

Energy Efficiency Participation in PJM's Capacity Market (RPM)

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Summary

Energy efficiency resources¹, similar to other demand resources, can provide large quantities of capacity reductions comparable to and as valuable as the capacity provided by traditional supply resources. When allowed to compete in regional wholesale capacity markets, energy efficiency resources can provide a relatively low-cost, short lead-time, low carbon, and fully scalable option to augment or replace traditional capacity resources. Design principles for incorporating energy efficiency resources and a draft proposal for PJM are provided here.

Introduction

In 2007, PJM began implementation of its Reliability Pricing Model (RPM) as the new mechanism for valuing capacity resources. As part of the FERC-approved RPM Settlement, demand response resources can participate in the RPM auction (three years before the delivery year) in either of two ways. First, demand response resources can bid into the auction and be eligible to set the clearing price. Second, demand response resources can be nominated in advance of the delivery year as an interruptible load for reliability and reduce a participant's capacity obligation in that year. The Settlement Agreement also provided that PJM would provide a report on the integration of energy efficiency into RPM and the establishment of a forum for identifying and resolving impediments to market participation by demand resources (including energy efficiency).

In a report filed with the FERC on September 24, 2007, PJM identified the Demand Side Response Working Group as the forum for demand response market design. The DSRWG has recently begun to focus on barriers to participation of energy efficiency (EE) resources in the capacity market (RPM). After an initial presentation in April on how EE was incorporated into New England's Forward Capacity Market, the DSRWG began a discussion of how EE resources might participate in RPM at two meetings, one in July and one in September.

Synapse, on behalf of several state consumer advocate offices, has been working with PJM staff to develop discussion topics for the DSRWG regarding the incorporation of EE resources into the capacity market. The discussions to date with both PJM staff and the DSRWG have focused on how EE resources from customers with interval meters, mostly large customers, might participate under current RPM rules. A far larger reservoir of EE

¹ For purposes of this discussion, energy efficiency is a measure of the energy required for a given physical or economic unit of output. Efficiency measures are distinct from the temporary curtailment of electric loads during periods of peak demand (i.e., demand response, or DR).

resources is available from residential and small commercial customers, many of whom do not have interval meters.² This paper focuses on mechanisms for monetizing the capacity value of both types of EE resources through participation in PJM's capacity market.

Design Principles

Current RPM options

Two basic options are available for participation in RPM: as an auction resource that is eligible to set the auction clearing price and is then paid that clearing price or as a reduction to load whereby the customer capacity obligation is lowered and the customer purchases less capacity. In simple terms: get paid or avoid a payment. The "get a payment" option involves bidding the resource into the annual RPM Base Residual Auction three years in advance of delivery of the resource.³ The "avoid a payment" option involves notifying PJM as little as four months before the delivery year that you are reducing your peak load.

As already discussed at the DSRWG, customers with interval meters can participate in either of the two basic options. Depending on the assumptions that are used to determine the **quantity** and the **value** of customer demand resources, there may be a preference among these customers as to which approach provides the greatest benefit to each individual customer. There are also timing issues that need to be evaluated between the two options.

For customers without interval meters, participation in either of the two basic options is problematic. Without an interval meter, it is impossible to directly attribute a specific customer load reduction to that specific customer. This is particularly true for small scale EE resources such as residential lighting. The other issue is that the size of any one customer's load reduction is generally small; these small reductions need to be aggregated into large blocks that meet a minimum size requirement and justify the administrative costs of participation in RPM.

One additional observation regarding the two options is important to note. When a resource (any resource, including an EE resource) participates in the Base Residual Auction, it is eligible to establish the auction clearing price if it is the marginal resource. If, as much research has demonstrated, EE resources can be acquired at costs that are significantly lower than the cost of a new peaking resource, then EE resources that are bid into the Base Residual Auction for a particular delivery year may lower the auction clearing price and influence the cost of capacity to **all** consumers in PJM (or in a specific

² As of early 2005, 59% of the electric load in the MADRI states (DC, DE, MD, NJ, and PA) was delivered to customers with standard meters. *MADRI Installed Meter Survey - Draft Report*, 4.27.2005. While several utilities have subsequently announced advanced metering initiatives, much of this work still awaits state regulatory approval.

³ PJM's Base Residual Auction scheduled for January 2008 (with results posted Feb. 1, 2008) will be for resources committed for the power delivery year that begins June 1, 2010.

PJM load zone if there is price separation between zones). In contrast, an EE resource that is not offered into the Base Residual Auction (and is used only as a reduction to a specific customer's load) will offset that specific customer's capacity cost, but will have no impact on the costs that are allocated to other customers for their peak loads in that year. This important "secondary impact" of participation in the Base Residual Auction deserves a much longer explanation and analysis in a follow up to this initial overview.

Qualifying the EE resource

Among the threshold questions regarding any resource that participates in RPM is how do we measure the capacity value of the resource and verify that it is performing up to its measured value. For EE resources that are often located at customer sites that do not have interval meters, both the "measurement" and the "verification" issues require special consideration.

Fortunately, measurement and verification (M&V) protocols have been part of utility and state-sponsored demand side management (DSM) programs for many years. Historically, these M&V protocols have focused mostly on energy savings, not capacity savings. However, with some adjustments, the M&V procedures that have been used to evaluate the cost-effectiveness of DSM programs can also demonstrate the capacity values of specific EE measures for RPM purposes.⁴

Quantifying the EE resource

One megawatt of an EE resource at a customer site is worth more than one megawatt of a generation resource at a distant location. There are two initial factors to consider: line losses and reserve margin. An EE resource does not experience any transmission or distribution system line losses; it is both "producing" and "delivering" the energy at the customer's site. Also, an EE resource does not require the purchase of additional capacity resources to compensate for forced outages or maintenance outages; its capacity rating (based on M&V protocols) is consistent for all applicable peak load periods.

A third factor arises when a capacity zone "separates" from the Base Residual Auction (due to congestion issues) and a separate capacity value for that capacity zone is established. EE resources in that congested zone should be credited for the avoided congestion costs as well as the lower line losses and reserve requirements.

Procedures for accounting for these attributes of EE resources need to be established for both participation options: bidding the EE resource into the Base Residual Auction or using the EE resource as a reduction to load in the delivery year.

⁴ ISO New England used a two track approach for its Forward Capacity Market (FCM). For the transition period (December 2006-May 2010), demand resources, including EE, could qualify as capacity resources with a state-approved (or equivalent) M&V standard. For the FCM auctions (beginning with the first delivery year that starts on June 1, 2010), demand resources, including EE, would need to satisfy the standards developed in the M&V Manual. The M&V Manual was developed by a stakeholder group and establishes common standards that all M&V protocols must meet. Over time, it is anticipated that a single set of M&V protocols will be established.

Compensating the EE Resource

EE resources should be compensated based on the services they provide. Under most situations, this will mean the same payment as a generation resource. If an EE resource is qualified as a year-round resource, it should be compensated on a twelve-month basis. If an EE resource is qualified as a summer only resource, then it should be compensated as other “summer only” resources are compensated. The current treatment of demand response in RPM requires these resources to respond only during the four summer months (June, July, August, and September). Based on an analysis of peak load events, DR resources are compensated at about 95% of the compensation of generation resources that have a twelve-month availability requirement.

One novel feature of EE resources is that once they are installed they provide the capacity reduction for multiple years (the measure life). Unlike generation resources that can choose to operate or not operate from one year to the next, an EE resource that clears in a single Base Residual Auction will provide capacity reductions for the delivery year **and for subsequent years**. One approach for addressing this feature of EE resources is to provide a multiple year commitment at the time of the first Base Residual Auction into which the EE resource was bid. Another approach is to include the EE resource in subsequent auctions as a zero-bid resource that gets paid that year’s auction clearing price.

Draft Proposal

Based on the design principles discussed above, we have developed a draft proposal for how EE resources could participate in RPM with a minimum modification of current RPM Business Rules.

- EE resources can choose to participate as a resource bid into the Base Residual Auction, similar to a DR resource, or as a load reduction prior to the delivery year, similar to an interruptible load resource (ILR).
- The annual capacity value and measure life of an EE resource should be based on a PJM-approved methodology that is based on existing M&V protocols approved by states or international M&V protocols. These would include stipulated savings for the most commonly installed efficiency measures.
- The capacity quantity of an EE resource established through M&V protocols should be increased to reflect avoided T&D losses, reserve requirements, and congestion costs.
- The capacity value of an EE resource should be adjusted to reflect the value of the service that it is providing to PJM (summer-only or year-round).
- EE resources should be allowed to aggregate within the same capacity zone.⁵
- EE resources can participate in RPM with an individual or aggregated capacity value of 100kW, the same as for all other auction participants.

⁵ PJM currently has three capacity zones; in future auctions, there could be as many as 23 separate capacity zones.

- EE resources that clear in a Base Residual Auction should be able to select up to a five year commitment at the first year's Base Residual Auction clearing price (in one year increments).
- EE resource should be paid based on the Base Residual Auction clearing price, if bid into the RPM auction, or the load zone price for the delivery year, if they are used as a reduction to load.