</sup> 2008 SOM Report Table 2-6 at 18.

<sup>17</sup> EMAAC includes the JC, PSEG, RECO, AECO load zone in New Jersey; the PECO zone in Pennsylvania; and the DPL zone in Delaware, Eastern Maryland, and the Delmarva Peninsula of Virginia. SWMAAC includes the BGE and PEPCO zones in Maryland and DC. WMAAC includes the PPL, Penelec, and Met Ed zone in Pennsylvania. RTO includes all other zones.

<sup>18</sup> See 2008 SOM Report at 39-40 for a brief discussion of frequently mitigated units.

**Table 2 – Frequently mitigated unit statistics by area – Calendar year 2008**

LDA	Real time offer capped MW	Real time offer capped run hours	Average frequently mitigated units
EMAAC	0.6%	3.5%	63.9
RTO	0.1%	0.3%	22.0
SWMAAC	0.8%	2.5%	38.0
WMAAC	8.9%	0.8%	1.2

The concentration of offer capping in these geographic areas of the market, signifying the presence of transmission congestion in these areas, underline the importance of locational price signals embodied in LMP to provide price signals to market participants to help alleviate these constraints in real-time operation to ensure system reliability. Moreover, these offer capping statistics show the reliability and market value of locational prices signals provided by the RPM Capacity Market in conjunction with LMP in the Energy Market which stimulates investment in these constrained areas to strengthen competitiveness and reliability. The SOM Report breaks down capacity market revenues and revenue adequacy for new entry combustion turbines, combined cycle, and coal plants. For 2008, a new entry combustion turbine would recover 99 percent of its costs in AECO (EMAAC) and PEPCO (SWMAAC) load zones and 93 percent of costs in BGE (SWMAAC) load zones, far above the 10 year average cost recovery and far greater than zones which observe lower levels of congestion.<sup>19</sup> A new entry combined cycle facility would have achieved revenue adequacy in all of SWMAAC (BGE and PEPCO), as well as all zones in EMAAC except for PECO, but not in any other zones.<sup>20</sup> With new entry of intermediate load combined cycle units in the zones that are subject to offer capping as signaled by the combined revenues in the Energy and RPM Capacity market, congestion could be alleviated. This could be accomplished by a larger array of resources providing greater real-time reliability while also enhancing competitiveness in these constrained areas through increased supply. According to The Brattle Group in its review of the RPM Capacity Market, RPM has successfully attracted over 14,500 MW of capacity resources. Of these resources 9,900 MW are new resources while 4,600 MW are retained resources that would otherwise have retired. There were also 1,500 MW of new resources offered, but not cleared.<sup>21</sup> Of these capacity resources attracted, almost 6,300 MW are located in EMAAC and SWMAAC.<sup>22</sup> The report also states that there were an additional 6,500 MW of

<sup>19</sup> 2008 SOM Report Table 3-24 at 144.

<sup>20</sup> 2008 SOM Report Table 3-26 at 148. Revenue adequacy in PECO was 97 percent in 2008.

<sup>21</sup> See *Review of PJM's Reliability Pricing Model (RPM)*, The Brattle Group at 17 at <http://pjm.com/Media/committees-groups/committees/cmec/20080709-er05-1410-000.pdf>

<sup>22</sup> Id. at 18. Brattle indicates most of this capacity attracted in these areas would have otherwise retired but for RPM. It is also estimated that about 1,300 MW of this new capacity is in the form of ILR and DR in the combined EMAAC and SWMAAC areas. Id. at 31.

capacity “at risk” for retirement in EMAAC and SWMAAC in the absence of RPM.<sup>23</sup> Looking ahead, the Brattle report also reports that there is nearly 9,800 MW of generation in the queue in EMAAC and SWMAAC that are eligible to participate in future RPM auctions.<sup>24</sup>

### **The Necessity for Scarcity Pricing Reform and Guidelines and Properties for a New Scarcity Pricing Mechanism**

In the SOM Report the IMM has recommended revisions to the PJM scarcity pricing mechanism that allows for more flexible and locational scarcity pricing signals.<sup>25</sup> The IMM recommends implementation of a mechanism with reserve requirements modeled as constraints for pre-defined regions with penalty factors assigned in the security constrained dispatch algorithm that assigns a cost for going short on reserves. As the system goes increasingly short on reserves, there would be increasing penalty factors associated with reserve levels providing a signal as to the severity of scarcity in PJM.<sup>26</sup> The IMM argues that such a mechanism would be consistent with economic dispatch, location pricing of energy, and competitive market outcomes since market power mitigation would need to be lifted in order to allow prices to rise.<sup>27</sup> The IMM views scarcity pricing and scarcity revenues as an alternative to capacity markets revenues for generators to cover their fixed costs that are not otherwise covered through normal energy market participation and recommends that any changes to the scarcity pricing mechanism include provisions to ensure that any scarcity revenues collected by capacity resources are not paid to those resources in the settlement process to ensure that there is no over-collection of scarcity revenues from both the capacity market and the energy market.<sup>28</sup>

PJM agrees with the IMM recommendation that the scarcity pricing mechanism in PJM needs to be revisited in line with FERC Order 719.<sup>29</sup> PJM also agrees consistency between scarcity revenues and capacity market revenues and ensuring against the exercise of market power as stated by the IMM, and as noted as part of the six FERC criteria for scarcity pricing, are desirable properties for a scarcity pricing mechanism.<sup>30</sup> PJM believes that a robust scarcity pricing mechanism satisfying

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<sup>23</sup> Id. at 24 as indicated by Figures 8 and 9.

<sup>24</sup> Id. Table 5 at 40.

<sup>25</sup> 2008 SOM Report at 6. For the entire IMM discussion on the current PJM scarcity pricing mechanism and the IMM proposal see 2008 SOM Report at 166-171.

<sup>26</sup> 2008 SOM Report at 6.

<sup>27</sup> 2008 SOM Report at 6.

<sup>28</sup> 2008 SOM Report at 166.

<sup>29</sup> 125 FERC ¶ 61,071 (Order 719). The discussion of price formation during operating reserve shortages can be found at paragraph 165-258.

<sup>30</sup> PJM also recognizes these as guiding principles in *Guiding Principles for a Pricing Mechanism during an Operating Reserve Shortage*, Updated March 12, 2009 at <http://www.pjm.com/Media/committees-groups/task-forces/tf719/20090312/20090312-item-05-scarcity-pricing-guiding-principles.pdf>

the six FERC criteria and the guidelines enumerated below will best be accomplished by the use of an operating reserve demand curve, which is one of the four FERC recommended options for pricing during and operating reserve shortage.<sup>31</sup> The demand curve will allow prices to rise predictably as reserves become short on the system and will generally satisfy the guiding principles that PJM has proposed to its stakeholders. There are many ways in which a reserve demand curve can be constructed. These range from penalty factor determinations at different levels of reserve shortage as developed in ISO New England and the NYISO and recommended by the IMM to more sophisticated methods based on the value of lost load and deriving the value of expected unserved energy at different reserve levels. PJM and the IMM are in concurrence that the preferred method would follow FERC approved penalty factor methods for defining an operating reserve demand curve that are already in operation in ISO New England and the NYISO and that satisfy the criteria laid out by the IMM and PJM. PJM has developed an example of how an operating reserve demand curve would work using the type of penalty factor construct recommended by IMM as part of Task Force 719.<sup>32</sup> Other implementation details are slated to be developed through the stakeholder process.

FERC Order No. 719, issued on October 17, 2008, specifically addresses scarcity pricing in what the Commission has termed "price formation during operating reserve shortages".<sup>33</sup> In its discussion of operating reserve shortages the Commission states that either current mechanisms or proposed mechanisms for price formation during an operating reserve shortage "ensure that the market price for energy accurately reflects the value of such energy during shortage periods (i.e., an operating reserve shortage)."<sup>34</sup> Moreover, any mechanism for price formation during an operating reserve shortage should achieve the goals of Order 719 of "maintaining reliability, eliminating barriers to the comparable treatment of demand response, and allocating energy during a shortage to those who value it most."<sup>35</sup> Order 719 goes on to require the RTO to describe how its pricing mechanism during an operating reserve shortage satisfies the six criteria enumerated by the Commission:<sup>36</sup>

- Improve reliability by reducing demand and increasing generation during periods of operating reserve shortage;
- Make it more worthwhile for customers to invest in demand response technologies;
- Encourage existing generation and demand resources to continue to be relied upon during an operating reserve shortage;

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<sup>31</sup> See Order 719 at paragraph 208.

<sup>32</sup> See *Operating Reserve Demand Curve Example* at <http://www.pjm.com/Media/committees-groups/task-forces/tf719/20090109-item-03c-operating-reserve-demand-curve-example.pdf>

<sup>33</sup> See Order 719 at paragraph 165.

<sup>34</sup> See Order 719 at paragraph 166.

<sup>35</sup> See Order 719 at paragraph 235.

<sup>36</sup> See Order 719 at paragraph 247.

- Encourage entry of new generation and demand resources;
- Ensure that the principle of comparability in treatment of and compensation to all resources is not discarded during periods of operating reserve shortage; and
- Ensure market power is mitigated and gaming behavior is deterred during periods of operating reserve shortages including, but not limited to, showing how demand resources discipline bidding behavior to competitive levels.

PJM's current scarcity pricing mechanism may not fully achieve compliance with the requirements set forth by FERC in Order 719 because it does not result in price impacts during reserve shortages, but rather results in price impacts only once emergency procedures are implemented during or in anticipation of an energy shortage. In order to encourage new and existing demand resources to be relied upon during an operating reserve shortage, PJM believes that any scarcity pricing mechanism should satisfy the following criteria:<sup>37</sup>

- Allocate energy during an operating reserve shortage to those who value it most. In the parlance of supply and demand, this means that the price of energy can clear on the demand curve or that the price of energy can equal the marginal willingness to pay which can be greater the marginal cost of the highest cost unit on the system.
- Provide predictable, stable triggers and prices during an operating reserve shortage. This will allow demand resources the ability to observe and plan to be available for scarcity events as they will have greater notice through price signals that the system is approaching an operating reserve shortage.
- Provide transparent reporting of the operating reserve situation in real-time so that market participants can observe how close the market is coming toward an operating reserve shortage. This is a reinforcing signal to demand resources to advise them to be available as the system approaches a reserve shortage since price increases are tied to reserve levels as indicated by the Commission.

Consistent with the Order 719 criteria regarding reliability, PJM's prospective reform of its scarcity pricing mechanism looks to provide consistency of price signals in real-time operation during scarcity conditions. Under the current scarcity pricing mechanism, prices may paradoxically fall just prior to a scarcity declaration as emergency load management resources are activated and reserves are allowed to go short. This effectively increases energy supply and drives prices down, to signal the impending scarcity declaration.<sup>38</sup> Moreover, the prices set between reserves and energy are not consistent in that if PJM

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<sup>37</sup> See *Guiding Principles for a Pricing Mechanism during an Operating Reserve Shortage*, Updated March 12, 2009 at <http://www.pjm.com/Media/committees-groups/task-forces/tf719/20090312/20090312-item-05-scarcity-pricing-guiding-principles.pdf> for a more detailed explanation.

<sup>38</sup> Under the current scarcity pricing mechanism, emergency load management activation is not a trigger for scarcity pricing.

directs resources to back down to maintain some level of reserves during scarcity, there may be no incentive for resources to remain in reserve when they could be paid more for producing energy. This paradoxically could lead to over-generation with emergency resources activated during a scarcity event. Consequently PJM also believes any scarcity pricing mechanism should satisfy the following:<sup>39</sup>

- Offer better system control through the alignment prices and incentives to provide energy and demand response during periods of operating reserve shortage. That is prices should not paradoxically fall as system conditions grow tighter and reserves levels are approaching shortage.
- Work seamlessly and consistently with PJM ancillary service markets so that all resources are financially indifferent to providing reserves or energy during an operating reserve shortage. In this way the paradox of over-generation during scarcity can be avoided.
- Harmonize emergency actions by operators with expected or actual levels of an operating reserve shortage.

### **Demand Response Continues to Evolve in PJM**

In its discussion of demand response in the PJM Energy Market, the IMM states that a fully functioning demand side means that customers have the ability to see real-time LMP and react to those prices to achieve benefits from changing energy usage in real-time based on the cost of power relative to the value the customer places on consuming that power. The IMM further argues that the goal of a functional demand side is to allow consumers to make informed decisions about consumption.<sup>40</sup> Moreover, the IMM argues that a fully functioning demand side does not necessarily mean prices will be lower than the otherwise would be or that all customers will reduce consumption at various price levels.<sup>41</sup> Consequently, the IMM argues that the purpose of the PJM Economic Load Response Program (ELRP) is to allow consumers who otherwise face fixed retail prices, to respond to wholesale prices in the PJM Energy Market by providing price signals to consumers that replicate the prices they would face if they were exposed to real-time LMP.<sup>42</sup>

PJM agrees with the IMM characterization of what a fully functional demand side would look like in its end state, and agrees with the rationale as described by the IMM for the PJM ELRP.

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<sup>39</sup> See *Guiding Principles for a Pricing Mechanism during an Operating Reserve Shortage*, Updated March 12, 2009 at <http://www.pjm.com/Media/committees-groups/task-forces/tf719/20090312/20090312-item-05-scarcity-pricing-guiding-principles.pdf> for a more detailed explanation.

<sup>40</sup> 2008 SOM Report at 93.

<sup>41</sup> 2008 SOM Report at 93.

<sup>42</sup> 2008 SOM Report at 93-94.

In its examination of the results of ELRP in 2008, the IMM recommends a modification of rules ensuring appropriate measurement and verification of load reductions and appropriate levels of payment for reductions, and “[e]valuation of additional actions to address institutional issues which may inhibit the evolution of demand response.”<sup>43</sup> PJM agrees with both of these recommendations and has been in the process of implementing changes to address the measurement and verification and payment issues as recognized by the IMM.

In its straw proposal for compensation in the ELRP<sup>44</sup>, PJM has proposed changing the base compensation to the zonal LMP less the generation portion of the retail rate from zonal LMP less (generation + transmission) portions of the retail rate. Including an offset for the transmission portion of the retail rate in the demand response compensation results in an underpayment of the savings due to demand response, and does not reflect generation savings in the wholesale market.<sup>45</sup> Moreover, PJM has further proposed revisions to the compensation and settlements for self-scheduled demand response to address many of the issues with the Customer Baseline (CBL) and settlements discussed by the IMM. Under the proposed revisions, self-scheduled demand response providers must settle all notification hours if they wish to submit a settlement and not “cherry pick” only the hours in which there is a net credit to the Demand Resource. They must also allow for the possibility of net debits over the day and face the possibility of having to pay rather than being held harmless under the current system for net debits.<sup>46</sup> These proposed settlement and payment changes are meant to complement the new CBL rules that were implemented in June 2008 and the Normal Operation Review procedures that were implemented in November 2008, which provide an economic incentive to deter behavior that is meant to preserve a CBL that is no longer representative.

The Normal Operation Review process screens demand response settlements for activity that would indicate a CBL is in place that is no longer representative or that a Demand Resource is attempting to preserve a CBL that is no longer representative. On a daily basis PJM denies settlements for which there is no advanced notification for settlements, settlement hours do not match notification hours, the settlement is worth less than \$5 in value, or 75 percent or more of settlement hours show a retail generation and transmission rate higher than LMP. On a longer term basis, the submission of settlements for 70 percent of days in the previous 30-day period on a rolling basis is flagged for further investigation by PJM. A Demand Resource or its Curtailment Service Provider (CSP) can be asked for descriptions of load reduction activities, verification that such activities took place, and/or an on-site visit. The result has been an increase in communication between

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<sup>43</sup> 2008 SOM Report at 4

<sup>44</sup> PJM Straw Proposal for Compensation Paid to Demand Resources Providing Demand Reductions in the Economic Load Response Program, 11-25-08, revised 12-19-08 (PJM DR Compensation Straw) at <http://pjm.com/Media/committees-groups/task-forces/tf719/20090109-item-02-pjm-straw-proposal-for-compensation-revised.pdf>.

<sup>45</sup> PJM DR Compensation Straw at 3. This follows the logic stated by the IMM in the 2008 SOM Report at 94.

<sup>46</sup> PJM DR Compensation Straw at 5.

PJM and the program participants, notably Curtailment Service Providers (CSPs). As a result of this communication, CSPs and other participants have gained a much greater understanding of the documentation required by PJM and the standards to be met. PJM has benefited with a greater understanding of the load reduction methods in use by various participants and the manner in which the end-use customer deploys its load reduction capability in response to PJM price signals. The objective Normal Operation Review demonstrates PJM's commitment to the integrity and development of robust demand response in the PJM markets. PJM expects to refine and improve tools like the Normal Operation Review over time based on experience.

With respect to the IMM recommendation to evaluate actions addressing institutional issues that inhibit the evolution of demand response, PJM has proposed a targeted incentive for three years after initial registration for the purpose of overcoming "barriers related to the high cost of installing advanced metering infrastructure (AMI), installing new infrastructure that allows Demand Resources to respond to prices more easily, and setting up institutional arrangements that facilitate potential Demand Resources response to wholesale market prices."<sup>47</sup> The incentives, which are not designed for the purpose of lowering prices, would be paid at high enough prices so that the incentive does not distort the decision of customers to demand respond at lower prices than they otherwise would and.

PJM has also engaged retail market representatives, including state commissions, to measure and reflect the impact of more dynamic, market-based rates combined with advanced metering infrastructure pilots on the wholesale Energy Market. This Price Responsive Demand initiative views demand response not as a supply resource, as is implicitly the case in the ELRP, but explicitly on the demand side of the market. Such treatment requires coordination and a seamless interface between wholesale and retail prices.

### **The Results of the Regulation Market are Consistent with Competitive Outcomes**

In the SOM Report, the IMM states, "[t]he Regulation Market results cannot be determined to have been competitive or to have been non-competitive."<sup>48</sup> The IMM bases its conclusion on the fact that it does not have supplier submitted cost-based offers, but is relying upon IMM estimates of what the cost-based offers would be.<sup>49</sup> The IMM states that it believes the results of the Regulation Market will be deemed competitive with a full year with the application of the TPST.<sup>50</sup> In December, 2008 PJM implemented market power mitigation in the Regulation Market. These measures included implementation of the TPST, requirement of the submission of cost-based regulation offers by resources offering into the market, and an increase in the

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<sup>47</sup> PJM DR Compensation Straw at 3.

<sup>48</sup> 2008 SOM Report at 2.

<sup>49</sup> 2008 SOM Report at 303.

<sup>50</sup> 2008 SOM Report at 303.

adder for regulation costs. While there is only a single month of Regulation Market operation under these new measures, some conclusions can be drawn by comparing this new data to offers and market results prior to December.

PJM agrees with the IMM insofar as application of the TPST with the requirement of the submission of cost-based regulation offers will provide market participants with greater assurance that results in the Regulation Market going forward will be competitive. PJM also understands the IMM's reluctance to draw conclusions about the competitiveness of market results absent the actual submitted cost-based offer for regulation over the entire year. However, PJM believes that the results of the Regulation Market in 2008 are consistent with competitive outcomes. For the entire year, the load-weighted average cleared offer price was \$11.94/MWh for regulation under a regime where there is no must offer requirement and the only market power mitigation from January 1 to November 30 was a \$100/MWh offer cap and mandatory cost-based offers for the two largest suppliers. This load-weighted average cleared offer price is less than the \$12 cost adder allowed in cost-based offers beginning December 1. Moreover, an examination of Figure 6-2 in the 2008 SOM Report reveals the cleared offer price rarely exceeds \$20/MWh in 2008.<sup>51</sup> PJM has also examined regulation offer behavior compared to the submitted cost-based offers from December 2008 when the TPST and associated market mitigation was in place. PJM found the vast majority of regulation offers, 78.8 percent, were competitive (meaning at- or below-cost) in 2008 using the December 2008 weighted average of cost-based offers as a benchmark. When viewed together with the price performance of cleared offer prices, PJM believes the Regulation Market outcomes were competitive.

### **PJM Continues to Refine the Procurement of Tier 2 Synchronized Reserves**

The SOM Report comments on the need for PJM to procure additional Tier 2 synchronized reserves outside of the Synchronized Reserve Market to satisfy reliability requirements. The IMM notes that "The out of market purchases indicate that the Synchronized Reserve Market is not functioning to adequately coordinate supply and demand,"<sup>52</sup> and further notes "It is clear that there is a difference in the calculation of the need for Tier 2 synchronized reserves between the market solution and the operators. The reason remains under investigation."<sup>53</sup>

PJM agrees with the IMM that the need for Tier 2 synchronized reserves should be supported by the market, rather than procured after the market has cleared. PJM made improvements to the Tier 2 reserve calculations that were implemented on February 1, 2009. In the six weeks following the new calculation's implementation, the average additional out-of-market Tier

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<sup>51</sup> 2008 SOM Report Figure 6-2 at 313. The cleared offer price does not include opportunity costs which accounts for approximately 72 percent of load-weighted average price of regulation

<sup>52</sup> 2008 SOM Report at 328

<sup>53</sup> 2008 SOM Report at 300

2 procured dropped by 93%. PJM continues to study the reserve calculations and is committed to making continuing improvements in this area.

### **The Results of the Day-Ahead Scheduling Reserve Market are Competitive**

PJM implemented the Day-ahead Scheduling Reserve Market (DASR) beginning June 1, 2008. The monthly load-weighted average clearing prices in this market are less than \$1/MW in all months, and the load-weighted average for the seven months of operation is \$0.26/MW.

PJM agrees with the IMM assessment in the 2008 SOM Report that the DASR market results were competitive, although the IMM notes that the DASR market is not structurally competitive based on the results of the TPST.<sup>54</sup> The IMM further recommends that the TPST and cost-based offer mitigation be implemented for the DASR Market.<sup>55</sup>

The TPST is a measure of structural market power and utilizes a threshold for eligible supply of offers within 150 percent of the market clearing price to be included in the test. Given the extremely low clearing prices of the DASR market, PJM believes this threshold may be preventing the test from providing a meaningful reflection of structural market power in this market. PJM is in agreement that implementing the TPST and associated cost-based offer mitigation would provide assurances to market participants that market results are driven by competitive pressures. However, PJM does not believe the 150 percent threshold for eligible supply was designed with such extremely low clearing prices in mind.<sup>56</sup> If the market clearing price is zero, then even an offer of \$0.01 is not considered relevant according to the test. In the case of the DASR market, PJM recommends that the threshold value determining eligible supply be revisited in the stakeholder process if the PJM members elect to incorporate the TPST and cost-based offer mitigation.

### **In Conclusion**

By necessity the SOM Report is a voluminous and data driven document. PJM congratulates the IMM on the publication of its first State of the Market Report as an independent entity. The SOM Report continues to set a high standard for comprehensive reporting and analysis of PJM's competitive wholesale markets. PJM looks forward to working with the IMM

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<sup>54</sup> 2008 SOM Report at 335

<sup>55</sup> 2008 SOM Report at 335.

<sup>56</sup> This is not the first time PJM has expressed concerns regarding the 150 percent threshold. Report of PJM Interconnection, L.L.C. pursuant to the FERC May 16, 2008 Order in EL08-47, September 5, 2008 at 22-24 found at <http://www.pjm.com/Media/documents/ferc/2008-filings/20080905-el08-34.pdf>.

going forward to continue to ensure the competitiveness and efficient operation of PJM's markets. PJM's key points regarding the conclusions of the SOM Report and key results in PJM's markets can be summarized as follows:

The volatility in wholesale energy prices over time is driven by the volatility in the underlying fuel prices. As fuel prices rose, so did wholesale energy prices. As fuel prices fell during the last half of 2008, wholesale energy prices declined as well.

In 2008 the decline in average energy for load in 2008 provided a mitigating effect on the increase in wholesale energy prices due to increased fuel prices in 2008. Had energy demand been as great as in 2007 or had continued to increase as it had historically, the annual load-weighted average LMP in 2008 would have been even higher than it was.

Wholesale energy prices in PJM are the product of competitive bidding behavior. On average coal-fired generating units that historically have been on the margin about 70 percent of the time, have negative mark-ups in their offers in a tight range of -0.01 to -0.04 (-1 to -4 percent) throughout 2008. Natural gas units historically on the margin about 25 percent of the time have mark-ups in their offers on average between 0.01 and 0.05 (1 to 5 percent).

The relatively small amount of offer capping at one percent of unit hours in the Real-Time Energy Market is further evidence of the competitiveness of PJM's markets. The offer capping that does occur is most prevalent among peaking units and in the EMAAC and SWMAAC regions of PJM. However, improved revenue adequacy for new entry combined cycle gas facilities and combustion turbines as a result of RPM, and new capacity already committed due to RPM in these regions indicate increased competitiveness in these constrained regions in the future.

There is a need to reform scarcity pricing in the PJM Market Design to better facilitate the participation of demand resources in PJM's Markets, especially during times when the system is approaching operating reserve shortages. Moreover, any new scarcity pricing reforms must ensure that prices do not paradoxically fall as the system approaches an operating reserve shortage. In addition and that the prices of energy and reserves must be rational so that it aids PJM in system operations during operating reserve shortage and does not result in a paradox of over generation during reserve shortages.

The purpose of the PJM Economic Load Response Program (ELRP) is to allow consumers who otherwise face fixed retail prices to respond to wholesale prices in the PJM Energy Market by providing price signals to consumers that replicate the prices they would face if they were exposed to real-time LMP. With access to wholesale power prices, consumers have the ability to make informed decisions about when and how much power to consume based on the value they attach to energy relative to the market price for energy. Demand response in PJM continues to evolve to meet the challenges of improving measurement and verification of demand reductions and to overcoming institutional barriers to the continuing evolution of demand response.

Using the cost-based offers for regulation submitted in December 2008 with the implementation of the TPTS and cost-based offer mitigation, almost 80 percent of regulation offers submitted in the first 11 months of 2008 were at or below the cost-

based offers. In combination with load-weighted average cleared offer prices of \$11.49/MW in the absence of market power mitigation beyond the \$100/MW offer cap, the results of the regulation market seem consistent with competitive behavior.

PJM has taken action following discussions with the IMM regarding the level of Tier 2 Synchronized Reserve procurement outside the Synchronized Reserve Market that has resulted in far less out-of-market Reserve procurement since February 1, 2009.

The results of the Day-ahead Scheduling Reserve Market which started on June 1, 2008 are competitive. PJM agrees with the IMM recommendation to implement the TPST with cost-based offer mitigation, but recommends revisiting the 150 percent threshold as it may not be appropriate for determining structural market power in a market with such low prices.

Market power mitigation incorporated in PJM's Market Design provides market participants and other interested stakeholder assurances that prices resulting in PJM's Markets are driven by competitive forces. However, the frequency with which cost-based offer mitigation occurs is low and analysis of bidding behavior by suppliers shows strong evidence of competitive behavior. PJM reiterates its commitment to competitive markets, to continued improvement of the PJM Market Design, and to the investigation of new tools that can be used to evaluate market performance. PJM looks forward to working with the IMM and market participants to address the open issues surrounding PJM's Markets in the areas of scarcity pricing, demand response, and other issues as they arise in the coming year.

## Appendix: PJM Response to the 2008 State of the Market Report Recommendations

The Independent Market Monitor (IMM) makes several recommendations in the 2008 State of the Market Report. PJM either supports the recommendations or supports the recommendation with some modifications.

### *Recommendations for continued action:*

PJM supports and agrees with the IMM regarding the recommendations for continued action. PJM appreciates the confirmation of these continuing actions by the IMM in order to ensure competitive market results.

1. **IMM Recommendation** — Retention and application of the improved local market power mitigation rules to prevent the exercise of local market power in the Energy Market while ensuring appropriate economic signals when investment is required.

**PJM Response** — PJM remains committed to retaining robust local market power mitigation rules and procedures.

2. **IMM Recommendation** — Retention, application and improvement of the RPM rules included in PJM's Tariff to stimulate competition, to provide direct incentives for performance, to provide locational price signals, to provide forward auctions to permit competition from new entrants and to limit market power by the application of clear and explicit market power mitigation rules. Implementation of enhancements to incentives for capacity resource performance to ensure stronger, market-based incentives for actual performance when needed.

**PJM Response** — PJM remains committed to retaining robust market power mitigation procedures in the capacity market. PJM agrees with the IMM that the RPM design include incentives for performance when needed. The RPM Capacity Market design explicitly allows competitive prices to reflect local scarcity without relying on the exercise of market power to achieve the objectives of the Capacity Market design and explicitly limits the exercise of market power.

3. **IMM Recommendation** — Retention and application of the improved market power mitigation rules in the Regulation Market to prevent the exercise of market power in the Regulation Market while ensuring appropriate economic signals when investment is required and an efficient market mechanism.

**PJM Response** — PJM is committed to market power mitigation in the Regulation Market to provide assurances of competitive outcomes. On December 1, 2008 PJM implemented the Three Pivotal Supplier Test and cost-based offer mitigation.

4. **IMM Recommendation** — Retention of the \$1,000 per MWh offer cap in the PJM Energy Market and other rules that limit incentives to exercise market power.

**PJM Response** — PJM remains committed to retaining rules that limit incentives to exercise market power including the overall existing energy market offer cap.

5. **IMM Recommendation** — Retention and application of enhancements to rules governing the payment of operating reserve credits to generators and the allocation of operating reserves charges among market participants.

**PJM Response** — PJM implemented changes to the determination of operating reserve credits and allocation of charges on December 1, 2008.

6. **IMM Recommendation** — Modification of rules governing demand-side programs to ensure appropriate levels of payment and to ensure appropriate measurement and verification of demand-side response. Evaluation of additional actions to address institutional issues which may inhibit the evolution of demand-side price response.

**PJM Response** — PJM implemented a new Customer Baseline (CBL) methodology on June 13, 2008 to make more the CBL, upon which reductions are measured, more representative of more recent levels of consumption absent demand reductions. Additionally PJM has implemented a Normal Operations Review of demand response settlements to ensure that all settled demand response are a result of actions taken in response to price and not business as usual under an inaccurate CBL. PJM has also been working within the stakeholder process to develop compensation for demand response that helps overcome possible barriers to entry that may remain for demand response.

7. **IMM Recommendation** — Reiteration by PJM and the Midwest ISO of their initial recommendation to create an energy schedule tag archive, as this would provide the transparency necessary for a complete loop flow analysis. The MMU recommends that the RTOs request action, and that both NERC and FERC consider taking the action required to make these data available to the RTOs and market monitors to make a full market analysis possible.

**PJM Response** — PJM agrees with the IMM that additional information is required on an hourly basis to provide greater transparency with respect to the sources of flows on the power grid. PJM is committed to working with other ISOs /RTOs and neighboring control areas to seek sharing of real-time transaction tag information and hourly flow information regarding power flows on key flowgates that result from hourly generation dispatch to meet control area. Currently, such hourly flow information is not available on an interregional basis.

8. **IMM Recommendation** — Continued improvement of pricing between PJM and surrounding areas, both market and non-market.

**PJM Response** — PJM is committed to working with other ISOs and RTOs and with neighboring control areas to improve interregional congestion management and to explore ways to implement real-time congestion management agreements.

9. **IMM Recommendation** — Continued enhancement of mechanisms used to manage flows at the interfaces between PJM and surrounding areas to ensure competitive outcomes.

**PJM Response** — PJM has been working with NYISO and Progress Energy to develop a real-time congestion management protocol. PJM is also committed to working with neighboring control area operators to explore ways to implement real-time congestion management agreements. A 2008 Loop Flow Study has been effective at shedding light on loop flows. PJM believes the solution to loop flow problems is better transparency of information about schedules and flows in real time that are caused by generation dispatch to serve control area load and by control area to control area transactions.

10. **IMM Recommendations** — Continued enhancement of PJM's posting of market data to promote market efficiency.

**PJM Response** — PJM remains committed to providing transparent data and information for all market participants. PJM has an established stakeholder process for all interested parties to propose enhancements to the posting of market data and this process has produced several enhancements in this area.

11. **IMM Recommendation** — Continued efforts to incorporate transmission investments into competitive markets.

**PJM Response** — PJM has in place criteria for evaluating transmission expansion projects based upon economic criteria and continues to refine it through compliance filings with FERC. As reliability driven transmission expansion is considered, PJM undertakes market efficiency analyses, the results of which are presented to the Transmission Expansion Advisory Committee and are summarized in the annual Regional Transmission Expansion Planning Report. In addition to the criteria for evaluating economic driven expansion, transmission can be bid into RPM as a capacity resource to serve a local deliverability area (LDA), although there has been no transmission project offered into RPM as yet.

***Recommendations for new action:***

1. **IMM Recommendation** — “Enhancement of PJM's scarcity pricing rules in the energy market to create regional scarcity signals that reflect stages of scarcity in order to ensure competitive prices when scarcity conditions exist in market regions.”

**PJM Response** — PJM and the IMM are in agreement on the need to reform scarcity pricing and are largely in agreement on the preferred method and many of the guiding principles for scarcity pricing reform.<sup>57</sup> PJM has proposed an operating reserve demand curve similar to that implemented by other RTOs that allows prices to rise in a pre-determined manner as the system encounters an operating reserve shortage during real-time operations. In the SOM Report the IMM has characterized this as modeling penalty factors for reserve constraints in the security constrained dispatch. These are equivalent in intent and implementation. While The IMM primarily is concerned revenue collected due to scarcity prices and RPM revenues offset each other. PJM does not disagree with the IMM in this view, but PJM views scarcity pricing primarily as a tool to send better price signals to generation and demand resources in short-term operations to maintain reliable system operations during extreme system peaks. PJM also believes further development of real-time scarcity pricing will also support smart grid initiatives at the state and national level.

2. **IMM Recommendation** — “Implementation of rules governing the definition of final prices to ensure certainty for market participants.”

**PJM Response** — PJM agrees with the IMM in that changing market prices after the fact should be avoided. However in certain circumstances correction of market prices may be necessary if an error is detected during quality assurance reviews in order to avoid a tariff violation. Given the rarity of such occurrences, and the compelling reasons for doing so for the instances it occurred in 2008, PJM believes that stakeholder discussion would be required to determine the feasibility of implementing comprehensive rules governing this issue. PJM believes it would be more helpful to develop more complete business rules, through the stakeholder process, that would specify the timing and application of market price adjustments in the event errors are detected.

3. **IMM Recommendation** — “Implementation of improved cost-based data submission to permit better monitoring and better analysis of markets. PJM should consider and implement rules requiring the submission of the components of cost-based generation offers.”

**PJM Response** — PJM recognizes the value to monitoring cost-based offers and having the individual elements of these offers broken out would make such monitoring and subsequent market analysis easier. However, PJM believes this recommendation should be vetted by the IMM in the PJM stakeholder process, and encourages the IMM to bring such a proposal to the stakeholder process. PJM is concerned that such a requirement could be viewed as administratively burdensome for all parties that must submit cost-based offers.

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<sup>57</sup> For example see “MMU’s Scarcity 719 Proposal” at <http://pjm.com/Media/committees-groups/task-forces/tf719/20090402/20090402-item-03-ma-scarcity-proposal-april.pdf> and PJM’s reply, “PJM Response to the Document Entitled “MMU’s Scarcity 719 Proposal” March 30, 2009” at <http://pjm.com/Media/committees-groups/task-forces/tf719/20090402/20090402-item-03-pjm-response-to-mmu-scarcity-719-prop.pdf>. See also the previous discussion of scarcity pricing above in this response.