

## DR Sub Zonal Dispatch Whitepaper

Why RPM Capacity Payments alone are insufficient compensation for dispatch of DR in more granular fashion than LDAs.

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**Summary** – Recent PJM actions calling on Demand Response sub zonally, in a manner both unprecedented and unanticipated in RPM, are inconsistent with FERC articulated concepts of comparability and are detrimental to participation of DR in wholesale markets.

### Introduction

PJM provides reliability through the Reliability Pricing Model (RPM) which is designed to provide for and compensate capacity committed to support reliability. The RPM was specifically designed to price capacity in different portions of the PJM region in a manner taking into account locational cost differentials for generation construction and the relative scarcity of generation and transmission with respect to load. The RPM construct provides for the possibility of different pricing in transmission Zones (regions served by transmission utilities) and certain combinations of Zones. Zones and combinations of Zones are called Locational Deliverability Areas or LDAs. In addition, on occasion, PJM will define Sub-Zonal LDAs where transmission within a Zone indicates clear geographic boundaries. Currently defined Sub Zones include PSEG North and Delmarva South. In PJM the RPM construct has generally shown differences in pricing between Eastern (MAAC) and Western (Rest of RTO) Regions reflecting more robust generation in the West, environmental and siting challenges in the more urban East and transmission constraints in between.

In recent months, PJM has asserted a heretofore unused right to call on more granular (smaller and more discreet) regions of Demand Response (DR) resources. Here is a summary of recent events:

- (Two subzonal events) May 26<sup>th</sup> and June 11<sup>th</sup> of 2010, PJM called on the Washington DC portions of the Pepco Zone in response to high demand and transmission outages.
- (Zonal event) July 7<sup>th</sup> of 2010, PJM called on 9 zones.
- (Subzonal event) August 11<sup>th</sup> of 2010, PJM called on the Washington DC portion of the Pepco Zone.
- (Two mixed zonal and subzonal events) September 23<sup>rd</sup> and 24<sup>th</sup> of 2010, PJM called on the WV, VA and MD portions of the APS zone along with Pepco and BGE.
- (One subzonal event and one zonal event) In May of 2011, PJM called on a newly defined Norfolk subzone of Dominion on May 26<sup>th</sup> and later called a zonal event on May 31<sup>st</sup>

For the period beginning in May of 2010 through May of 2011, of 7 events called, 6 involved dispatch of subzones, 4 involved dispatch of complete Zones, and one involved only discrete Zones during the

mandatory compliance period. None coincided with RPM LDA boundaries<sup>1</sup>. Prior to May of 2010 going back to 1991, PJM had never called on Demand Resources more granular than Zonal<sup>2</sup>

As we shall explain:

- RPM design does not take into consideration subzonal dispatch
- the practice of sub zonal dispatch of DR fails to consider the differing incentives for DR activity in capacity markets and as a result fails to assure comparability of DR and generation resources

### **DR Incentives**

DR is currently compensated with a standby credit equal to the committed reduction amount times the cost of the capacity. In addition, the DR resource is compensated for unused energy during an event at a rate of up to \$1000/MWh. Thus the DR resource is compensated for the commitment to curtail for planning purposes and for unused energy which reflects operational impacts in a manner similar to generation.

Generation resources are primarily in the electric supply business and capacity shortage events that RPM is designed to address are a key opportunity for revenue enhancement for generators. In fact, virtually any commitment event for a generator is a profit opportunity. In many cases, sub zonal events caused by operational issues or simply inadequate transmission create revenue opportunities for generators in constrained regions. For example, net energy revenues for the RPM reference capacity resource in eastern regions historically were nearly 8 times the revenues in the west.<sup>3</sup> This is a reflection of higher energy prices and operational transmission constraints that are predominantly an eastern phenomenon. The key point is that generators profit from each commitment for an event and profit more from each instance of dispatch.

DR resources on the other hand engage in wholesale markets as capacity resources to offset electricity costs. For DR, electricity market participation is not a primary (or often even a secondary) profit center – it is a cost control tool. In many cases, each DR event reduces the cost control benefit of capacity market participation. It is true that for some DR participants energy payments of less than \$1000/MWh may fully cover lost production costs or other costs. For these participants each event offers a profit opportunity. However, a number of studies indicate that the retail cost of loss of load ranges up to \$24,000/MWh with \$5,000 being a low end range number. Therefore for many DR participants, unlike generation, each commitment for an event represents a loss in production and a reduced benefit to participation.

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<sup>1</sup> The event of 9/24/2010 included BGE and Pepco, i.e. SWMAAC, though SWMAAC was not a separately cleared LDA. This event also included the eastern portions of APS. The July 7, 2010 event included EMAAC though again, EMAAC was not a separately cleared LDA.

<sup>2</sup> <http://www.pjm.com/~media/planning/res-adeq/load-forecast/alm-history.ashx>

<sup>3</sup> Source is RPM Planning Parameters for 2014-15. <http://www.pjm.com/markets-and-operations/rpm/~media/markets-ops/rpm/rpm-auction-info/rpm-bra-planning-parameters-2014-2015.ashx>

The RPM and the PJM Tariff capture this difference in part by limiting DR's commitment for compliance purposes to 10 events of up to 6 hours duration during the months of June through September<sup>4</sup>. In effect, DR receives capped revenue of a capacity payment plus energy compensation for response of up to 60 hours per year. Depending on the load's cost structure maximum use of the resource may either maximize or minimize the value of participation. For most DR participants, the capacity component of RPM participation is the primary motivation. Energy Compensation is viewed as incidental. For DR, failure to respond during events results in reduction in capacity compensation – a fundamentally punitive approach. For generation, as described above, there are natural incentives to deliver during an event but failure to respond *during an event*<sup>5</sup> does not result in direct reduction of capacity compensation. While PJM strives for market designs that incent and motivate, in the case of DR in RPM the mechanisms are more based on “command and penalize” concepts. This is primarily due to the difficulties of reconciling very different motivations in a single market design.

### **Sub Zonal Dispatch is essentially equivalent to Transmission Service**

The RPM construct is designed to ensure adequate capacity to meet reliability needs. It does this by taking into account the location of capacity and the transmission system characteristics, including the ability of the transmission system to deliver capacity to load. Capacity in a region defined as an LDA<sup>6</sup> is assumed to be of equal value and, importantly capacity is assumed to be deliverable by transmission *within* an LDA. RPM, however, is a planning construct. Assumptions are made about expected loads, available generation, and transmission status. Conditions in actual operations vary from these assumptions. This is the case for sub zonal dispatch.

While the details for needing sub zonal dispatch in areas not defined by LDAs have not been fully explained, every event to date has a common cause of inadequate transmission. Often transmission outages are a factor. It may be that specific generation was subject to unexpectedly high unavailability, but in all cases transmission is inadequate. Sub zonal events are always related to transmission service that is at a lesser level than the RPM construct anticipated. Had RPM anticipated these events, there would be an LDA defined by the limited transmission and generation service and higher *capacity* prices might result for both generation and DR. It is not possible to anticipate every configuration of the system that is possible or even likely to occur. However, sub zonal events can be accurately characterized as events caused by inadequate transmission rather than inadequate planned generation capacity within an LDA and should be characterized as supplementing transmission service. This distinction is not necessary for generation resources because generation resources, unlike DR, receive

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<sup>4</sup> PJM has implemented Summer Extended and Annual DR products for the 2014-15 DY. These products commit to an unlimited number of events and up to 10 hours duration each.

<sup>5</sup> Generation need only be available during 500 pre-defined peak hours per year at a frequency comparable to its historical average to avoid a capacity compensation reduction.

<sup>6</sup> An LDA is defined by its transmission characteristics in combination with internal load and generation, most importantly the limits on the ability to import electricity to meet expected demand.

increased compensation for dispatch within subzones and because, as described in more detail below, generation is not subject to transmission charges.

When emergency events occur, PJM as a matter of course will call on generation as needed and generation is generally eager to respond because response in a constrained situation is often a revenue enhancing opportunity due to related high prices. However, when the situation reaches a point where generation and transmission are unable to meet demand, PJM has asserted a right to call on DR without added compensation in the apparent belief that a capacity resource, whether it is generation or DR, is indifferent to being committed. As we have discussed previously, DR is not indifferent to being committed. And further, committing DR in such events as if it were any other capacity resource creates unforeseen inequities.

First and foremost among the inequities is disparate treatment of DR resources within the same LDA. Resources within an LDA are compensated with identical capacity payments. Resources that are dispatched are compensated with energy payments that generally do not offset the incremental expense of curtailing operations. Thus for a sub zonal event where some DR resources within an LDA are dispatched and some are not, those resources that are dispatched are providing more service but with less compensation than the uncommitted resources. Contrast this with generation resources where the generation within a sub zone provides more service but with greater compensation. DR resources within a subzone are not treated comparably to DR resources within the LDA but not in the subzone.

Secondly, DR resources within a subzone are treated disparately relative to non-DR loads within the same zone. The fundamental difference between DR loads and non-DR loads is that DR loads forego firm capacity delivery with the LDA for that portion of capacity offered as DR. Non-DR load pays for firm capacity delivery within the LDA. However, as discussed previously, a sub zone event causes DR resources to supplement *transmission* service, not LDA capacity. It is important to point out that all loads pay for transmission service, usually based on their maximum usage. **But DR Capacity resources subject to sub- zone dispatch are in essence expected to forego firm *Transmission* service in addition to foregoing firm *capacity* delivery.** As a result, similarly situated loads that receive comparable capacity service are subject to disparate transmission service.

**It is worth noting that the disparate treatment of DR resources relative to transmission is not applicable to generation because generation resources do not pay for transmission service.** This may be one reason why PJM has not considered the implications of sub zonal dispatch for DR resources.

### **What about Energy Payments?**

As noted previously, DR resources are eligible for energy payments when events occur and the resource responds. This provides for added revenues that can offset curtailment costs and in limited circumstances may enhance DR provider margins. DR providers have highly varying costs of curtailment. Each curtailment event may increase the risk that primary provider business goals are not met. For example, a cement plant may be able to shift some production to early morning or evening hours but

where there are a number of events might be building a backlog of orders that mean delays<sup>7</sup> in deliveries. As mentioned earlier, in a great many cases and probably most cases, the energy compensation, currently capped at \$1000/MWh, may simply be inadequate to offset curtailment costs.

### **Implications for Summer Extended DR and Annual DR**

PJM has established two new DR products called Summer Extended DR and Annual DR for the 2014-15 Delivery Year. These new products are distinguished from traditional Limited DR by obligations for longer curtailment events (up to 10 hours) and an unlimited number of events. Potential DR providers that contemplate curtailment costs in excess of \$1000/MWh will take substantial risks if committed to provide these services. In fact, for those with higher costs than \$1000/MWh, provision of these products would in essence be committing to an open ended expense for a fixed price. This would be comparable to asking a generator to provide capacity at a fixed price with energy compensation less than fuel prices. The prospect of an open ended and unlimited number of events combined with sub zonal dispatch in addition to the threat of a local transmission outage that could lead to localized and frequent commitments of DR make the new products unattractive for most DR participants. Participation would only make sense for participants that have event curtailment costs of less than \$1000/MWh.

### **Options for addressing sub zonal dispatch**

We offer several options for addressing the barriers and inequities to entry created by requests for sub zonal dispatch;

#### **Option 1. Prohibit Sub zonal Dispatch**

This option would preclude sub zonal dispatch of DR resources. It addresses most barriers to entry for DR participants. But it also may preclude that subset of DR that may welcome the opportunity to respond to sub zonal events, though some participants could probably continue to respond via Economic DR programs. In addition, it offers no ability to contribute to reliability for these local events.

#### **Option 2. Establish sub-Zonal dispatch as a voluntary option.**

This option would establish response to sub zonal events as voluntary and treated similarly to events that occur outside of the June through September peak period for Limited DR. This approach allows voluntary response for those participants willing and able to respond while avoiding penalties for those that are not being adequately compensated for the curtailment event. This approach recognizes the differing incentives of generation and DR resources. The approach is consistent with the language of the tariff with respect to event penalties which speaks generally in terms of Zonal commitments and Zonal performance. It has the disadvantage of establishing some uncertainty for dispatchers regarding the actual response that can be anticipated. This concern can be alleviated to some degree with sufficient advance notice of anticipated sub zone which would allow CSPs to estimate the DR response.

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<sup>7</sup> Some who study DR activity mention customer "fatigue" when there are events on consecutive days. This can be viewed in economic terms as a result of daily increases in cost of curtailment that are not being addressed.

Option 3. Combine Option 2 with a provision to allow optional Emergency Energy bids in excess of \$1000/MWh.

This approach would permit DR providers to provide Emergency Energy offers in excess of \$1000/MWh in a manner similar to existing provisions for Emergency Energy purchases from external or non-capacity resources. These offers would not set price but instead would establish as bid compensation to DR providers. The energy bids would be optional, but if accepted would result in a requirement to respond and imposition of the usual event performance requirements. Charges could be to all load benefitting or to RT deviations from DA load or some other approach.

Option 4. Allow Emergency Energy offers in excess of \$1000/MWh

This approach would simply remove the current energy strike price cap of \$1000/MWh. This would allow DR to establish a minimum energy compensation price at any level<sup>8</sup>. DR resources would be required to respond whenever committed regardless of the sub zonal situation. This option has the advantage of allowing DR to be incented to respond. In addition it would reduce barriers to entry into Summer Extended and Annual DR products by facilitating the opportunity to recover event curtailment costs. The approach could lend itself to elimination of multiple DR products by requiring response at any time if the offer were accepted for the event. PJM and CSPs would have a more complex dispatch process because PJM would need to consider the quantity of DR needed for any event and CSPs would need to have the ability to differentiate customers by price offer. If PJM required the ability to incrementally commit on a price basis, compliance measurement could become more complex.

#### Summary

PJM activities to dispatch DR sub zonally create barriers to entry for DR and introduce un-reconciled comparability issues between similarly situated DR within LDAs and between DR and non-DR loads within a sub zone. PJM stakeholders should consider options to resolve these issues.

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<sup>8</sup> An offer cap may be a viable feature. This option has characteristics of PRD