

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

PJM Interconnection, L.L.C.

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Docket No. ER11-2288

**AFFIDAVIT OF JAMES F. WILSON
IN SUPPORT OF PROTEST AND COMMENTS OF
THE JOINT CONSUMER ADVOCATES**

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I. Introduction

1. My name is James F. Wilson. I am an economist, principal of Wilson Energy Economics, and affiliate of LECG, LLC. My business address is 4800 Hampden Lane Suite 200, Bethesda, MD 20814.

2. I have 25 years of consulting experience to the electric power and natural gas industries. Many of my past assignments have focused on the economic and policy issues arising from the introduction of competition into these industries, including restructuring policies, market design, and market power. Other engagements have included contract litigation and damages; pipeline rate cases; forecasting and market assessment; evaluating allegations of market manipulation; probabilistic modeling of utility planning problems; and a wide range of other issues arising in these industries. I also spent five years in Russia in the early 1990s advising on the reform, restructuring, and development of the Russian electricity and natural gas industries for the World Bank and other clients. I have submitted affidavits and presented testimony in proceedings of the Federal Energy Regulatory Commission (“Commission”), state regulatory agencies, and U.S. district court. I hold a B.A. in Mathematics from Oberlin College and an M.S. in Engineering-Economic Systems from Stanford University. My curriculum vitae, summarizing my experience and listing past testimony, is Exhibit JFW-1 attached hereto.

3. I have been involved in electricity restructuring and wholesale market design for over twenty years in PJM, New England, Ontario, California, Russia, and other regions. I have also been involved in issues of reliability planning, resource adequacy, and peak load forecasting. With regard to the PJM system, I have been involved in a broad range of market design, planning and capacity market issues over the past several years.

4. On December 2, 2010, PJM Interconnection, L.L.C. (“PJM”) filed tariff revisions to establish new demand response (“DR”) products and to impose new restrictions on the quantities of certain DR products that would be allowed to clear in Reliability Pricing Model (“RPM”) base residual auctions. PJM requests an order by February 1, 2011 in order to put the

new restrictions in place for the RPM base residual auction scheduled for May 2011 for the 2014/2015 delivery year.

5. This affidavit was prepared at the request of the Pennsylvania Office of the Consumer Advocate, the New Jersey Division of Rate Counsel, the Office of the Ohio Consumers' Counsel, the Maryland Office of People's Counsel, and the Office of the People's Counsel of the District of Columbia. I have been asked to review and comment on the PJM Filing and supporting affidavits of Thomas A. Falin and Michael E. Bryson. In particular, I was asked to 1) evaluate the proposed limits on clearing of the traditional DR product and the methodology used to calculate them; 2) evaluate whether there is a reliability need to impose the proposed limits (or higher limits) on DR for the upcoming RPM auction; and 3) comment on the proposed approach for imposing the restrictions in the RPM auctions. I also comment on a few other aspects of the PJM filing, in particular the impact of the proposed changes on the policy under which 2.5% of the Reliability Requirement is acquired in the three RPM incremental auctions for each delivery year rather than in the base residual auction.

II. Summary of Evaluation and Conclusions

6. The "traditional" DR product on the PJM system is required to perform a maximum of ten times per year and a maximum of six hours each time called. The PJM filing is motivated by the expressed concern that with DR satisfying a higher fraction of the RTO and LDA Reliability Requirements in future years, there might be times when some of the DR capacity is needed for more than six hours or for more than ten calls, but it would not be required to perform or be subject to penalties for non-performance. To prevent such circumstances from occurring, PJM proposes to introduce two new DR products that do not have the ten call/six hour parameters and to establish minimum purchase quantities for "unlimited" or less limited capacity products, in effect restricting the quantities of the traditional DR product that can clear in the RPM auctions.

7. I evaluated the proposed methodology for establishing the limits on the traditional DR product and find that it is unnecessarily restrictive. The proposed methodology is based on the assumption that when PJM calls DR, all of the DR operates during the same 6-hour window; however, PJM presents no data to support this assumption. This assumption is contradicted by the historical patterns of DR use on the PJM system, which show that DR operation is always

spread over additional hours and generally matches the hourly shape of load. Assuming a very modest staggering of the DR operation, which still understates the historical spreading of DR use, allows the limits on DR to be increased by one-third to one-half.

8. I also evaluated whether there is a reliability need to impose restrictions on “limited” DR products (or, equivalently, minimum purchase levels on “unlimited” products) for clearing the May 2011 base residual auction for the 2014/2015 delivery year. To impose such restrictions on this auction, the restrictions would have to be identified by February 1, 2011, and this motivates PJM’s request for an order in this proceeding by that date. I explain that there is not a reliability need to impose these restrictions on this auction because there are many ways an identified need for unlimited capacity, and a shortfall of such capacity in this base residual auction, can be addressed in the intervening time before the delivery year arrives:

- a. Load forecasts may be revised downward, reducing the Reliability Requirement and need for unlimited capacity (recent forecasts have repeatedly been lowered, and PJM’s independent consultant has recommended changes to its forecasting methodology that are likely to lower next year’s forecasts);
- b. A decrease in the Installed Reserve Margin or Capacity Emergency Transfer Objective (“CETO”) values can also reduce the Reliability Requirements (PJM plans to review its CETO methodology in 2011);
- c. Additional experience with the operation of larger amounts of DR on the PJM system may lead to refinements to the proposed procedures for establishing the limits, and some relaxation of the limits on DR;
- d. Shortage pricing and price-responsive demand will draw forth additional supply and demand reductions; these incremental resources may also reduce the Reliability Requirements for this delivery year, which initially will ignore such resources;
- e. There will be three Incremental Auctions held between the base residual auction and the delivery year, and additional economical capacity purchases are typically available through these auctions.

9. In addition, even if PJM were to enter the delivery year with less “unlimited” product than it desires, it can call on traditional DR providers to operate additional hours or for

additional calls if the need arises, and the evidence has been that they will respond even if not exposed to penalties during such hours.

10. I also reviewed the proposed approach to acquiring capacity through RPM to satisfy the proposed restrictions on DR products and minimum purchase levels for unlimited or less limited products. Contrary to PJM's claim, there is not a good analogy between the separate auctions for LDA capacity and the proposed treatment of different DR products. Unlike capacity located in different zones, the various DR products would be very good substitutes for one another. PJM's proposal apparently would use "vertical" demand curves for the unlimited products, which is contrary to the current RPM design based on downward-sloping capacity demand curves and could lead to inefficient results.

11. I also note some additional flaws in the draft DR Reliability Target Analysis Procedures and in the proposed tariff language. Finally, I comment on the proposed treatment of the Short Term Resource Procurement Target in conjunction with the proposed limits on DR, and find PJM's proposed approach appropriate.

12. PJM proposes two new DR products, an unlimited product (that can be called any number of times all year, for up to ten hours each time) and a summer unlimited product (that can be called May through October, for up to ten hours each time). The summer unlimited product is important as it accommodates existing or planned utility DR programs. However, for brevity, the discussion in this affidavit mainly focuses on the proposed limits on the traditional DR product.

13. The remainder of this affidavit is organized as follows. The next section comments on the proposed procedure for determining the DR Reliability Targets, and shows that the target is considerably higher if one key assumption is corrected. The following section describes why there is not a reliability need to put the proposed restrictions, or the higher restrictions based on my calculation, in place for the upcoming RPM auction. The final sections comment on the auction approach, tariff language, and a few other issues.

III. The Proposed Limits on the Traditional DR Product Are Based on Unrealistic and Infeasible Assumptions and are Unnecessarily Restrictive

14. The draft proposed *DR Reliability Target Analysis Procedures* (Exhibit 2 to the Falin Affidavit) call for evaluating, for the RTO region and each applicable LDA, two potential limits on traditional DR: one based on the ten call limit ("Ten Call Analysis") and one based on

the six hour limit (“Duration Analysis”). Then for the RTO and each LDA, the applicable DR Reliability Target is the lesser of the two limits. Limits are also determined for the proposed new Extended Summer DR product. These DR Reliability Targets determine the Minimum Annual Resource Requirement (“MARR”) and Minimum Summer Extended Resource Requirement (“MESRR”), which become minimum purchase quantities for the RPM auctions.

15. PJM’s original concern was with the ten call limit. PJM’s first presentation on the “DR Saturation” issue this year was to the Reserve Requirements Assumptions Working Group (“RRAWG”) on April 9, 2010.¹ The first presentation included only the Ten Call Analysis of DR saturation based on the ten call limit, with the final slide stating that future work would “Investigate if 6 hour duration limit on DR interruption is a limiting factor”. Under the proposed analytical approach, the ten call limit suggests a DR Reliability Target for the RTO of 8.5%.

16. However, under the analytical approach and assumptions PJM now proposes, the limits based on the Duration Analysis are much lower than the limits based on the Ten Call Analysis (for the RTO Region, 4.7% compared to 8.5%²). Because the lower of the two limits is used, the limits based on the Duration Analysis, not ten calls, determine the results. The Duration Analysis methodology that now results in the lower restrictions (4.7% for the RTO Region) was first presented only in October.³

17. Because the Duration Analysis ultimately determines the proposed limits, I focus my attention on that part of the analysis, and discuss the Ten Call Analysis only briefly.

A. Description of the Proposed Duration Analysis

18. Both the Ten Call Analysis and the Duration Analysis rely upon the same critical assumption: that whenever PJM calls DR, it will call all available DR, and the DR will all perform during the exact same six hour interval. This assumption is illustrated in the figure that appears on page 14 of the filing and also on page 9 of the *May 2010 Analysis*, Exhibit 1 to the Falin Affidavit. This figure is included here as Figure 1.

¹ RRAWG meeting April 9, 2010 item 5A: *DR Saturation*, available at <http://www.pjm.com/~media/committees-groups/working-groups/rrawg/20100409/20100409-item-05a-dr-saturation-analysis.ashx>

² DR Reliability Target Analysis Results for 2013/2014 Delivery Year, Exhibit 3 to the Falin Affidavit.

³ *DR Saturation Analysis*, presentation to Planning Committee meeting, October 6, 2010.

19. Figure 1 shows that if all DR is implemented during the six-hour period from (hour ending) 1400 to 1900, and none operates outside that window, the daily peak does not decline by the quantity of DR, because the daily peak now occurs in an hour in which no DR was called (hour ending 1300). To put numbers around this, if the peak absent DR would have been 146,000 MW, and the quantity of DR was 12,000 MW, we would want the peak to decline by 12,000 MW to 134,000 MW assuming all DR is called. Instead, Figure 1 shows that if all DR is called for the six hours as shown, the daily peak is now in hour ending 1300 and is about 140,000 MW. As a result, the 12,000 MW of DR only reduced the daily peak by 6,000 MW (from 146,000 MW to 140,000 MW), and PJM did not obtain the full reliability impact of the DR. Notice that if the quantity of DR had been much smaller (say, 1,000 MW) the peak would have been reduced the full 1,000 MW, indicating that the DR Saturation problem is associated with larger quantities of DR.

20. Based on this concept, the proposed Duration Analysis, described in the document *DR Reliability Target Analysis Procedures* (Exhibit 2 to the Falin Affidavit), works as follows. A small number of historical days with very high loads or when DR was called are selected. For each of these days, the maximum quantity of DR such that the full value of the DR would be realized, rather than shifting the peak outside the six hour window, is determined, based on the day's hourly load pattern, and assuming all DR operates during a six-hour window. PJM's assumption that all DR is called and performs during the same six-hour window drives the result. For each day selected for the analysis, the limit on DR becomes simply the difference between the daily peak and the load level in the seventh highest load hour, because it is assumed DR reduces the load only in the top six hours and no DR at all is available to reduce load in the seventh highest load hour.

21. Table 1 shows this very simple calculation for the RTO Region. The Duration Analysis calculation has only three inputs: the peak and seventh highest unrestricted loads on the selected days, and the corresponding forecast peak loads. The proposed DR Reliability Target is simply the average difference between the peak and seventh highest load hour on the ten selected high-load days, expressed as a percentage of the forecast peak, as shown in Table 1.

22. PJM claims (p. 2) that compared to its assessments of DR Saturation in previous years, the proposed DR Reliability Target Analysis Procedures use "the more sophisticated tools and analytical techniques currently available." The Falin Affidavit claims, P 10:

10. PJM’s analyses described above reasonably rely on models, assumptions and techniques that PJM also regularly uses for its transmission expansion and capacity planning efforts. The probabilistic peak load model used in the analyses is also used by PJM for long-term load forecasting to ensure the transmission and resource adequacy of the region. The probabilistic capacity model used in the Demand Resource analyses is based on an approach that is widely used in the industry to perform Loss of Load Expectation (“LOLE”) studies. PJM has been using this capacity model for over thirty years to assess resource adequacy and to establish the installed reserve margin required to satisfy the “one day in ten years” LOLE standard.

23. However, neither the Ten Call Analysis nor the Duration Analysis procedures use any models, and in particular, they do not use the PRISM model PJM uses to determine the IRM and CETO values for its transmission expansion and capacity planning efforts. The Ten Call Analysis procedure (which is irrelevant because the Duration Analysis determines much lower limits) only uses a few common inputs and outputs of these analyses. The techniques are not sophisticated but actually quite simple (as Table 1 shows for the Duration Analysis), and I have recreated them and obtained the same or very similar results without use of models or sophisticated techniques.

A	B	C	D	E	F
Date	Daily unrestricted peak	Seventh highest hourly unrestricted load	Difference, peak and seventh highest load	Forecast peak load for the year	Difference, peak and seventh highest load, percent of forecast peak
Data source:	PJM historical data	PJM historical data	Col. B - Col. C	Load Forecast Reports*	Col. D/Col. E
7/26/2005	134,219.25	127,772.57	6,446.68	133,550	4.8%
8/3/2005	133,870.36	126,814.10	7,056.26	133,550	5.3%
7/17/2006	139,387.88	133,347.95	6,039.93	133,500	4.5%
7/31/2006	138,639.00	132,630.29	6,008.71	133,500	4.5%
8/1/2006	145,308.78	138,621.50	6,687.28	133,500	5.0%
8/2/2006	145,950.51	139,233.14	6,717.37	133,500	5.0%
8/3/2006	136,534.02	131,710.36	4,823.66	133,500	3.6%
8/8/2007	140,948.31	133,984.77	6,963.55	136,961	5.1%
6/9/2008	130,792.34	125,554.12	5,238.21	137,948	3.8%
8/10/2009	126,944.00	119,395.00	7,549.00	134,428	5.6%
Average					4.7%
Average, excluding 2008 and 2009					4.7%
* For 2005 the weather-normalized peak was used as a forecast including the Dominion zone was not available.					

B. The Assumption That All DR Operates During the Same Six Hour Window Is Inconsistent With Historical Patterns and Infeasible With Larger Amounts of DR on the PJM System

24. PJM attempts to defend the assumption that all DR is called and performs in the same six-hour period. The Bryson affidavit argues that the system dispatchers are uncertain about the need for DR and do not have the luxury of time on days when DR is likely needed, so “Dispatching all available Demand Resources in the affected area is the quickest approach and offers the most assurance of effective relief.” P 7. However, Mr. Bryson mainly argues for calling all DR rather than only the amount needed during the day. He does not discuss the hourly pattern of operation of DR, or defend the assumption that all DR operates during the same six-hour window.

25. Nor did PJM provide any historical data showing how DR has actually been used on the PJM system. The historical data reveals that in fact, DR does not all operate within the same six hour window, but instead the quantity is always spread over a broader range of hours. Figure 1, illustrating the fundamental assumption upon which PJM’s proposed Duration Analysis and resulting DR Reliability Target limits are based, is not an accurate depiction of how DR has operated in the past.

26. Figure 2 shows the hourly estimated unrestricted load (without demand response) on the same ten days that are used for the Duration Analysis. This figure shows that the load patterns are very regular and similar on such high-load days. Figure 3 shows the quantity of actual load reduction by hour during the ten days used in the Duration Analysis. These figures are based on hourly unrestricted and restricted load data from PJM’s website. As Figure 3 clearly shows, the actual load reduction is always spread over more than six hours, and in particular, a significant amount operates in the “shoulder” hours (hours 13, 14, 19, 20) outside of the six highest load hours. The use of DR is considerably more “shaped” according to actual load patterns than PJM proposes to assume for the Duration Analysis.

27. Over the ten days selected for the Duration Analysis, on average only 67% of the total MWh of load reduction was in the top six load hours, with 33% occurring outside the top six hours. The highest concentration was on two days in which 81% and 80% of the MWh were concentrated in the top six hours. For these same ten days, only 69% of the total MWh of load reduction was in the top six hours based on DR usage (rather than load) each day, and on only one day was over 81% concentrated into the top six hours. It is clear that, contrary to PJM’s

assumption in the Duration Analysis, the DR has to a great extent been spread over time and “shaped” to follow hourly load rather than concentrated into a six hour period.

28. The assumption that all DR operates in the same 6-hour window is inconsistent with the facts; in addition, with higher levels of DR, it also becomes increasingly infeasible. If a large amount of DR were to be implemented simultaneously, PJM would have to quickly and substantially reduce generation levels. Similarly, were a large amount of demand reductions to be released at the same time, PJM would need to have generators ready to rapidly increase output. A more staggered use of DR, in addition to being consistent with historical patterns, becomes an operational necessity when the quantity of DR on the system is larger.

C. Realistic Assumptions about DR Operation Result in Much Higher DR Reliability Targets

29. Because the assumption that all DR operates during the same six-hour window is both inconsistent with historical patterns and increasingly infeasible, I recalculated the DR Reliability Targets based on the Duration Analysis, changing only this one assumption. I made a conservative assumption that DR is “staggered” in a modest way that better corresponds to the historical practices, while still understating the extent to which DR is spread over additional hours compared to the historical patterns.

30. Figure 4 shows the hourly patterns of DR operation on the days selected for the Duration Analysis (the same data shown in Figure 3), but now expressed as a percent of the maximum hourly demand reduction on each day. The dark blue line is the average hourly DR as a percent of the daily maximum, representing the typical pattern of DR use. The red line is the average based on a slightly different method, averaging hours with the same rank rather than based on the actual hours.

31. Figure 5 shows these two averages compared to assumptions used in the Duration Analysis. In Figure 5 the orange line shows PJM’s assumption that all DR operates during a six hour window. The green line shows a somewhat staggered dispatch, in which the DR is assumed to begin operation spread over a three hour period rather than all simultaneously. Figure 5 shows that the staggered DR operation assumption reflected in the green line better matches the historical practice, but is still very conservative and understates the extent to which DR operation usually spreads into additional hours outside the six highest load hours. By comparison, PJM’s assumption, reflected in the orange line, does not match the historical patterns, and results in

understating DR in the shoulder hours while “wasting” DR in the first and last hour during the six hour window.

32. The first analysis I performed simply assumes that one-third of the DR operates in hours 13 through 18, one-third in hours 14 through 19, and one-third in hours 15 through 20. Figure 7 provides an illustration of this assumption. This approach does not assume any ability of the system dispatchers to forecast the hours when DR will be most needed; the dispatch is assumed fixed in advance and the same on all days if DR is called. This simple, fixed staggered assumption increases the DR limit by 30 percent, from 4.7% of peak (according to PJM’s analysis) to 6.1%. If, instead of one-third in each hour, 30% of the DR begins operation the first hour, 40% in the second hour, and 30% in the third hour, the limit increases further to 6.3%.

33. PJM’s analysis assumes DR operates in the six highest load hours rather than during a fixed interval of hours. While the hourly load patterns are very consistent, as shown in Figure 2, there are days when the highest loads occur somewhat earlier or later than on other days, and these differences will often be predictable based on weather forecasts. Therefore, PJM’s assumption that DR can be used in the hours most needed is reasonable. When it is assumed the DR is staggered 1/3, 1/3, 1/3 across the highest load hours, the limit is 6.3%. If instead the DR operation is staggered over three hours such that 80% is available in the fifth highest load hour and 60% in the sixth highest load hour, the limit rises to 7.0%, fifty percent greater than PJM’s limit based on the unrealistic assumption that all DR performs in the same six-hour period.

34. While PJM notes that DR on the PJM system has increased in recent years, the figure on page 7 of the PJM filing shows that in fact, DR has stabilized at about 6% of peak load over the past four base residual auctions for delivery years 2010/2011 through 2013/2014. The cleared quantity of DR, as a percent of peak load, was 6.1% in the most recent RPM auction, for the 2013/2014 delivery year, and this percentage was lower than cleared for the 2010/2011 or 2011/2012 delivery years, as the figure shows. Setting realistic limits on the traditional DR product would accommodate clearing the entire quantity that has cleared in the RTO Region in recent years.

35. The PJM filing and Bryson Affidavit also note that the traditional DR product is only required to respond between noon and 8 PM; however, on the ten days identified for the RTO analysis, the seven highest load hours were always during this window, and the eighth

highest load hour was also in this window eight out of ten times. Therefore, the noon to 8 PM period nearly always includes the eight highest load hours and the restriction to this period does not prevent use of DR in the hours when it is needed. The hourly load patterns on high load days when DR is needed are quite regular, as shown above in Figure 2.

36. In the stakeholder process around this issue, consideration was also given to increasing the duration over which the traditional DR product would be required to respond from six hours to eight or ten hours. PJM states that it dropped this idea as a result of the stakeholder process (Filing p. 15). I evaluated an eight hour DR product and found that increasing the duration to eight hours increases the DR Reliability Limit for the RTO Region from 4.7% to 7.3% (with PJM's assumption that all DR operates during the same eight hours), or 10.1% (with some staggering of the DR into a ninth and tenth hour). This alternate may not have received adequate consideration.

37. The calculations shown above are for the Duration Analysis for the RTO Region. I was not able to recalculate the Duration Analysis DR Reliability Targets for the LDAs because, despite my repeated requests, PJM did not make the hourly unrestricted LDA load data available. However, the staggered dispatch assumption I have used would likely be as applicable to the LDAs as to the RTO, and would likely raise the DR Reliability Targets in a similar way.

38. This analysis shows that the proposed Duration Analysis procedure, which determines the DR Reliability Targets and Minimum Annual and Minimum Extended Summer Resource Requirements, is overly restrictive due to at least one unrealistic assumption, and requires further development in order to be the basis for reasonable limits on the standard DR product.

D. The Ten Call Analysis Also Includes Unrealistic Assumptions and Results in Overly Restrictive DR Reliability Targets

39. As noted above, the Ten Call Analysis procedure has no impact as the Duration Analysis results in much more restrictive limits for the RTO and all LDAs (this is clear from the values in Exhibit 3 to the Falin Affidavit). With the procedures as proposed, this would be unlikely to change even as the data is updated in future years. Nevertheless, I offer brief comments on the Ten Call Analysis, which I have also recreated and evaluated.

40. The results of the Ten Call Analysis hinge on the assumption that when any DR is needed, all available DR is called, even if this means calling several thousand MW when only a

few hundred MW is needed. As with the assumption that all DR operates in a six hour window, the assumption that 100% of the DR is called whenever any is needed is both inconsistent with the historical facts and increasingly infeasible from an operational perspective with higher levels of DR on the system. Because hourly load patterns are fairly predictable on high load days (as shown in Figure 2 above), it is not necessary to call all DR when some DR is needed. Therefore, I recreated PJM's Ten Call Analysis and evaluated the impact of a more realistic assumption in this regard.

41. The DR Reliability Target for the RTO Region based on the Ten Call Analysis is 8.5% of peak load. This is based on the assumption that whenever any DR is called, it is all called, which results in considerable waste of the DR resource (8.5% is approximately 11,000 MW). I evaluated the assumption that whenever DR is called, the amount needed, plus an additional 3,000 MW extra, is called; this increased the DR Reliability Target from 8.5% to 12.5%. The assumption that an extra 3,000 MW of DR would always be called would ensure that the amount of DR is always more than sufficient to meet the need, even if the need turns out to be much higher than expected, and taking into account that the response is uncertain because some of the called DR may have already reduced at the time of the call.

42. The fact that this realistic and reasonable change to the assumptions increases the DR Reliability Target based on the Ten Call Analysis so substantially suggests that this procedure results in unreasonable restrictions and is not ready for implementation.

IV. There Is Not a Reliability Need to Impose Limits on the DR Clearing in the May 2011 RPM Auction for the 2014/2015 Delivery Year

43. There is not a reliability need to impose the proposed DR Reliability Limits (or the higher limits I have calculated based on more realistic assumptions), and the corresponding Minimum Annual Resource Requirement ("MARR") and Minimum Extended Summer Resource Requirement ("MESRR") for the upcoming RPM auction for the 2014/2015 delivery year. The limits are proposed to protect against a circumstance that is quite unlikely to occur, and should it appear more likely to occur as the delivery year approaches, there are various actions available to ensure reliability in the delivery year. The following paragraphs describe why it is unlikely the additional unlimited product will ultimately be needed and how PJM would be able to adjust capacity commitments closer to the delivery year if it appears additional unlimited capacity is needed.

44. Of course, the limits could be unnecessary because the base residual auction may clear sufficient unlimited capacity (the MARR) without limiting the amount of traditional DR that clears. The RTO Region has cleared a large excess in the past two base residual auctions, while LDAs have cleared closer to the indicated Reliability Requirement, most with a small excess. However, Reliability Requirements for the RTO Region and LDAs will be lower for the 2014/2015 base residual auction than in the prior base residual auction for the 2013/2014 delivery year due to an updated forecast (the PJM 2011 load forecast is available at this time only in draft form, and further changes may be made, but it is clear that the updated forecast will be lower than the prior forecast).

45. Any shortfall in cleared “unlimited” capacity that may appear to exist as a result of the base residual auction may be eliminated when PJM further lowers its load forecast for the delivery year in future years, which reduces the Reliability Requirements proportionally. Each of the past four PJM load forecasts (from the 2008 load forecast through the draft 2011 load forecast) has resulted in a lowering of the previous forecasts for many years and zones, and PJM will likely be implementing its consultant’s recommendations regarding the forecasting methodology next year, which are expected to result in lower forecasts.

46. In addition, the Reliability Requirements may also be reduced after the base residual auction due to a revision in the PJM Installed Reserve Margin (“IRM”, for the RTO Region) or CETO values (for LDAs). PJM plans a broad review of its CETO methodology (which determines LDA Reliability Requirements) in 2011,⁴ and this may result in changes that substantially lower LDA Reliability Requirements.

47. Second, even if there is a shortfall in cleared unlimited capacity in the base residual auction and it is not eliminated by reductions in the load forecasts and Reliability Requirements, there will be a First, Second and Third Incremental Auction for the delivery year, held at approximately one-year intervals, through which PJM can acquire additional unlimited or less limited capacity if still needed. The incremental auctions have generally provided additional capacity at bargain prices compared to the base residual auction prices.

⁴ Comments of Mr. Steve Herling, chair, PJM Planning Committee, at the December 2010 Planning Committee meeting.

48. Third, over the coming summers PJM will acquire additional experience with the use of larger amounts of DR during peak periods and other times when the capacity is needed. PJM has not relied upon DR in very many hours in recent years, as shown in Figure 6, which summarizes the hourly use of DR over the past four years based on PJM data. Additional experience with DR may lead to a better understanding of how DR contributes to reliability, which may suggest changes to the “DR Reliability Target Analysis Procedures” to reflect this improved understanding. A refined analysis procedure may result in higher limits on the traditional DR product, which could eliminate any apparent shortfall in unlimited capacity.

49. Fourth, PJM has proposed new “shortage pricing” rules under which prices will rise to very high levels at times of operating reserve shortages. These rules are intended to attract additional supply and additional demand reductions at such times, beyond the capacity committed through RPM. However, PJM will determine the Reliability Requirements for the 2014/2015 delivery year to be used in the May 2011 RPM auction ignoring the additional capacity and demand reductions that will result from shortage pricing, which should be in place by 2012 and be in its third summer by 2014.

50. Advanced meters, smart devices, and pricing changes at the retail level are expected to result in a sharp increase in the price-responsiveness of demand on the PJM system in the coming years. The Reliability Requirements for the 2014/2015 delivery year will not reflect any forecast of the impact of shortage pricing or of price-responsive demand. As experience with the new shortage pricing rules and with the growth of price-responsive demand is gained over the coming summers, it may become clear that the original Reliability Requirements, which will not have anticipated these impacts, were excessive and an apparent shortfall in cleared unlimited capacity may not exist. There was no mention of shortage pricing or of the development of price-responsive demand in the PJM Filing or supporting affidavits, and the proposed restrictions on DR completely ignore these developments.

51. Fifth, even if there is ultimately some shortfall of unlimited cleared capacity compared to the target for the RTO or an LDA, this circumstance is unlikely to result in a substantially heightened or unacceptable reliability risk. The Reliability Requirements are not intended to be firm constraints on capacity procurement, but instead “the target around which, over many years, levels of procurement capacity should fluctuate”, as PJM’s Senior Vice

President - Operations, Michael J. Kormos, has described it.⁵ This reflects the fact that clearing a quantity of capacity close to but somewhat below the Reliability Requirement still provides a very high level of resource adequacy. Consistent with this fact, RPM employs a downward-sloping capacity demand curve designed to clear a quantity of capacity that may at times exceed and may at times be somewhat below the Reliability Requirement.

52. Similarly, clearing a quantity of unlimited capacity that is short of the target by a small amount has only a small impact on reliability. In fact, clearing a quantity of unlimited capacity below the target has a much smaller potential impact on reliability than clearing a quantity of total capacity less than the Reliability Requirement for the RTO or an LDA. This is because there is additional cleared traditional DR which is a very good, if not a perfect, substitute for unlimited DR.

53. Finally, it should also be noted that even if PJM enters a peak period with less unlimited product than it would like, and does exhaust either the ten calls or the six hours at times, it can still call on DR to perform additional times or for additional hours. The evidence is that DR will follow dispatch instructions even if not subject to penalties. For instance, Mr. Bryson notes (P 13) that PJM called on DR in May 2010, outside of the seasonal window, and received an “acceptable voluntary response.”

54. The Second Incremental Auction (“2IA”) for the 2014/2015 delivery year is scheduled for July 2013, over two and a half years from now and about a year before the peak period of the 2014/2015 delivery year. If, following next year’s base residual auction for that delivery year there appears to be a shortfall in “unlimited” capacity for the RTO region or an LDA; and if that shortfall is not extinguished by a decrease in Reliability Requirements due to a decrease in the load forecast, as has consistently occurred in recent years; and if the shortfall is also not eliminated by a reduction in the installed reserve margin or CETO calculations; and if, in addition, the shortfall is not extinguished through additional economical purchases in incremental auctions; and if, in addition, any shortfall is not eliminated by the additional capacity and price-induced demand reductions forthcoming as a result of new shortage pricing rules increases in price-responsive demand; and if, in addition, any remaining shortfall is not

⁵ Reply Testimony of Michael J. Kormos, PJM Interconnection, L.L.C., On Behalf of the Staff of the Maryland Public Service Commission, Maryland PSC Case No. CN-9117, October 30, 2007, p. 3.

eliminated by revisions to the DR Reliability Target Analysis Procedures based on additional experience with DR's contribution to reliability; and if, in addition, any remaining potential shortfall is not assessed as presenting an acceptably small increase in reliability risk, taking into account that additional limited capacity, a very good substitute, has also cleared, and in any case the Reliability Requirement is not a hard constraint but the quantity around which cleared capacity is expected to fluctuate over time; then there would still be plenty of time to acquire additional unlimited capacity for the delivery year. In the unlikely event PJM should deem it necessary after the Second Incremental Auction in July 2013, it could devise an approach to ensure the additional needed unlimited capacity could be procured through the third incremental auction, or a special auction could be held to convert some of the cleared traditional DR product to unlimited or less limited product.

V. The Proposed Approach to Acquiring Unlimited Capacity is Economically Inefficient and Inconsistent with Fundamental RPM Design Elements

55. PJM draws an analogy between the reliability need for unlimited capacity product and the reliability need for capacity located in an LDA, and suggests that the problems, and solutions, are similar. PJM Filing, p. 3-4; Falin Affidavit P 12, 14. However, PJM's proposed approach to acquiring multiple DR products is unlike the existing approach to acquiring capacity located in LDAs, and violates a fundamental design principle of RPM. In addition, the analogy fails; the two problems are actually quite different.

56. The analogy fails because unlike capacity located inside or outside an LDA, limited and unlimited DR products are in fact very good substitutes. PJM establishes a separate Reliability Requirement and downward-sloping Variable Resource Requirement ("VRR") capacity demand curve for LDAs in order to acquire sufficient capacity located within the LDA to provide adequate reliability. The extent to which capacity located outside the LDA can contribute to meeting demand within the LDA is represented by the LDA's CETL value, and, beyond the CETL, capacity located outside the LDA is not a substitute for capacity located within the LDA. The separate VRR curve allows acquiring adequate capacity located in the LDA.

57. By contrast, the traditional DR product is a very good, if not a perfect, substitute for unlimited capacity. PJM's proposal recognizes that as long as the Minimum Annual

Resource Target has been satisfied, additional traditional DR is a perfect substitute for additional unlimited DR, and there is no willingness to pay extra for incremental unlimited product.

58. When there is adequate total capacity but a small shortfall of unlimited product, the likelihood that the shortfall will become a problem (that is, a situation will occur such that reliability is jeopardized because PJM lacks somewhat more unlimited instead of traditional product) is quite low. This reflects the fact that the traditional product is a very good substitute for unlimited product. Accordingly, PJM's willingness to pay extra for additional unlimited (rather than traditional) product should be very low when the potential shortfall is small. However, PJM's proposal does not accomplish this. PJM's proposal would allow a very high price differential to emerge in order to clear the last increment of unlimited capacity, which would be a highly inefficient result. This might be unlikely in the RTO Region but could be more likely in smaller LDAs such as Southwest MAAC.

59. The proposed multiple DR products represent a circumstance entirely different from the locational aspect of RPM. Capacity located in the RTO is not a substitute for capacity in the LDA, and the LDA price rises independent of the RTO price to clear adequate capacity in the LDA. There is no basis for a linkage between the RTO and LDA prices because capacity in the RTO and LDA are not substitutes once the CETL has been exhausted.

60. Because traditional DR is a very good substitute for unlimited capacity, PJM should prefer to acquire a few additional units of traditional DR at a lower price than fewer units of unlimited capacity at a higher price. For instance, if incremental traditional DR is available at \$50/MW-day and incremental unlimited capacity is available at \$100/MW-day, PJM should strongly prefer to acquire two units of the traditional product rather than one unit of unlimited product at the same cost. The extra unit of traditional product would permit meeting a higher peak demand and, in addition, could be used to provide additional calls and duration during a call. PJM's proposed approach does not recognize that because traditional DR is a very good substitute for unlimited product, the willingness to pay extra for unlimited product, and maximum price differential, should be small with the exception of the highly unlikely situation with a large shortfall in unlimited capacity.

61. In addition, whereas RPM uses downward-sloping VRR curves (in particular, for the RTO Region and all LDAs), PJM apparently proposes to use "vertical" demand curves for the unlimited capacity products. I find no reference to separate, sloped VRR curves for the

unlimited products in the filing and attached proposed tariff sheets. The examples in Attachment C make no reference to a VRR curve and clearly suggest a fixed Minimum Annual Resource Requirement (“MARR”) and Minimum Extended Summer Resource Requirement (“MESRR”) to be met without regard to price or cost. The proposal to use vertical demand curves violates a fundamental precept of RPM – the downward-sloping demand curve – around which various other RPM features were designed and rely, and the vertical demand curve can lead to excessive price differentials between limited and unlimited capacity. The use of a vertical demand curve, allowing prices to rise to any level (limited only by the VRR curve for total capacity) is especially inappropriate in light of the fact that the traditional DR product is a very good substitute for the unlimited product and may be available at much lower prices.

62. PJM’s proposal can even lead to clearing a lower total amount of capacity at a higher price than if the auction were operated without the limits. This would occur if by accepting resources out of merit order to satisfy the MARR or MESRR, as PJM proposes, the supply curve intersects the VRR curve so no limited resources clear. This would provide less reliability and at a higher price and cost, an absurd outcome resulting from the inflexible demand for unlimited capacity independent of price (vertical demand curve).

VI. Comments on Other Aspects of the Filing

A. The Draft Proposed “*DR Reliability Target Analysis Procedures*” Document is Not Ready for Implementation

63. As described above, the proposed DR Reliability Target Analysis Procedures result in overly restrictive limits on traditional DR, largely due to the incorrect assumption that all DR operates within a six-hour window. In addition, there are other flaws in this document, which is not ready for approval and implementation at this time. This section notes a few other flaws in this document that should be addressed before it is finalized.

64. The RTO Procedure, Ten Interruption Requirement section, refers to “LOL” or “LOLE” six times in steps 5, 6a, 6b, 6c. However, Loss of Load apparently plays no part in these calculations and these references are either entirely pointless, or there is another step or test or calculation in the process that is not documented.

65. This section, step 7, calls for finding the DR Reliability Target by substituting DR for generation “so that the [Installed Reserve Margin] is held constant.” However, this is

inconsistent with PJM planning principles as reflected in the PJM Reserve Requirements Study and reliability standard BAL-50-RFC-02, under which DR would substitute for generation in a manner that holds the LOLE at 0.1, with the reserve margin changing. Holding the Installed Reserve Margin constant while substituting DR for generation results in LOLE very different from 0.1 and this simplification will affect the DR Reliability Target.

66. The Duration Requirement section states that any day with a peak load “well below” the 50/50 peak “may be excluded”. In Exhibit 3 to the Falin Affidavit, showing results of the calculations for the 2013/2014 delivery year, some values were excluded for 2008 and 2009 from the averages for some zones (pages 4 and 5). The basis for excluding some days from the analysis is not specified anywhere and appears to be arbitrary and entail undue discretion. For Southwest MAAC, the limit would have been substantially higher had certain days not been excluded.

67. These are just a few flaws I have identified in this document. As the Falin Affidavit suggests (P 12), this document is in draft form and requires further review with stakeholders before it can be implemented and its results used to impose restrictions applicable to RPM base residual auctions.

B. The Proposed Tariff Language Should Be Clarified to Reflect that the DR Reliability Targets May Change Year to Year

68. The document, *DR Reliability Target Analysis Procedures* states that the analysis, which determines the DR Reliability Targets, is performed annually prior to each base residual auction. The DR Reliability Targets may change each year due to changes in the various inputs, as noted in this document. In particular, the limits based on the Duration Analysis will change because they are based on a selection of days from the past five years, and each year additional days from the past year will be added while older days will be dropped from the sample. In addition, the *DR Reliability Target Analysis Procedures* may be further refined as more experience is gained with use of DR over the coming years.

69. The proposed tariff language should be changed to clarify that the latest DR Reliability Targets should be used to determine the “updated Minimum Annual Resource Requirement” and “updated Minimum Summer Extended Resource Requirement” for Incremental Auctions. These updated values are referenced in section 5.12(b)(iv)(i). The proposed language for tariff section 5.10(c) should also be changed to state that the Minimum

Annual Resource Requirement and Minimum Summer Extended Resource Requirement ... will be established prior the Base Residual Auction *and each Incremental Auction* for each Delivery Year. Section 5.4(c) should also be changed to acknowledge that in addition to Reliability Requirements, the Minimum Annual Resource Requirement and Minimum Summer Extended Resource Requirement values can also change for Incremental Auctions. Other changes may be needed to clarify that the DR Reliability Targets can change and the changes will be reflected in procurement quantities in incremental auctions.

C. The Proposed Treatment of the Short Term Resource Procurement Target Is Appropriate

70. Under PJM's proposal, the Minimum Annual Resource Requirement for the RTO and each LDA will be calculated as the Reliability Requirement minus the applicable Short-Term Resource Procurement Target ("STRPT") Minus the Extended Summer Demand Resource Reliability Target. PJM will also set a Minimum Extended Summer Resource Requirement for the RTO and each LDA, calculated as the Reliability Requirement minus the applicable STRPT minus the Limited Demand Resource Reliability Target. PJM explains that it is appropriate to reduce the minimum procurement levels for annual and extended summer resources by the STRPT because the overall procurement is reduced by this amount. In incremental auctions, PJM adjusts the capacity procurement to account for changes in the load forecasts and Reliability Requirements, and acquires the STPRT amounts, if needed. The proposed tariff rules call for the amounts PJM will offer to buy or sell in the incremental auctions to reflect the STPRT and also additional unlimited product, if needed.

71. It is appropriate to reduce the minimum procurement levels by the full STRPT as PJM proposes. As additional resource is acquired in incremental auctions, as needed, additional unlimited resource will be acquired, as needed. The additional procurement of unlimited resource should occur in the incremental auctions rather than being forced into the base residual auctions because it may well not be needed, as described in an earlier section of this affidavit.

72. The purpose of the Commission-approved STPRT is to create opportunities for short-lead-time and other resources that become available after the three-year-forward base residual action. This includes, in addition to DR, energy efficiency; price-responsive demand upgrades at existing plants; resources that, at the time of the base residual auction, were expected to be retired but whose owners have decided to keep them in operation; plants that failed to clear

in the base residual auction and can be offered at lower prices in the incremental auctions; additional unforced capacity from plants whose outage rates have declined; and incremental imports, among other short-lead-time resources. The STRPT also enhances efficiency by contributing to price convergence between the base residual and incremental auctions, resulting in a better approximation of the operation of a voluntary market. The prices in incremental auctions have generally been lower than in the corresponding base residual auctions due to the appearance of additional supply with little or no incremental demand. The price convergence was much improved in the First Incremental Auction for the 2012/2013 delivery year, the first involving the STRPT, than in all previous incremental auctions.

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

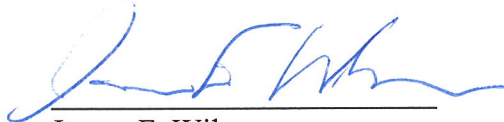
PJM Interconnection, L.L.C.

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Docket No. ER11-2288

**AFFIDAVIT OF JAMES F. WILSON
IN SUPPORT OF PROTEST AND COMMENTS OF
THE JOINT CONSUMER ADVOCATES**

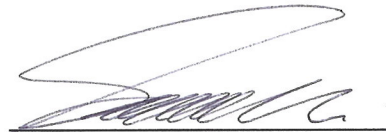
James F. Wilson, being first duly sworn, states he is the same James F. Wilson whose Affidavit in Support of Protest and Comments of the Joint Consumer Advocates accompanies this affidavit; and that the facts set forth therein are true and correct to the best of his knowledge, information, and belief.



James F. Wilson

Subscribed and sworn before me, a Notary Public in and for the State of Maryland

this 23rd day of December, 2010.



Notary Public

My Commission expires:

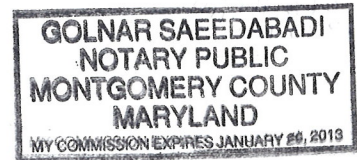


Figure 1: From the PJM Filing

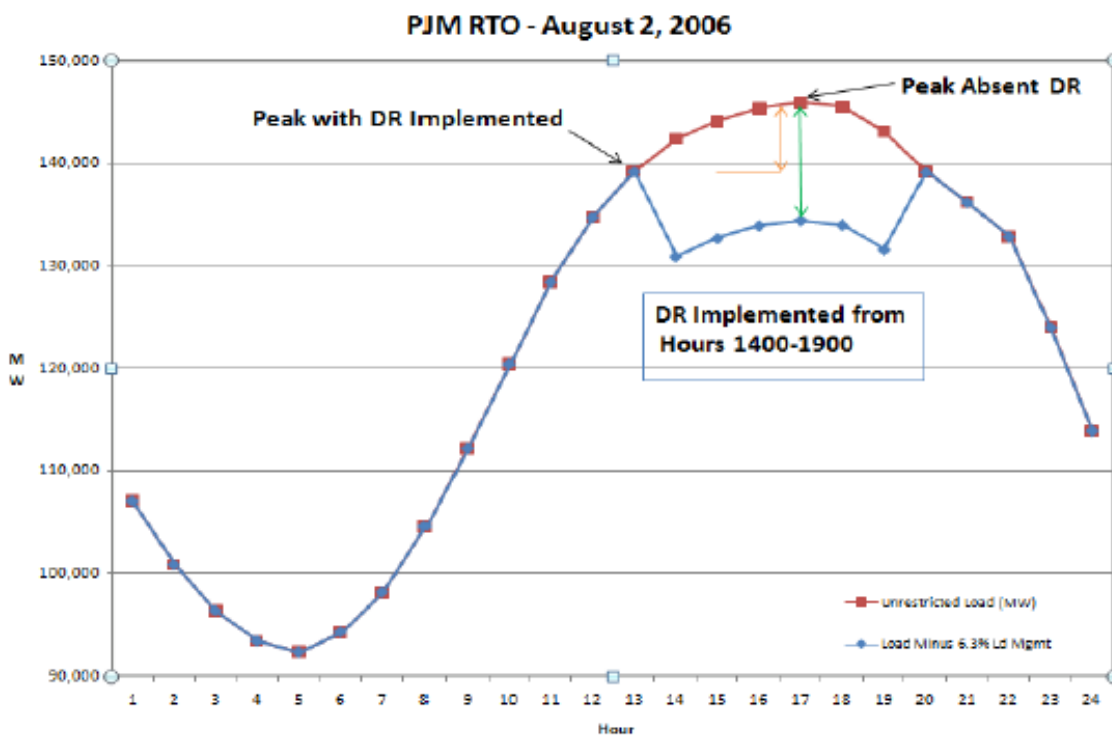
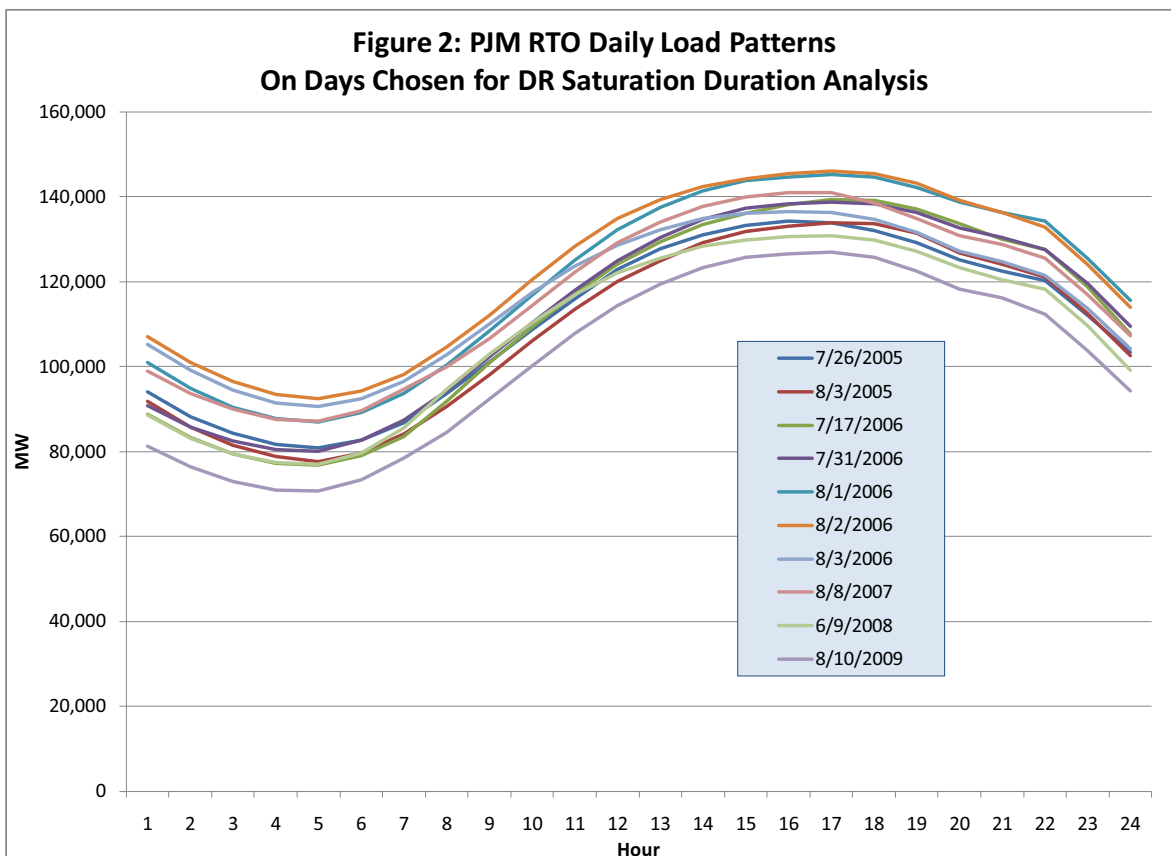
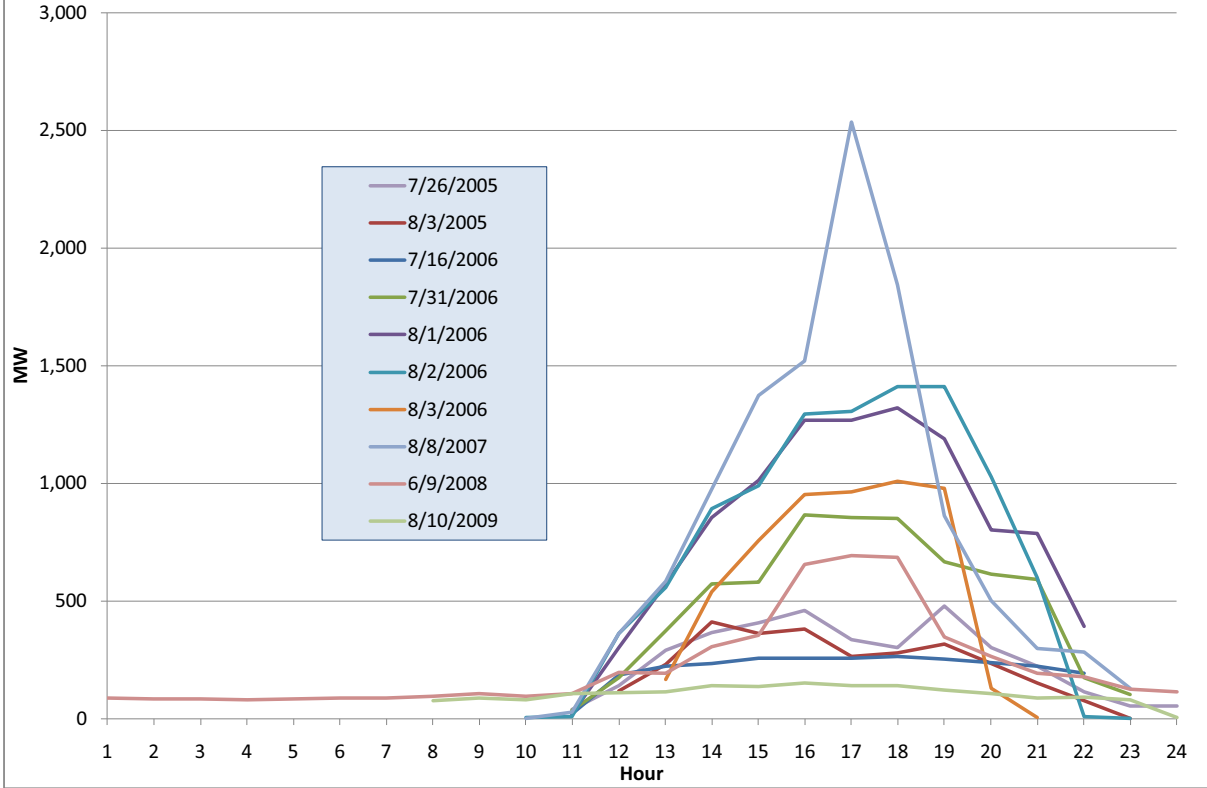


Figure 2: PJM RTO Daily Load Patterns On Days Chosen for DR Saturation Duration Analysis



**Figure 3: Load Management By Hour, RTO,
Days Selected For DR Saturation Duration Analysis (MW)**



**Figure 4: Load Management By Hour, RTO,
Percent of Max. Daily Load Management**

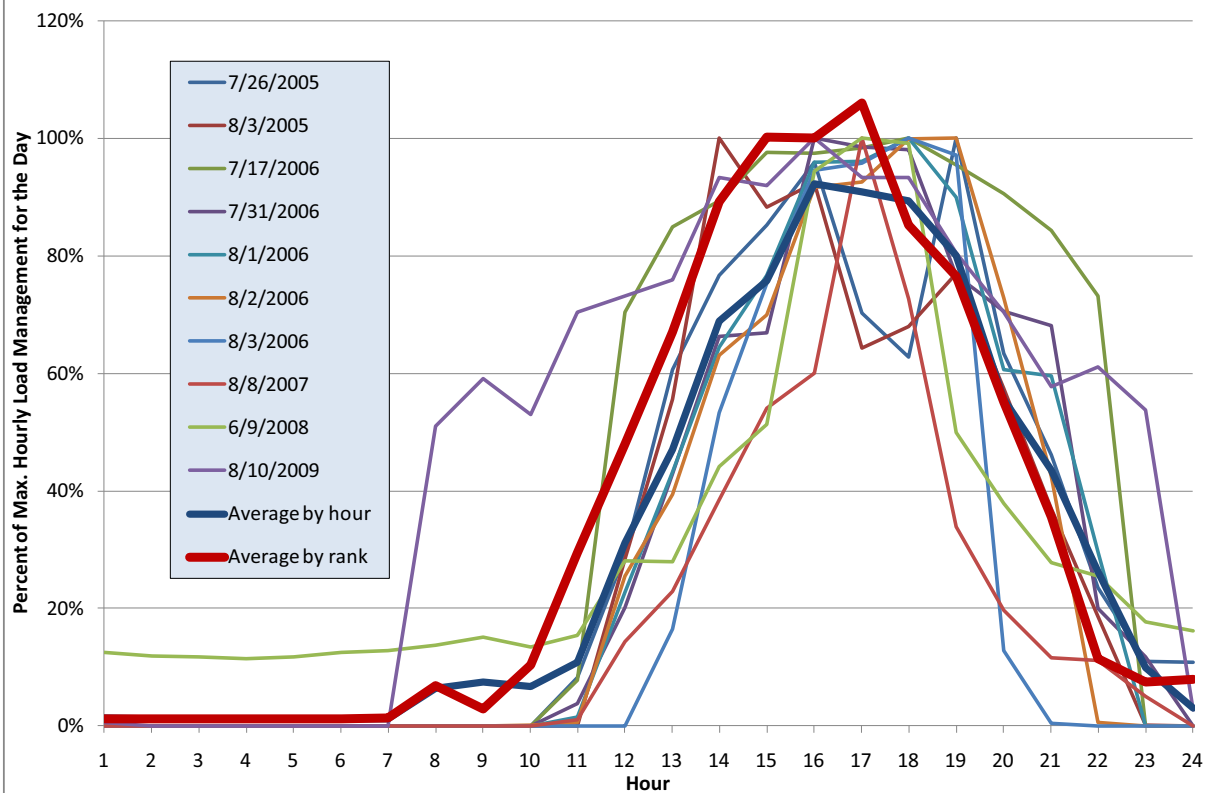


Figure 5: Load Management Patterns By Hour, RTO, and Assumptions for Duration Analysis

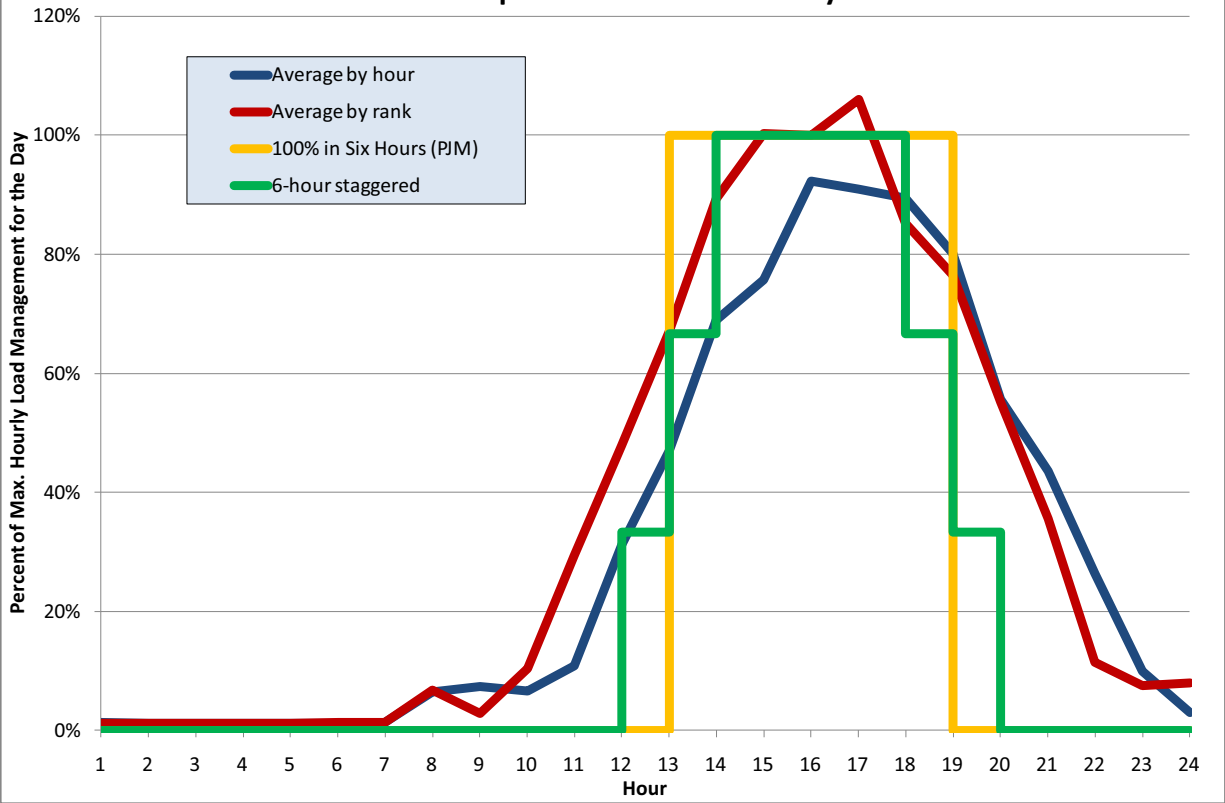


Figure 6: PJM RTO Use of Demand Response 2006 to 2009 (difference between unrestricted and restricted loads)

