

Monitoring Competitive Markets

Pennsylvania Public Utility Commission

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Statutory Authority

- Pennsylvania Public Utility Commission
 - Pennsylvania Public Utility Code
 - Business Corporation Act (eminent domain)
- Federal Energy Regulatory Commission
 - Federal Power Act of 1935
 - Public Utility Regulatory Policies Act of 1978
 - Department of Energy Organization Act
 - Energy Policy Act of 1992
 - Energy Policy Act of 2005

Areas of Regulation

- Pennsylvania Public Utility Commission

- Retail Electricity
- Electric Transmission & Siting (not gas transmission)
- Gas
- Water
- Sewer
- Telephone
 - (above includes consumer service and billing complaints)
- Rail Crossings
-
- Transportation Safety (intrastate),
- Private toll:
 - canals, turnpikes, tunnels, bridges, wharves,

- Federal Energy Regulatory Commission

- Interstate water power generation facilities (dams)
- Interstate electric transmission rates & reliability (new)
- Wholesale electricity sales
- “Backstop” electric transmission siting (new)
- Wholesale gas sales
- Gas transmission line siting
- LNG facility siting,
- International wholesale electricity, gas

Areas of Regulation

- Pennsylvania Public Utility Commission
- Federal Energy Regulatory Commission

Retail:

“Sale to End User”

Wholesale:

“(Interstate) Sale
for Resale”

Market Monitoring

- Pennsylvania Public Utility Commission

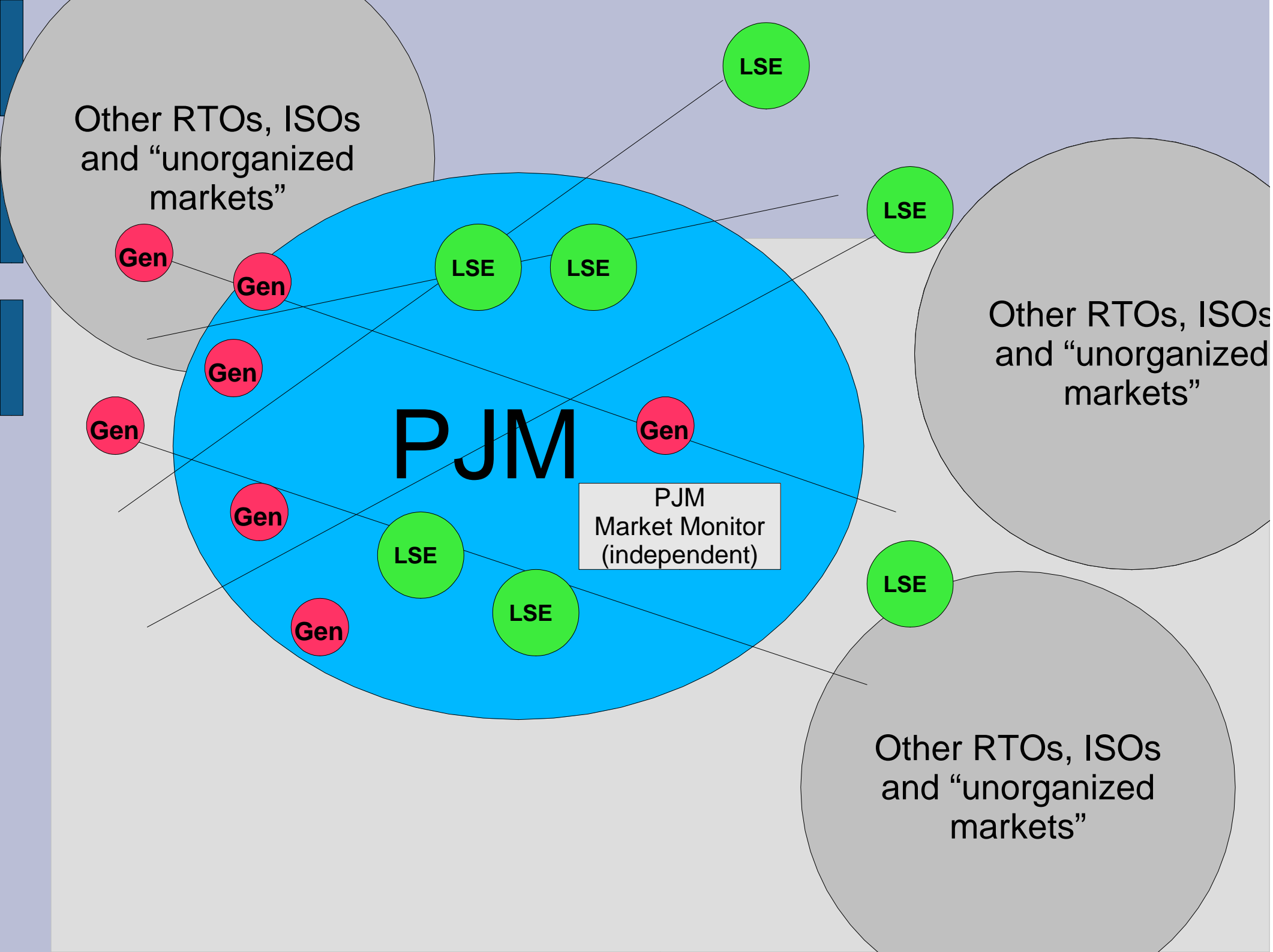
Retail Market Monitoring:

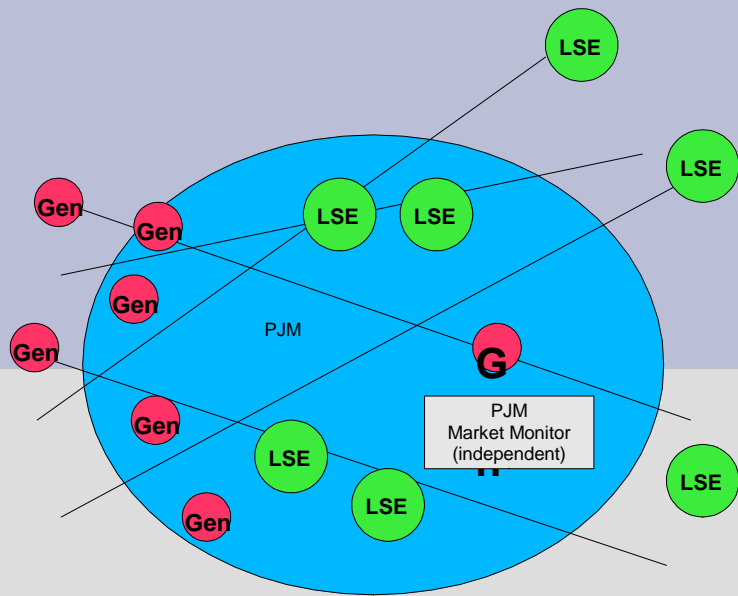
- Retail Sales
- Distribution Companies / Electric Generation Suppliers: Code of Conduct
- Consumer Protection
- No Jurisdiction
 - Interstate Electricity Sales
 - Wholesale Markets
 - ISOs / RTOs
 - Retail sales in other States,
 - Interstate Transmission

- Federal Energy Regulatory Commission

Wholesale Market Monitoring:

- RTOs / ISOs
- Wholesale Sellers
- Wholesale Buyers
- Transmission Grid Operators

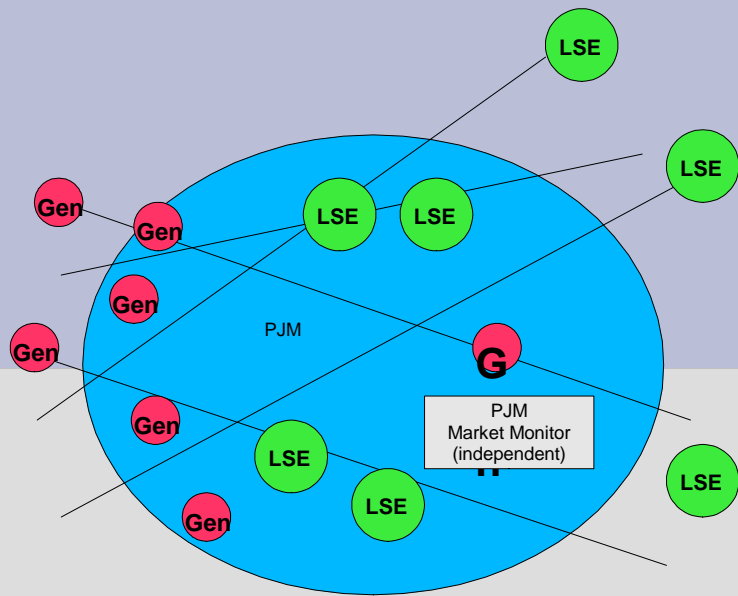




PJM

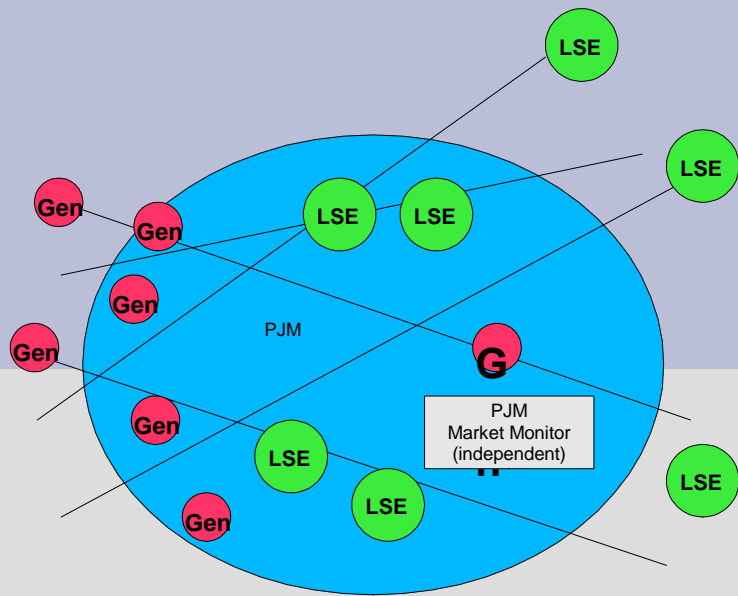
- Operates TX grid
- Monitors and controls grid in real time
- Schedules TX outages
- Directly controls generation for reliability
- Responsible for short term reliability
- Responsible for long term grid planning,
- Day Ahead and Real Time Energy Balancing Markets, capacity markets, financial redispatch hedging (FTRs and ARRs), demand response markets, etc., etc.
- Accepts power scheduling, withdrawals
- Controls ancillary services
- Does financial settlements
- Provides web information and data access
- Credit review of market participants
- etc...etc...etc...

Performs market mitigation pursuant to tariffed rules



PJM Independent Market Monitor (MMU)

- Monitors Generation Buyers, Sellers, Transmission Owners and PJM for anti-competitive behavior and compliance with market rules
- Monitors market rules for effectiveness
- Reports public findings to PJM, PJM members, State Commissions and FERC
- Maintains large data warehouse of past market transactions
- Has active, real time access to all PJM data
- May request generation data not held by PJM (generation heat rates, operating costs, bilateral transaction details) any other relevant data
 - If refused, must go to FERC
- Publishes annual State of the Market Report
- Reports suspected market manipulation to FERC on confidential basis (not to states)
- FERC does investigations
- **MMU does not directly mitigate markets**



FERC

- Sets market rules through tariffs
- Controls RTOs and participants through tariffs, enforcement actions
- Monitors (at high level) wholesale prices
- Interacts with RTO / ISO market monitors
- Conducts confidential investigations
- Penalizes violations of tariff rules
- Grants or denies market based rate authority to generation owners, LSEs
- Rules on complaints filed by market participants, State Commissions, State consumer advocates and public
- **Independent quasi-judicial agency**
 - Does not assume control of grid
 - Does monitor all direct real time RTO data
 - Actions reviewed only by Federal Courts
 - Congress controls annual budget
 - FERC Commissioners appointed by President, confirmed by Congress

PJM Market Monitor

PJM MMU

- Uses a variety of screens and tests for determining exercise of market power and manipulation
 - Concentration tests (HHI)
 - Marginal Cost Review of Generation Units
 - Generation Reported
 - Industry Database
 - Historic and real time conduct
 - Economic withholding
 - Physical withholding
 - “Scarcity Pricing” vs. “Market Power”

PJM Market Monitor

- Three pivotal supplier test
 - In a given region constrained by transmission import capability:
 - If three or fewer generation owners control the region (i.e. control all the pivotal generation), market power is assumed to exist (scarcity pricing exception on next slide) they fail the test
 - Failing units are “mitigated”: price capped at cost plus defined additional cost and profit
 - Chronically capped units may request “reliability must run contracts”
- Mitigation may occur in day ahead or real time markets
- Exempt interfaces present a problem for MMU

PJM Market Monitor

PJM MMU

- Reliability must run units
 - Units that are frequently mitigated in localized area may negotiate with PJM for “RMR” contract
 - PJM not obligated to agree – price is negotiated
 - Generating units have option to mothball or retire units
 - MMU may investigate retirements or mothballing for market power concerns

PJM Market Monitor

Scarcity Pricing

- When energy consumption has increased to critical levels and system operators must take emergency actions:
 - normal mitigation rules are suspended
 - scarcity pricing rules are triggered.
 - no generator mitigation and prices capped at \$1000
- When energy consumption has dropped to a non-emergency level – Normal mitigation rules apply

PJM Market Monitor

Generation Facilities

- MMU maintains database of bidding and market behavior; monitors bidding behavior
 - Looks for odd operational and bidding patterns for:
 - Physical withholding
 - Economic withholding
 - Attempts to “break the rules”
 - Collusion or parallel actions
 - “Broken” market design rules

PJM Market Monitor

Transmission Facilities

- Because transmission owners may also own generation, MMU:
 - Monitors scheduled and unscheduled outages

PJM Market Monitor

Load Serving Entities

- Some limited monitoring of buyers in capacity markets:
 - Buyers that bid generation capacity into RPM markets 70% or below “industry reference price” may be mitigated according to “minimum offer price rule”
 - Generators assert that buyers should not be able to “crash the market” through bidding in generation capacity below cost.
 - I say “baloney”

Market Monitoring Issues

- PJM and MMU have policy differences
 - PJM management has sought to replace three pivotal supplier test with a more “generation friendly” screen
 - Certain newer generation facilities are exempt from some offer capping rules
 - Some interfaces are exempt from three pivotal supplier application



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.

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: Central American Electric Power (AEP), The Dayton Power & Light Company (DPL), Duquesne Light Company (DLC) 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."

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



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



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