2007 State of the Market Report

VOLUME 2: DETAILED ANALYSIS

MARKET MONITORING UNIT

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PREFACE

The Market Monitoring Unit of PJM Interconnection publishes an annual state of the market report that assesses the state of competition in each market operated by PJM, identifies specific market issues and recommends potential enhancements to improve the competitiveness and efficiency of the markets.

The *2007 State of the Market Report* is the tenth such annual report. This report is submitted to the Board of PJM Interconnection pursuant to the PJM Open Access Transmission Tariff (OATT), Attachment M (PJM Market Monitoring Plan):

> The Market Monitoring Unit shall prepare and submit to the PJM Board and to the PJM Members Committee, annual state-of-the-market reports on the state of competition within, and the efficiency of, the PJM Market. In such reports, the Market Monitoring Unit may make recommendations regarding any matter within its purview. The reports to the PJM Board shall include recommendations as to whether changes to the Market Monitoring Unit or the Plan are required.[1]

The Market Monitoring Unit is submitting this report simultaneously to the United States Federal Energy Regulatory Commission per the Commission's order:

> The Commission has the statutory responsibility to ensure that public utilities selling in competitive bulk power markets do not engage in market power abuse and also to ensure that markets within the Commission's jurisdiction are free of design flaws and market power abuse. To that end, the Commission will expect to receive the reports and analyses of an RTO's [regional transmission organization's] market monitor at the same time they are submitted to the RTO.[2]

1 PJM, OATT, "Attachment M: PJM Market Monitoring Plan," Third Revised Sheet No. 452 (Effective July 17, 2006).

2 96 FERC ¶ 61,061 (2001).

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SECTION 1 – INTRODUCTION

The PJM Interconnection, L.L.C. operates a centrally dispatched, competitive wholesale electric power market that, as of December 31, 2007, had installed generating capacity of 163,498 megawatts (MW) and more than 500 market buyers, sellers and traders of electricity in a region including approximately 51 million people in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.[1] As part of that function, PJM coordinates and directs the operation of the transmission grid and plans transmission expansion improvements to maintain grid reliability in this region.

PJM Market Background

PJM operates the Day-Ahead Energy Market, the Real-Time Energy Market, the Reliability Pricing Model (RPM) Capacity Market, the Regulation Market, the Synchronized Reserve Markets and the Annual and monthly Balance of Planning Period Auction Markets in Financial Transmission Rights (FTRs).

PJM introduced energy pricing with cost-based offers and market-clearing nodal prices on April 1, 1998, and market-clearing nodal prices with market-based offers on April 1, 1999. PJM introduced the Daily Capacity Market on January 1, 1999, and the Monthly and Multimonthly Capacity Markets in mid-1999. PJM implemented an auction-based FTR Market on May 1, 1999. PJM implemented the Day-Ahead Energy Market and the Regulation Market on June 1, 2000. PJM modified the regulation market design and added a market in spinning reserve on December 1, 2002. PJM introduced an Auction Revenue Rights (ARR) allocation process and an associated Annual FTR Auction effective June 1, 2003.[2] PJM introduced the RPM Capacity Market effective June 1, 2007.

Volume I of the *2007 State of the Market Report* is the Introduction. More detailed analysis and results are included in Volume II.[3]

Conclusions

This report assesses the competitiveness of the markets managed by PJM during 2007, including market structure, participant behavior and market performance. This report was prepared by and represents the analysis of PJM's independent Market Monitoring Unit (MMU).

The MMU concludes that in 2007:

- The Energy Market results were competitive;
- The Capacity Market results were competitive;
- The Regulation Market results cannot be determined to have been competitive or to have been noncompetitive;
- The Synchronized Reserve Markets' results were competitive; and
- The FTR Auction Market results were competitive.

1 See the *2007 State of the Market Report*, Volume II, Appendix A, "PJM Geography" for maps showing the PJM footprint and its evolution.

2 See also the *2007 State of the Market Report,* Volume II, Appendix B, "PJM Market Milestones."

3 Analysis of 2007 market results requires comparison to 2006 and to certain prior years. During calendar years 2004 and 2005, PJM conducted the phased integration of five control zones: ComEd, American Electric Power (AEP), The Dayton Power & Light Company (DAY), Duquesne Light Company (DLCO) and Dominion. By convention, control zones bear the name of a large utility service provider working within their boundaries. The nomenclature applies to the geographic area, not to any single company. For additional information on the integrations, their timing and their impact on the footprint of the PJM service territory, see the *2007 State of the Market Report*, Volume II, Appendix A, "PJM Geography."

Recommendations

The MMU recommends retention of key market rules, specific enhancements to those rules and implementation of new rules that are required for continued competitive results in PJM markets and for continued improvements in the functioning of PJM markets. The recommendations are for continued action where PJM has already identified areas for improvement and for new action in areas where PJM has not yet identified a plan.

Continued Action

- 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 applies the three pivotal supplier test to determine whether local energy markets are structurally competitive. The three pivotal supplier test, as implemented, is consistent with the United States Federal Energy Regulatory Commission's (FERC's) market power tests, encompassed under the delivered price test. The test is a flexible, targeted real-time measure of market structure which replaced the previous mitigation method of offer capping of all units required to relieve a constraint. The application of the three pivotal supplier test successfully limits offer capping in the Energy Market to situations where the local market is structurally noncompetitive and where specific owners have structural market power, except in cases where either specific units or interfaces are exempt from the application of this rule.

- Retention of the $1,000 per MWh offer cap in the PJM Energy Market and other rules that limit incentives to exercise market power.

  The PJM market design includes a variety of rules that effectively limit the incentive to exercise market power and ensure competitive outcomes. These should be retained and enforced and any proposed PJM market rule change should be evaluated for its impact on competitive outcomes.

- Retention and application of the rules included in PJM's RPM 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.

  Market power remains a serious concern in the PJM Capacity Market based on market structure conditions in this market including high levels of supplier concentration, frequent occurrences of pivotal suppliers and extreme inelasticity of demand. 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 via the application of the three pivotal supplier test.

- Implementation of enhancements to PJM's rules governing operating reserve credits to generators.

  The operating reserve rules should ensure that credits and corresponding charges to market participants are consistent with incentives for efficient market outcomes and should reduce gaming incentives. PJM is expected to file proposed changes, approved by the membership, to the operating reserve rules with the FERC in 2008.

- Continued enhancements to the cost-benefit analysis of congestion and transmission investments to relieve congestion, especially where that congestion may enhance generator market power and where such investments support competition.

  PJM has significantly improved its approach to the cost-benefit analysis of transmission investments. PJM should continue to evaluate critically its approach, particularly as it applies to constraints with large and persistent market impacts. New transmission projects and the lack of existing transmission can have significant impacts on the PJM markets. The goal of transmission planning should ultimately be the incorporation of transmission investment decisions into market-driven processes as much as is practicable.

- 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 and the MMU should continue efforts to ensure that market power is not exercised on the demand side of the market, particularly via gaming of the measurement and verification process. The rules governing measurement and verification need to be tightened substantially. The principal barriers to the further development of demand-side response are in the interface between wholesale and retail markets.

- Provision of data to PJM from external control areas to enable improved analysis of loop flows in order to enhance the efficiency of PJM markets.

  PJM and other control area operators have only limited access to the data required for a complete analysis of loop flow in the Eastern Interconnection. Provision of such data access and completion of the loop flow analysis could significantly enhance the transparency and efficiency of energy markets in both market and non market areas and the efficiency of transactions between market and non market areas as well as permit market-based congestion management across the Eastern Interconnection. Loop flows have negative impacts on the efficiency of market prices in markets with explicit locational pricing and can be evidence of attempts to game such markets. Loop flows also have poorly understood impacts on non market areas. PJM has taken some actions to address this issue and should give a high priority to continued actions to achieve this.

- Continued enhancement of mechanisms used to manage flows at the interfaces between PJM and surrounding areas.

  Changes in net interchange affect PJM operations and markets as they require increases or decreases in generation to meet load. As a result of the fact that ramp is free but is a valuable resource, there are strong incentives to game the ramp rules. The same is true of spot import service.

- Continued enhancement of PJM's posting of market data to promote market efficiency.

  PJM has expanded the types and extent of data posted to the Web for public access. PJM should continue to expand data posting consistent with the goal of improving market efficiency and stimulating competition.

- Based on the outcome of the active, public process that addressed the independence of market monitoring during the MMU's ninth year, the MMU is confident that the market monitoring function will be independent, well-organized, well-defined, clear to market participants and consistent with the policies of the FERC.[4, 5]

New Action

- Enhancements to PJM's scarcity pricing rules to create locational scarcity pricing signals in place of regional scarcity signals and to create stages of scarcity with corresponding stages of scarcity pricing in order to ensure competitive prices when scarcity conditions exist in market regions.

  The MMU reviewed the summer of 2007 for scarcity conditions and the market prices that resulted. Based on the results, the MMU recommends that PJM's scarcity pricing mechanism be reviewed and modified. The definition of scarcity should include several stages of scarcity, each with an associated administrative price, rather than the single step now in the Tariff. Scarcity pricing should include stages, based on system conditions, with progressive impacts on prices. In addition, the actual market signal needs further refinement. Under the current rules, a scarcity pricing event sets prices for all generators in the defined area at the same level, equal to the highest accepted offer within a scarcity pricing region. The single scarcity price signal should be replaced by locational signals that are consistent with economic dispatch, consistent with locational pricing and consistent with competitive market outcomes. PJM should also consider adding new scarcity pricing regions.

- Implementation of targeted, flexible real-time, market power mitigation in the Regulation Market.

  The MMU concludes from the analysis of the 2007 data that the PJM Regulation Market in 2007 was characterized by structural market power in 80 percent of the hours, based on the results of the three pivotal supplier test. The MMU concludes that it would be preferable to retain the existing, experimental single PJM Regulation Market as the long-term market if appropriate mitigation can be implemented. Such mitigation, in the form of the three pivotal supplier test, addresses only the hours in which structural market power exists and therefore provides an incentive for the continued development of competition. While suppliers have not provided data on their cost to regulate, an analysis of the Regulation Market based on the MMU's cost estimates, adjusted to reflect the modified cost definitions implemented in 2007, indicates that offers above the competitive level set the clearing prices in 26 percent of the hours. The combined market results include the effects of the current mitigation mechanism which offer caps the two dominant suppliers in every hour. The MMU also recommends that all suppliers be required to provide cost-based regulation offers, consistent with the practice in the Energy Market.

- Consistent application of local market power rules to all constraints.

  The MMU recommends that the Commission terminate the exemption from offer capping currently applicable to generation resources used to relieve the western, central and eastern reactive limits in the PJM Mid-Atlantic control zones and the AP South Interface. The MMU recommends that all constraints, including these interfaces, be subject to three pivotal supplier testing as specified in the PJM

4 PJM. "Open Access Transmission Tariff (OATT)," "Attachment M: PJM Market Monitoring Plan," Third Revised Sheet No. 452 (Effective July 17, 2006). Section VII.A. states: "The reports to the PJM Board shall include recommendations as to whether changes to the Market Monitoring Unit or the Plan are required."

5 On December 19, 2007, the parties filed a settlement with the Federal Energy Regulatory Commission, pursuant to the September 20, 2007, order in Docket Nos. EL07-56-000 and EL07-58-000 (consolidated).

Amended and Restated Operating Agreement (OA). The exemptions for the identified interfaces are no longer necessary given PJM's dynamic implementation of the three pivotal supplier test based on actual market conditions in real time. It is not necessary to make an *ex ante* decision about the market structure associated with individual interface constraints that applies for an extended period. Prior to the implementation of the three pivotal supplier test, all units required to resolve a constraint were offer capped. For the identified exempt interfaces, this could have resulted in the offer capping of a large number of units even when the relevant market was structurally competitive. That is no longer the case. Under the current PJM dynamic approach, offer capping will be applied only as necessary and will be applied on a nondiscriminatory basis for all units operating for all constraints. It would be reasonable to implement this change at the same time as the recommended changes to the scarcity pricing rules.

- Consistent application of local market power rules to all units, including those currently exempt from offer capping.

  PJM's offer-capping rules provide that specific units are exempt from offer capping, based on their date of construction. In a January 25, 2005, order, the FERC found "that the exemption for post-1996 units from the offer capping rules is unjust and unreasonable under section 206 of the Federal Power Act and that the just and reasonable practice under section 206 is to terminate the exemption, with provisions to grandfather units for which construction commenced in reliance on the exemption."[6] The FERC noted, however, that grandfathered units would "still be subject to mitigation in the event that PJM or its market monitor concludes that these units exercise significant market power."[7] A small number of exempt units accounted for a disproportionate share of markup in 2007. Eight exempt units accounted for 20 percent of the overall markup component of PJM prices in 2007.

  The rationale for grandfathering the specific 56 exempt units was that their owners might have relied on the exemption in deciding whether to invest. Given the substantial changes in PJM markets, including the introduction of the RPM Capacity Market and scarcity pricing, the rationale for grandfathering no longer holds. The combination of RPM and scarcity pricing has had a substantial impact on unit revenues, as demonstrated in the "Net Revenue" section of the *2007 State of the Market Report.* Rather than devise a special market power test for exempt units or go through a separate process for each such unit, it would be reasonable to remove the exemption on a going forward basis.

6 110 FERC ¶ 61,053 (2005).

7 110 FERC ¶ 61,053 (2005).