

AFFIDAVIT OF PAUL M. SOTKIEWICZ, PH.D.
Senior Economist
PJM Interconnection, L.L.C.

Paul M. Sotkiewicz, being first duly sworn, deposes and says as follows:

1. My name is Paul M. Sotkiewicz, Ph.D. My business address is 955 Jefferson Avenue, Valley Forge Corporate Center, Norristown, Pennsylvania 19403. I am the Senior Economist in the Market Services Division of PJM Interconnection, L.L.C. ("PJM") and have held this position since February 11, 2008. In this capacity I provide analysis and advice to PJM with respect to its market design and market performance including demand response mechanisms, intermittent and renewable resource integration, market power mitigation strategies, capacity markets and the potential effects of climate change and other environmental policies on PJM's markets. I hold a Bachelor of Arts degree in History and Economics from University of Florida (1991), and a Master of Arts degree (1995) and Ph.D. (2003) in Economics from the University of Minnesota. Prior to becoming PJM's Senior Economist, I served as the Director of Energy Studies at the Public Utility Research Center at the University of Florida from August 2000 until February 2008, and as a Staff Economist at the Federal Energy Regulatory Commission from 1998 to 2000.

2. I provide this affidavit to give an overview of the opportunities that Demand Resources in PJM have to participate in the PJM Energy Market, Capacity Market

and Ancillary Service Markets.¹ Demand Resources are defined in Section 1.13 of the Reliability Assurance Agreement Among Load Serving Entities in the PJM Region (“RAA”) as resources capable of providing reductions in demand or otherwise controlling load. Implicit in the idea that Demand Resources are capable of demand reductions is that demand reductions are made in response to market prices, thus the capability of providing demand reductions is also known generically in the context of PJM’s Markets as demand response. Colloquially, the suite of opportunities for demand resources to participate in PJM’s Markets is also known as PJM’s demand response program. I have personal knowledge and understanding of PJM’s demand response program.

3. PJM and its stakeholders have worked diligently to ensure that Demand Resources have comparable participation opportunities to Generation Capacity Resources in the PJM Energy, Capacity and Ancillary Services Markets. The stakeholders, through the Demand Response Steering Committee, continue to work on potential enhancements to the incorporation of Demand Resources into PJM’s Markets. More specifically, Demand Resources can participate in the following PJM Markets: Day-ahead and Real-time Energy Markets; Day-ahead Scheduling Reserves Market (“DASR Market”); Synchronized Reserve Market (“SR Market”); Regulation Market (“Regulation Market”); and the Reliability Pricing Model Capacity Market (“RPM” or “Capacity Market”).

¹ Capitalized terms used and not otherwise defined herein have the meaning set forth in the PJM Open Access Transmission Tariff, Amended and Restated Operating Agreement of PJM Interconnection, L.L.C., RAA, and PJM Manuals.

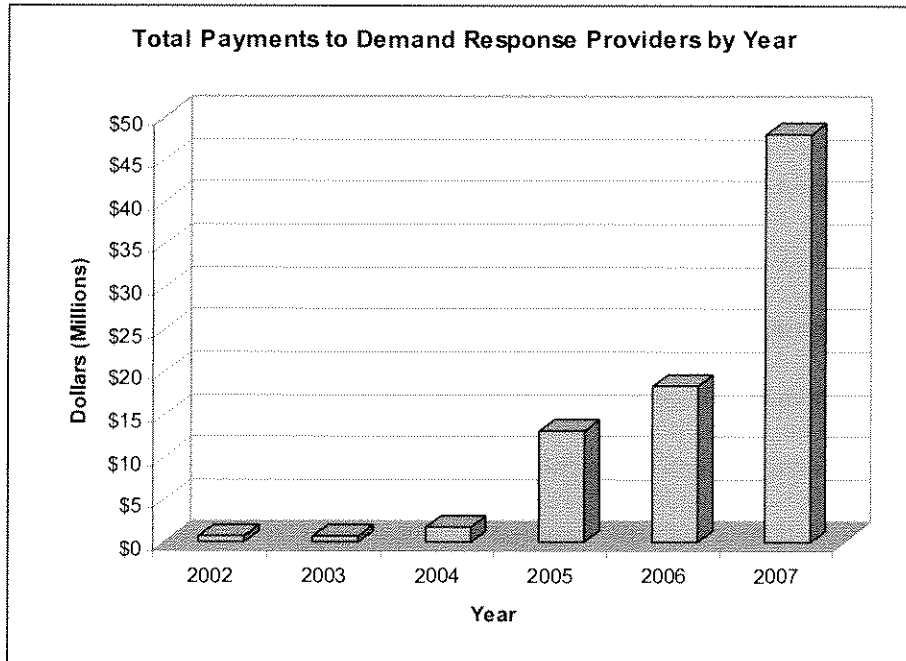
4. The active participation of Demand Resources in PJM's Markets provides a number of benefits to PJM's Markets and to Market Participants. At a higher level, the incorporation of demand response in power markets allows electric consumers to express their willingness to pay for power which enhances market efficiency relative to markets where consumer demand is taken as given regardless of price. Moreover, as consumers are allowed to respond to prices (and provide additional supply), market competitiveness is enhanced, and potential exercises of supplier market power are checked as any supplier attempts to raise price will result in a corresponding reduction in demand making such attempts less profitable. At the level of individual consumers, the incorporation of demand response into power markets provides electric consumers the opportunity to control their individual electricity expenditures. And in a time where the inputs to power production are increasing in cost and resulting in higher power prices, the empowerment of consumers to reduce demand in response to rising prices provides a mechanism to control the total electric bill even as prices rise. If enough customers respond to price, market prices may even be reduced.

5. Demand Resources are bid into PJM's Markets through Curtailment Service Providers ("CSPs") who are required to be PJM Members. A CSP is a PJM Member which acts on behalf of itself, or other Members or non-Members, to submit demand reductions into PJM's Markets. Potentially any PJM Member, whether they are an Electricity Distribution Company ("EDC"), Load Serving Entity ("LSE"), a large industrial customer, or any company that specializes in demand reductions can be a

CSP. Functionally, CSPs aggregate and/or manage the load reduction capability of Demand Resources in PJM's Markets. CSPs are responsible for registering Demand Resources and submitting settlements through the Load Response Web Services eTool application. Market rules govern the review of registrations and settlements by the applicable EDC and/or LSE.

6. **Demand Resource Participation in the Energy Market.** In PJM's Energy Market registered Demand Resources participate in PJM's Economic Load Response Program by reducing electricity use when Locational Marginal Prices ("LMPs") are high. Participation in the Economic Load Response Program can occur in either the Day-ahead or Real-time Energy Markets. The growth trend in Demand Resource participation in the Economic Load Response Program is exemplified in Figure 1 showing the growth in payments made to CSPs for demand reductions made by Demand Resources.

Figure 1 – Annual energy payments to curtailment service providers for economic activity.



7. All Demand Resources, except those that are committed to contracts for energy priced at the Real-time LMP, are eligible to participate in the Day-ahead Energy Market. CSPs offering load reductions in the Day-ahead Energy Market on behalf of Demand Resources may submit an offer schedule of price quantity pairs similar to generators as well as shut down costs and minimum down times for which the reduction must be committed in their offers. Load reduction offers that clear in the Day-ahead Market receive the Day-ahead LMP. Any deviations from Day-ahead commitments are settled at the Real-time LMP along with applicable Balancing Operating Reserve charges. Participation by Demand Resources in the Day-ahead Energy Markets is relatively light. Through August 31, 2008, there have only been

3,097 MWh of reductions with a value of approximately \$371,000 at less than 10 unique sites per month.² Activity in the Day-ahead Energy Market accounts for only one percent (1%) of all activity by MWh in the Economic Load Response Program.

8. CSPs have two options for participation in the Real-time Energy Market as part of the Economic Load Response Program: real-time dispatch or as a self-scheduled resource. To be dispatched in the Real-time Energy Market using the Unit Dispatch System (“UDS”), a CSP submits an offer for a Demand Resource that indicates an LMP strike price, a price at or above which the Demand Resource commits to make a reduction, the time needed to shut down, and the minimum time the end-use site must reduce load. To exercise the self-schedule option, the CSP must provide notification to PJM no less than five minutes prior, and no more than seven days prior, to the demand reduction. The notification includes the start and stop times for the demand reduction as well as the quantity of the demand reduction. Through August 31, 2008 real-time activity accounts for 99 percent (99%) of the MWh activity in the Economic Load Response Program or about 288,000 MWh up to and including that date. Most of this activity has been self-scheduled, accounting for \$17.9 million in revenues collected, compared to UDS dispatched activity of only \$466,000.
9. The load reduction quantity for any hour is the difference between the calculated Customer Baseline (“CBL”) and the metered usage. CSPs must submit load reduction

² In February 2008 there were 59 unique sites responding Day-ahead, but this is the only month in 2008 with over 10 sites responding.

settlements within sixty (60) days of the Load Reduction Event. Participating sites having Demand Resources must have metering equipment that provides integrated hourly kWh values. The applicable EDC or LSE serving the site of the Demand Resource has the option to review and approve the metered data and calculations that support the settlement. Approved settlements are paid by PJM on the basis of the quantity of the load reduction times the difference between the zonal, aggregate, or nodal (as applicable) LMP and the end-use customer's generation plus transmission charge (also referred to as the "retail rate"). The total savings for a Demand Resource for each MWh of reduction is equal to the avoided retail rate expenditure plus the payment of the LMP minus the retail rate which adds up to a savings of the applicable LMP.

10. From the perspective of an individual, the revenue opportunities for a Demand Resource participating in the Economic Load Response Program can be seen in the following example. During the year period March 1, 2007 to February 29, 2008 a one megawatt Demand Resource with a retail rate of \$75/MWh and a willingness to reduce demand one megawatt each time LMP was at or above \$100/MWh would have collected \$50,458 in revenue over and above the savings from avoiding the retail rate in the demand reduction.

11. Demand Resource Participation in the Synchronized Reserve Market.

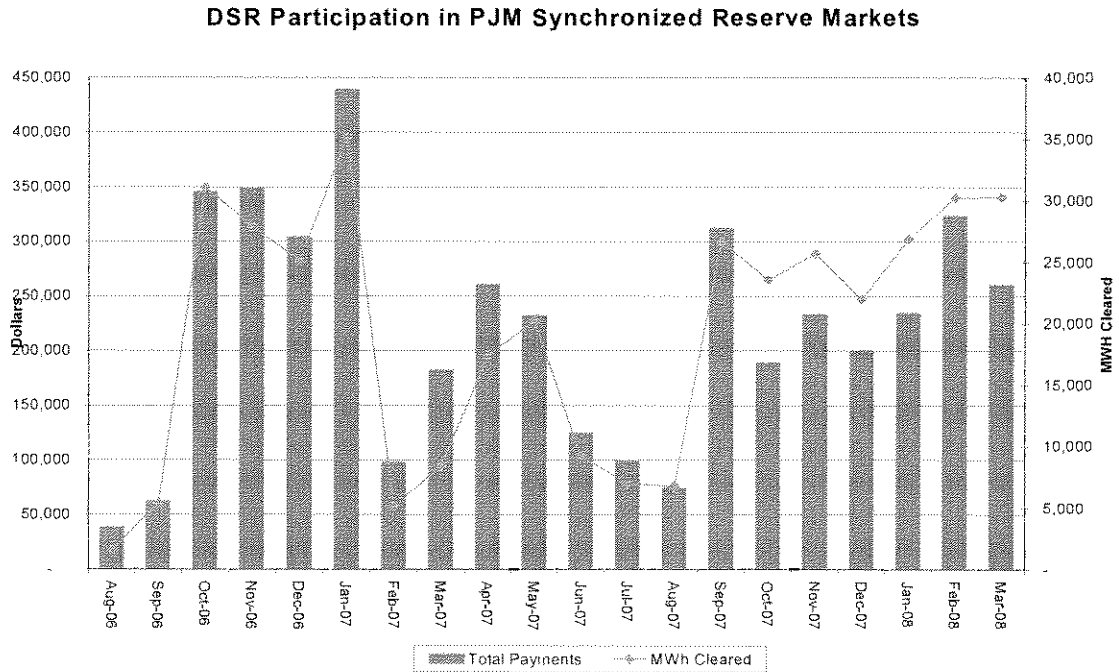
Synchronized Reserve service is necessary to serve load immediately in the event of a system contingency or unexpected need for more power immediately ("Synchronized

Reserve Event”). In PJM, Synchronized Reserve is broken up into Tier 1 Synchronized Reserve which is provided by units that are on-line, following economic dispatch, and capable of increasing output within ten minutes of a call for Synchronized Reserve, and Tier 2 Synchronized Reserve, which is extra Synchronized Reserve capacity committed in excess of Tier 1 capacity to meet Synchronized Reserve requirements. The SR Market is the mechanism by which Synchronized Reserve is committed.

12. In order to participate in the SR Market, Demand Resources must be capable of dependably providing a response within ten minutes of a Synchronized Reserve Event call, providing data at no less than a one-minute scan rate surrounding a call for Synchronized Reserves, and must have appropriate metering infrastructure that provides data at no less than a one-minute scan rate surrounding a call for Synchronized Reserve in place to verify responses to Synchronized Reserve Events. It should be emphasized that Demand Resources need not make a demand reduction until a Synchronized Reserve Event is called, but must be ready to do so on short notice. The metering information must be uploaded to PJM’s Load Response application within 24 hours of the event to ensure compliance. The overall participation by demand resources currently is limited to 25 percent (25%) of the Synchronized Reserve requirement in each Synchronized Reserve Zone while PJM gains experience with Demand Resource participation in this market. To ensure that proper reliability standards are maintained, there are mandatory training requirements for CSPs that desire to bid load reductions in the Synchronized Reserve Market.

13. The SR Market is cleared every hour based on the offers that are submitted by various resources. The market clearing results establish the Synchronized Reserve assignments for each cleared resource in order to meet the Synchronized Reserve requirement for each Synchronized Reserve Zone. Each assigned resource is paid the Synchronized Reserve clearing price for providing the service for the hour. Should a Demand Response (or Generation Capacity Resource) fail to respond to a Synchronized Reserve Event, the penalty imposed is the cost to supply Synchronized Reserve during the same time period in which the Demand Resource failed to respond to the call for Synchronized Reserve.
14. Figure 2 shows the additional revenue stream currently paid to CSPs for the growing number of Demand Resources that were qualified to provide Synchronized Reserve from August 2006 through March 2008. The first qualified Demand Resource participated in the Synchronized Reserve Market on August 17, 2006. Today more than 75 demand resources are qualified to provide Synchronized Reserve. The ability for a Demand Resource to reduce overall expenditures through participation in the SR Market can be significant. If a one megawatt Demand Resource supplied SR in the Mid-Atlantic sub-zone of the Reliability First Corporation (“RFC”) area in all hours over the period from March 1, 2007 to February 29, 2008, that resource would have been paid \$52,381 that could have offset its energy expenditures. Through August 31, 2008 over 277,000 MWh of Synchronized Reserve has been provided by Demand Resources with payments to Demand Resources over \$2.4 million.

Figure 2 – Demand Response as Synchronized Reserve



15. Demand Resource Participation in the Regulation Market. Regulation is necessary to provide for the continuous balancing of generation, load and interchange to maintain system frequency at sixty cycles per second (60 Hz). Regulation is accomplished through the raising or lowering of output by Generation Capacity Resources or the raising or lowering of loads by Demand Resources as required. CSPs that bid Demand Resources into the Regulation Market must meet all the criteria necessary to provide Regulation in the PJM Manuals including the ability to receive AGC signals and the appropriate telemetry to the PJM Control Center. Current market rules limit demand resources to 25 percent (25%) of the Regulation

requirement in the RFC region. There are mandatory training requirements for CSPs that desire to bid load reductions in this market.

16. To date there have been no Demand Resources that have offered into or cleared the Regulation Market. However, the financial opportunities for Demand Resources are exceeding those that have been observed in the SR Market. Over the period March 1, 2007 to February 29, 2008, if a Demand Resource had provided one megawatt of Regulation any time the Regulation Market clearing price was at or above \$100/MWh, the Demand Resource would have collected \$47,306 while only being committed for Regulation in 306 hours (3.5 percent of all hours in the year) for the entire period. At a Regulation offer price of only \$50/MWh, the same Demand Resource could have collected \$120,534 while being committed 1,386 hours (15.8 percent of all hours during the year) for Regulation.

17. Demand Resource Participation in the Day-ahead Scheduling Reserve Market.

The DASR Market procures supplemental, 30 minute reserves on the PJM system as required by RFC and other reliability organizations with the PJM footprint. Demand Resources, like other resources, must be capable of converting their committed DASR capability to energy within 30 minutes of a request by PJM dispatchers. Demand Resources are limited to providing the lower of 25 percent (25%) of the DASR requirement or supply limitations as provided by RFC and/or Southeast Reliability Corporation (SERC).

18. The DASR Market commenced operation on June 1, 2008. During the first three months of operation (through August 31, 2008), the prices in the DASR Market have been quite low. The average price of \$0.56/MWh. Over the first three months of operation, a one megawatt Demand Resource committed in the DASR Market in each hour would have collected \$1,236 in revenue.

19. **Demand Resource Participation in the RPM Capacity Market.** The participation of Demand Resources in RPM occurs under the concept of Load Management which is the ability to reduce metered load either manually by request or automatically based on a communication signal. Load Management is broken into two categories for the purposes of capacity: Demand Resource (“DR”) and Interruptible Load for Reliability (“ILR”) with the difference being DR must be offered into an RPM Base Residual Auction or Incremental Auction and receives the market price in the auction while ILR need only be certified three months prior to the Delivery Year (June 1 to May 31) and receives a different price. CSPs (including EDCs and LSEs) can aggregate load reduction capability from multiple Demand Resources for Load Management. Both DR and ILR must have the capability to be interrupted up to 10 times each delivery year for up to six hours per interruption.

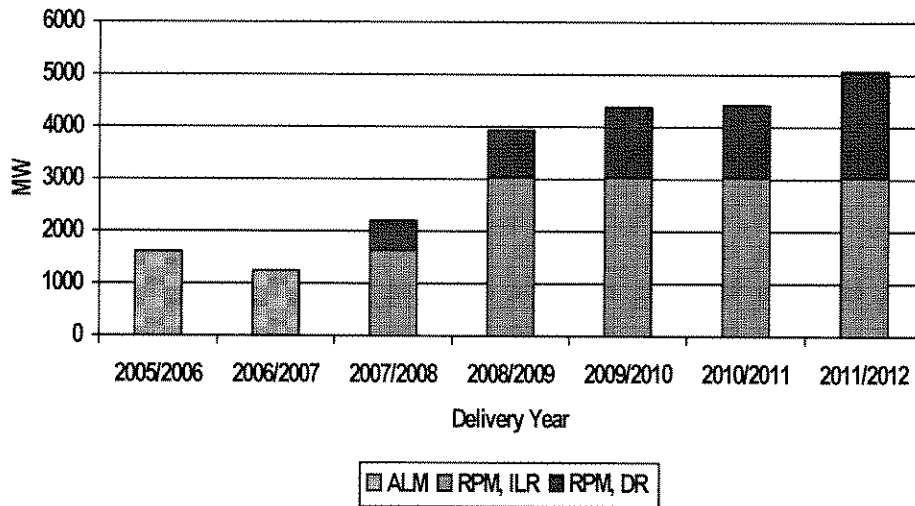
20. Three types of Load Management products can serve as capacity: Direct Load Control (“DLC”), Firm Service Level (“FSL”) and Guaranteed Load Drop (“GLD”). Under DLC the CSP sends a communication signal that controls various loads such as air conditioning units of the DR and ILR which it serves. For FSL, the DR or ILR

capacity reduces its load to a pre-determined level upon notice from its CSP. GLD requires the DR or ILR make pre-specified load reductions. Moreover, there are two notification periods that apply to each of the aforementioned products. Under Short Lead Time notification DR or ILR must respond within one hour of notification, while under Long Lead Time notification, DR and ILR have up to two hours to respond with reductions.

21. To date there have been four transitional auctions for the 2007/2008, 2008/2009, 2009/2010, and 2010/2011 Delivery Years and one Base Residual Auction three years forward for the 2011/2012 Delivery Year. Traditional EDCs/LSEs provided 73 percent of the Load Management for the 2007/2008 Delivery Year, with CSPs providing the balance. Traditional EDCs/LSEs cleared 41 percent of the DR in the July 2007 transition auction for the 2008/2009 Delivery Year, CSPs cleared 59 percent. The amount of DR capacity committed in Base Residual or Incremental Auctions has grown from just over 1,000 MW in the current 2008/2009 Delivery Year to over 1,600 MW in the 2011/2012 Delivery Year. Actual ILR committed for the current 2008/2009 is almost 3,500 MW giving a total capacity for reliability from Demand Resources at three times the level it was for the 2006/2007 Delivery Year prior to the current Capacity Market. In terms of dollars, Demand Resource participation in RPM accounts for more than 75 percent (75%) of all money paid out to Demand Resources in 2008. The growth in Demand Resource participation in RPM is illustrated in Figure 3. Please note that the ILR values in years beyond 2008/2009 are assumed to stay at the 2008/2009 levels.

22.


Figure 3 – Demand Resource Participation in Capacity Market



23. From the perspective of an individual Demand Resource, offering capacity as DR or ILR provides yet another revenue stream by which to offset energy expenditures. To remain consistent with the examples above, a Demand Resource accepted as DR for the 2007/2008 in the RTO Locational Deliverability Area would have received \$40.80/MW-day. During the March 1, 2007 to February 29, 2008 period a one megawatt resource would have received this payment for only nine months from June 1, 2007 to February 29, 2008 but the total payments would have been \$11,179.

24. In summary, the participation of Demand Resources in PJM's Markets enhances market efficiency and competitiveness while providing options for electric consumers to manage their electricity expenditures. There are multiple opportunities for Demand Resources to participate in PJM's Markets. For Demand Resources with the

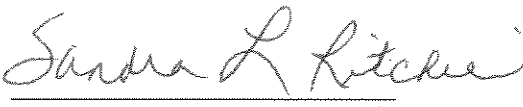
flexibility to make demand reductions in response to PJM Energy Market prices, the Economic Load Response Program provides an economically attractive opportunity for customers to begin to manage the cost and value proposition of their energy consumption. For Demand Resources that cannot engage in reductions as often, but can do so for reliability, the SR Market and RPM offer opportunities. Regardless of which market a Demand Resource chooses to participate, they are being exposed to market prices and afforded the opportunity to respond to those prices to manage their overall energy expenditures. For the one megawatt Demand Resource example used throughout, if that resource participated in the Economic Load Response Program, Synchronized Reserve Market, and RPM as explained in the previous examples, the Demand Resource could have collected \$114,018 to offset its total electricity bill during the March 1, 2007 to February 29, 2008 period.



Paul M. Sotkiewicz

The foregoing was Subscribed to and Sworn
Before me this 26 day of September, 2008





Notary Public 9/25/08

