



Analysis of the Three Pivotal Supplier Test: March 1 through August 31, 2006

**PJM Market Monitoring Unit
October 18, 2006**

Summary

The Market Monitoring Unit (MMU) submits this report in compliance with its obligation to evaluate on a quarterly basis whether any changes in status are appropriate for the exempt and non-exempt interfaces in PJM.

The PJM Operating Agreement (OA) (Schedule 1, Section 6.4.1(d)(i)) states that “offer price caps shall not be applicable to generation resources used to relieve the Western, Central and Eastern reactive limits in the MAAC Control Zone and APS South Interface,” subject to the additional OA provision (Schedule 1, Section 6.4.1(d)(ii)) that “on a quarterly basis, using an analysis no less stringent than the test for suspending offer capping set forth in sections 6.4.1(e) and (f) below, the PJM Market Monitoring Unit will evaluate whether additional interfaces also should be exempt and whether any existing exemptions should be terminated.” This report is in compliance with the defined MMU’s quarterly reporting obligation.

The test for suspending offer capping set forth in the OA Schedule 1, Sections 6.4.1(e) and (f) is the three pivotal supplier test. The three pivotal supplier test is applied by PJM on an ongoing basis in order to determine whether offer capping is required for any constraint not exempt from offer capping. The MMU analyzed the results of the three pivotal supplier tests conducted by PJM for the real-time energy market during the period March 1, 2006 through August 31, 2006. A summary of the results of PJM’s application of the three pivotal supplier test is presented for all constraints including interfaces currently exempt from the application of offer mitigation rules and interfaces currently subject to the application of the offer mitigation rules.

As a result of PJM’s recent implementation of the three pivotal supplier test in real time, the actual competitive conditions associated with each binding constraint are analyzed in real time as they arise. The three pivotal supplier test replaced the prior approach which was to offer cap all units required to resolve a binding constraint. As a result of the fact that the new approach ensures that offer capping will be applied only when required by market conditions, the MMU recommends that no interfaces or constraints be granted a blanket exemption. The MMU recommends that offer capping be based on the application of the three pivotal supplier test to actual market structures for all constraints, including those interfaces now exempt from offer capping.

Background

By order issued April 18, 2005, the Commission set for hearing, in Docket No. EL04-121-000, PJM’s proposal (a) to exempt the APS South Interface from PJM’s offer-capping rules and (b) to conduct annual competitive analyses to determine whether additional exemptions from offer capping are warranted.

By order issued July 5, 2005, the Commission also set for hearing, in Docket No. EL03-236-006, PJM’s three pivotal supplier test used to determine whether suppliers have market power when units must be called out of merit order in order to resolve transmission constraints. The Commission further set for hearing issues related to the appropriateness of implementing scarcity pricing in PJM. In the July Order, the Commission consolidated Docket No. EL04-121-000 and Docket No. EL03-236-006.

On November 16, 2005 PJM filed a Settlement Agreement resolving all issues set for hearing in the two section 206 proceedings established by the Commission to address certain aspects of PJM’s market power mitigation rules including the application of the three

pivotal supplier test, provisions for scarcity pricing, offer caps for frequently mitigated units and competitive issues associated with certain of PJM's internal interfaces. On December 20, 2005, the Presiding Administrative Law Judge certified the Settlement Agreement to the Commission as uncontested. On January 27, 2006 in Docket Nos. EL03-236-006, EL04-121-000, 001 and 002 the Commission ordered that the Settlement Agreement, including the amendments to the PJM Tariff and Operating Agreement, was in the public interest and was thereby approved and accepted for filing and made effective as set forth in the Settlement Agreement.¹

Prior Analyses

The Commission conferred blanket exemptions from offer capping for local market power mitigation on four of the largest interfaces in PJM prior to the development and implementation of the three pivotal supplier test. The current exemption of the Western, Central and Eastern interfaces (reactive limits) in the MAAC Control Zone is based on a study completed in 1997 and submitted as part of PJM's initial application to the Commission.² That study examined HHI statistics for a then recent historical period and determined that concentration was generally not high enough to be a concern for these interfaces. The study did not examine the markets defined by the demand for effective MW to resolve the identified interface constraints and associated incremental MW of effective supply available to meet that demand, but analyzed the total capacity in the areas created by the interfaces, taking account of estimated costs as well as a market definition for total capacity consistent with the delivered price test approach. As a result of data limitations, that study did not account for distribution factor impacts on effective supply or the effective cost of that supply. That study also concluded that local market power was a concern for the local markets created by other transmission constraints.

The current exemption of the APS South Interface is based on an October 2004 report of the PJM Market Monitor. On October 26, 2004 PJM submitted a Report of the PJM Market Monitor Regarding Offer Capping of Major Transmission Constraints in which the PJM Market Monitor concluded that the continued exemption of the Western, Central and Eastern interfaces was supported by competitive analysis as was exemption of the APS South Interface.³ The conclusions of the October report differ from the recommendations in the present report for a number of reasons, primarily that offer capping is now applied in real time based on the results of the three pivotal supplier test that takes account of actual, real-time system conditions including generator availability and transmission system conditions. Given this real-time application of a test for competition, there is no longer a need to make a general determination about the competitiveness of any constraint, including the currently exempt interfaces.

In the October 2004 report, a delivered price test was performed based on supply curves simulated using GE MAPS and representative loads for each constraint analyzed. The supply curve was divided into four quartiles, representing relatively competitive resources within each quartile of the supply curve, for each system load condition. Load duration analysis was used to divide load levels into four quartiles for each constraint where the difference among the four quartiles was the system load and the corresponding system price. The requirement, or demand for, MW levels of control actions was determined by reviewing a range of actual system conditions and selecting a representative high requirement for control actions taken by PJM where these data were available from PJM and

¹ 114 FERC ¶ 61,076.

² *PJM Supporting Companies*, Transmittal Letter, Docket No. ER97-3729-000 (July 14, 1997).

³ See Report of the PJM Market Monitor filed October 26, 2004 in Docket Nos. ER04-539-001, 002, EL04-121-000 at P 27.

using estimates where the data were not available. Within the markets defined in this manner, a pivotal supplier analysis was performed to determine the extent to which one or more suppliers were individually or jointly pivotal in the market to provide required control for the identified major transmission constraints.⁴

The method of analysis performed in the October 2004 report differed in a number of significant ways from the application of the three pivotal supplier test arising from the Settlement Agreement cited above, and as currently defined in the OA and applied by PJM. The October 2004 analysis used a simulation of expected market conditions under a single set of defined circumstances while the current application of the three pivotal supplier test is in real time and is based on actual system conditions. In the October 2004 report, generation was evaluated based on marginal cost while the current application of the three pivotal supplier analysis takes into account actual generation offers. The October 2004 report estimated the definition of the relevant market while the current application of the three pivotal supplier analysis defines the market based on the actual MW available at a price less than or equal to 150 percent of the clearing price for constraint relief. The three pivotal supplier test defined in the OA represents a significant evolution in accuracy because the current application of the test uses real-time data and tests constraints as they actually arise with all the actual system features that exist at the time including transmission constraints, load and generator availability.

Results for All Constraints

Peak Hours

There were a total of 37,620 three pivotal supplier tests applied across 345 constraints during peak hours for the period March 1, 2006 through August 31, 2006.⁵ Of the 345 constraints tested during peak hours, all demonstrated market structures which resulted in one or more owners failing the three pivotal supplier test for at least one tested interval. Of the 37,620 tests conducted during peak hours, 37,186 were applied to non-exempt constraints.⁶ Of these 37,186 tests, 4,800, or 13 percent, resulted in one or more suppliers passing the three pivotal supplier test. Under PJM's prior offer mitigation rules, all suppliers would have been subject to offer capping. A summary of these results is presented in Figure 1.

Off-Peak Hours

There were a total of 23,646 tests applied across 196 different constraints during off-peak hours for the period March 1, 2006 through August 31, 2006. Of the 196 constraints tested during off-peak hours, 192 demonstrated market structures which resulted in one or more owners failing the three pivotal supplier test for at least one tested interval. Of the 23,646 tests conducted during off-peak hours, 23,482 were applied to non-exempt constraints. Of these 23,482 tests, 6,893, or 29 percent, resulted in one or more suppliers passing the three pivotal supplier test. Under PJM's prior offer mitigation rules, all suppliers would have been subject to offer capping. A summary of these results is presented in Figure 1.

⁴ Id at P 16.

⁵ Peak hours are defined as weekdays between 0700 and 2300 hrs, excluding NERC holidays.

⁶ Offer price caps currently are not applicable to generation resources used to relieve the Western, Central and Eastern reactive limits in the MAAC Control Zone and APS South Interface.

Figure 1 PJM Application of Three Pivotal Supplier Test to All Constraints

	Peak hours	Off-peak hours
Total tests applied		
All constraints	37,620	23,646
Non-exempt constraints	37,186	23,482
Tests resulting in one or more passing owners		
All constraints	5,100	7,012
Non-exempt constraints	4,800	6,893
Percent of tests resulting in one or more passing owners		
All constraints	14%	30%
Non-exempt constraints	13%	29%

Results for Interfaces

Offer caps currently do not apply to generation resources used to relieve the Western, Central and Eastern reactive limits in the MAAC Control Zone or the APS South Interface. Nonetheless, during the period March 1, 2006 through August 31, 2006, three pivotal supplier test results were calculated for all four currently exempt interfaces.

Interface Testing Results: Peak Hours

Exempt Interfaces

There were a total of 434 three pivotal supplier tests applied to the exempt interfaces during peak hours for the period March 1, 2006 through August 31, 2006. Of the 434 three pivotal supplier tests applied to exempt interfaces during peak hours, 198, or 46 percent of those, resulted in one or more suppliers failing the three pivotal supplier test. Under PJM's current offer mitigation rules, these suppliers were not subject to offer capping. A summary of these results is presented in Figure 2. A breakdown of the results for exempt interfaces is presented in Figure 3. Figure 3 shows that 361, or 83 percent, of the tests applied to exempt interfaces during on-peak periods were applied to the APS South Interface with the remainder applied to the other three exempt interfaces. Figure 3 also shows that 178, or 90 percent, of the three pivotal supplier tests during on-peak periods with one or more failing owners were for the APS South Interface, again with the remainder for the other three exempt interfaces.

Non-Exempt Interfaces

There were a total of 2,383 tests applied to non-exempt interfaces during peak hours for the period March 1, 2006 through August 31, 2006.⁷ Of the 2,383 three pivotal supplier tests applied to non-exempt interfaces during peak hours, 944, or 40 percent of those, resulted in one or more suppliers failing the three pivotal supplier test. Under PJM's current offer

⁷ Non-exempt transfer interfaces are those constraints defined as transfer interfaces and not subject to exemption from offer mitigation per section 6.4.1(d)(i) of the PJM Operating Agreement. Non-exempt transfer interfaces for which the TPS was applied during the study period and included in this analysis are the 5004/5005, Bedington-Black Oak, Kanawha-Matt Funk and PL North transfer interfaces. A list of interfaces used by PJM in RT operations and the Day-Ahead Energy Market may be found at www.pjm.com/markets/energy-market/downloads/20031017-interface-definitions.xls (35 KB).

mitigation rules, these suppliers were subject to offer capping. A summary of these results is presented in Figure 2.

Interface Testing Results: Off-Peak Hours

Exempt Interfaces

There were a total of 164 tests applied to exempt interfaces during off-peak hours for the period March 1, 2006 through August 31, 2006. Of the 164 three pivotal supplier tests applied to exempt interfaces during off-peak hours, 76, or 46 percent of those, resulted in one or more suppliers failing the three pivotal supplier test. Under PJM's current offer mitigation rules, these suppliers were not subject to offer capping. A summary of the exempt interface results is presented in Figure 2. A breakdown of the results for exempt interfaces is presented in Figure 3. Figure 3 shows that 122, or 74 percent, of the tests applied to exempt interfaces during off-peak periods were applied to the APS South Interface with the remainder applied to the other three exempt interfaces. Figure 3 also shows that 72, or 95 percent, of the three pivotal supplier tests during off-peak periods with one or more failing owners were for the APS South Interface, again with the remainder for the other three exempt interfaces.

Non-Exempt Interfaces

There were a total of 2,827 tests applied to non-exempt interfaces during off-peak hours for the period March 1, 2006 through August 31, 2006. Of the 2,827 three pivotal supplier tests applied to non-exempt interfaces during off-peak hours, 1,759, or 62 percent of those, resulted in one or more suppliers failing the three pivotal supplier test. Under PJM's current offer mitigation rules, these suppliers were subject to offer capping.

Figure 2 PJM Application of Three Pivotal Supplier Test to Interface Constraints

	Peak hours	Off-peak hours
Total tests applied		
Exempt interfaces	434	164
Non-exempt interfaces	2,383	2,827
Tests resulting in one or more failed owners		
Exempt interfaces	198	76
Non-exempt interfaces	944	1,759
Percent of tests resulting in one or more failed owners		
Exempt interfaces	46%	46%
Non-exempt interfaces	40%	62%

Figure 3 PJM Application of Three Pivotal Supplier Test to Exempt Interface Constraints

Period	Constraint	Total tests applied	Number of tests with one or more failing owners	Percent of tests with one or more failing owners
Peak	TRANSFER INTERFACE: APSOUTH	361	178	49%
Peak	TRANSFER INTERFACE: CENTRAL	6	3	50%
Peak	TRANSFER INTERFACE: EAST	11	5	45%
Peak	TRANSFER INTERFACE: WEST	56	12	21%
Offpeak	TRANSFER INTERFACE: APSOUTH	122	72	59%
Offpeak	TRANSFER INTERFACE: CENTRAL	10	0	0%
Offpeak	TRANSFER INTERFACE: EAST	0	0	N/A
Offpeak	TRANSFER INTERFACE: WEST	32	4	13%

Process and Recommendations

Section 6.4.1(d)(ii) of Schedule 1 of the PJM Operating Agreement states:

“On a quarterly basis, using an analysis no less stringent than the test for suspending offer capping set forth in sections 6.4.1(e) and (f) below, the PJM Market Monitoring Unit will evaluate whether additional interfaces also should be exempt and whether any existing exemptions should be terminated. Considering the recommendations of the PJM Market Monitoring Unit, the Office of the Interconnection shall determine whether to make a filing with the FERC proposing that an additional interface should be exempt or an existing exemption should be terminated. Any change in the exempt status of the interface shall become effective upon FERC acceptance. The Office of the Interconnection shall post a summary of the results of the PJM Market Monitoring Unit’s quarterly analyses and the Office of the Interconnection’s determination whether to make a filing with the FERC.”

Section 6.4.1(e) of the PJM Operating Agreement states in part:

“Notwithstanding the number of jointly pivotal suppliers in any hour, if the Market Monitoring Unit determines that a reasonable level of competition will not exist based on an evaluation of all facts and circumstances, it may propose to the Commission the removal of offer-capping suspensions otherwise authorized by this section. Such proposals shall take effect only upon Commission acceptance or approval.”

The PJM Market Monitor 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 MAAC Control Zone and the APS South Interface. The PJM Market Monitor recommends that all constraints, including these interfaces, be subject to three pivotal supplier testing as specified in the PJM Operating Agreement. This recommendation is based on two factors.

The current exemption of the West, South and Central interfaces is based on an analysis performed in 1997 and supported by the October 2004 report cited above. The current exemption of the APS South Interface is based on the October 2004 report. Neither analysis was as accurate as the current application of the three pivotal supplier test by PJM. The 1997 analysis was based on HHI and market share results for broad areas of the system and did not incorporate distribution factor impacts or analysis of incremental supply and demand associated with constraints. The October 2004 report was described above.

The primary reason to remove the exemptions for the identified interfaces is that they 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 whenever the constraint was binding. 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 non-discriminatory basis for all units operating for all constraints.

The fact that some non-exempt constraints never had any generation resources that failed the three pivotal supplier test during the period analyzed does not lead to the conclusion that such constraints should always be exempt from offer capping for local market power. The same logic applies to currently exempt interface constraints. Even if no generation resources associated with any of the exempt interface constraints failed the three pivotal supplier test during the study period, that does not mean that such interfaces should always be exempt from offer capping for local market power. The fact that one or more generation resources required to resolve these interfaces did fail the three pivotal supplier test at times simply reinforces the point. If the generation resources associated with these interfaces always pass the three pivotal supplier test, there will be no offer capping and conversely if such resources at times fail the three pivotal supplier test, appropriate offer capping will be applied.