Demand Response Participation in PJM Markets

Review of PJM Independent Market Monitor's Criticisms and Responses

PREPARED FOR

Alberta Electric System Operator

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September 26th, 2017
History of Demand Response in PJM

Utility Programs

Capacity Market Introduced

Stricter Performance, M&V Requirements

DR as % of Total Capacity

Limited ALM

Limited DR

Limited ILR

Annual DR

Annual CP

Extended Summer

Base CP

Source and Notes:


PRD: Price Responsive Demand; CP: Capacity Performance; ILR: Interruptible Load for Reliability; ALM: Annual Load Management.
Capacity Markets Provide Nearly All DR Revenue

Source of DR Revenues in PJM

- Economic Energy Incentives
- Ancillary Services
- Economic Energy
- Emergency Energy
- Capacity*

DR Revenues ($Millions)

Source and Notes:

* Capacity net revenue inclusive of capacity credits and charges
**PJM assumes capacity value at $50/MW-Day
Benefits of DR Supply-Side Participation

In addition to participating on the demand side of wholesale markets, direct DR participation on the supply-side through capacity markets offers a number of benefits (see Aug 28 memo)

1. Recognizes retail loads do not receive efficient price signals to curtail demand in response to wholesale market conditions
   - Even demand charges in retail rates are not aligned with wholesale market price signals during scarcity and reliability events

2. Facilitates DR aggregation and participation in wholesale markets
   - Aggregators and predictable fixed capacity payments responsible for most of the growth; “unbundled” capacity payment facilitates aggregation

3. Makes multi-year peak-load forecasting by ISO less challenging
   - Capacity market participation requires customer/aggregator commitment for specific quantities that the ISO can reflect in its RA determinations
Benefits of DR Supply-Side Participation (cont’d)

4. Makes capturing capacity market savings simpler for loads
   - If DR participates on the demand-side, loads won’t get benefits of reduced quantities once the quantity of capacity procured is set in 3-year forward auction
   - PJM won’t reduce quantity until demand-side DR and EE is reflected in historical load data

5. More accurately accounts for infrequently-deployed resources
   - Allows for annual testing, monitoring, and verification

6. Improves commitment, visibility, dispatchability, and responsiveness of DR resources
   - Establishes communication systems to allow for ISO control, testing, and verification of response
The PJM IMM’s Concerns

Since 2011, the PJM IMM has raised three overarching concerns about DR participation in capacity markets:

- The possibility of “speculative” DR offers in the 3-year forward auction
- Capacity market design may not treat DR and generation equally
- Measurement and verification (M&V) is inadequate

The IMM has articulated its concerns in reports and FERC filings

Some concerns have been partially or fully resolved, others remain unaddressed or have been rejected by FERC

- The next slides summarize the IMM’s concerns and our responses
The IMM’s Concerns

The Possibility of “Speculative” DR Offers

- PJM has consistently over-forecast load, so suppliers could profitably buy out of their forward positions
- DR buys out disproportionately more than generators
- IMM argues “speculative” DR bidding may suppress prices, threaten reliability, and constitute manipulation

Brattle Response:
- Agree rampant speculative bidding could reduce reliability
- Core issue has been PJM’s load forecast inaccuracy
- DR’s ability to exit and enter on short notice may enhance market efficiency
- Committed DR has shown to be reliable

Source and Notes:
Monitoring Analytics, “Analysis of Replacement Capacity for RPM Commitments: June 1, 2007 to June 1, 2016.”
The IMM’s Concerns
Unequal Treatment of DR and Generation

IMM Recommendations:

- **Establish the Same Performance Requirements for DR as Other Resources**
  - ISOs have long accommodated resources with different operational characteristics. Strictly equal treatment may exclude participation by some resources and increase costs (e.g. DR availability may vary seasonally)

- **Subject DR to a Must-Offer Requirement and Offer Caps**
  - Agree that DR should be subject to must-offer requirement, if it is consistent with resources’ capability and availability windows
  - Energy offer caps should not prevent DR from offering at their true opportunity costs

- **Require Nodal DR Dispatch and Without Advanced Notice**
  - Recommend accommodating DR with different response times, just as RTOs accommodate generation with a variety of response times
  - Requirements for locational granularity (load zones and subzones vs. nodes) should strike a practical balance
The IMM’s Concerns
Inadequate Measurement and Verification

IMM Recommendations:

- Improve Baseline Estimates and Performance Measurements
  - Agree. M&V is improving, but less than “perfect” M&V is not a “show stopper”

- Increase Metering and Load Data
  - Agree. Recommend measuring DR performance, but on a portfolio basis

Performance of PJM DR Capacity
Relative to UCAP Rating

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<th>Test Performance</th>
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Source:
Takeaways for Alberta

- Demand Response has played an important role in price formation and resource adequacy within existing capacity market.

- DR will likely be an important resource in Alberta:
  - Competitive entry and exit with less lead-time than conventional resources will be important for stabilizing pricing, particularly in the relatively small Alberta market.
  - Superior commitment, visibility, and dispatchability compared to demand-side participation.

- Despite the PJM IMM’s concerns, we believe the benefits of DR participating as a supply-side resource outweigh the downsides.
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