Demand Response in PJM: Past Successes and the Murky Legal Future of Demand Response…

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PJMs as Part of the Eastern Interconnection

- 27% of generation in Eastern Interconnection
- 28% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection

**KEY STATISTICS**

- PJM member companies: 900+
- Millions of people served: 61
- Peak load in megawatts: 165,492
- MWs of generating capacity: 183,604
- Miles of transmission lines: 62,556
- 2013 GWh of annual energy: 791,089
- Generation sources: 1,376
- Square miles of territory: 243,417
- Area served: 13 states + DC
- Externally facing tie lines: 191

21% of U.S. GDP produced in PJM

As of 4/1/2014
# PJM Opportunity by Wholesale Service

<table>
<thead>
<tr>
<th>Wholesale Service</th>
<th>Demand Side Response</th>
<th>Energy Efficiency</th>
<th>Price Responsive Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Yes</td>
<td>Yes</td>
<td>yes</td>
</tr>
<tr>
<td>Energy</td>
<td>Yes</td>
<td></td>
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<tr>
<td>Day Ahead Scheduling</td>
<td>Yes</td>
<td></td>
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<td>Reserves (30 min)</td>
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<tr>
<td>Synchronized Reserves (10</td>
<td>Yes</td>
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<tr>
<td>min)</td>
<td></td>
<td></td>
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<tr>
<td>Regulation</td>
<td>Yes</td>
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</tbody>
</table>

**Customer may participate as Emergency and Economic DSR and as EE**
Current (2014) DSR capability
~ 6% of System Peak Load

Represents over 1 million end use customers (~14,000 C&I) across PJM

Emergency DR (Capacity)
9,360 MW

Economic DR Capability (Energy)
2,367 MW

~5 MW Regulation

~200 MW Sync Reserves

~900 MW offered into energy market on peak day

~200 MW Sync Reserves

Current (2014) DSR capability
~ 6% of System Peak Load

Represents over 1 million end use customers (~14,000 C&I) across PJM
• **Load Management (Emergency and Pre-Emergency)**
  – Capacity resource responsible to reduce load when PJM needs it during an emergency
    • Limited DR, Extended Summer DR or Annual DR
    • Load reduction required within 30 minutes unless physical limitation (then allowed up to 2 hours for notification)
    • Annual Test required if DR not called during an emergency
    • Penalties for non-performance
  – Offer into auction up to 3 years in advance
• Energy Efficiency Resource (*still fairly new in PJM*)
  – Infrastructure investment where *efficiency is greater than current codes and standards.*
    • Lighting
    • HVAC
    • Building thermal envelope (insulation, windows, doors, etc.)
  – Offer into auction up to 3 years in advance
  – Receive revenue from capacity market for 4 years
    • Based on demand reduction during peak
  – Must have EE measurement and verification plan approved to participate
• **Economic Resource**
  - Energy market – participate based on economic price signal
    - Day ahead market – offer into market similar to generation
    - Real time market
      - PJM dispatch – based on hourly availability, strike price, minimum downtime and shutdown cost.
  - **Ancillary Services**
    - Synchronized Reserves
    - Day Ahead Scheduling reserves
    - Regulation

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_Economic load reduction are based on specific actions taken by resource & should not represent normal operations at the facility. Normally scheduled plant shutdowns do not qualify as PJM economic demand response._
Demand Response in Ancillary Service Markets

- **Day ahead scheduling reserves** (30 minute supplemental reserves)
  - Must reduce net load within 30 minutes if dispatched by PJM
  - Hourly market price (DAMCP)
    - Jan – Sept 2011 average ($1.04 mwh)
  - Minimal participation to date based on economics

- **Synchronized Reserves** (10 minute spinning reserves)
  - Reduce load during reserve shortage, must reduce net load within 10 minutes.
  - Hourly market price (SRMCP)
    - Jan – Sept 2011 average (Mid Atlantic = $12.00 mwh, RFC non-Mid Atlantic = $0.05 mwh)
  - Active participation from ~120 different resources

- **Regulation** – real time load change (increase and decrease) based on real time system conditions
  - Hourly market price (RMCP)
    - Jan – Sept 2011 average ($17.03 mwh)
  - 2 resources began participation in December 2012

0.1 MW required to participate
Publically posted information about system conditions and prices cleared in PJM markets available

PJM posts a monthly report of Demand Response activity in PJM Markets (link provided below)

• US Court of Appeals Finds FERC has no jurisdiction over demand response
• Finds its not a wholesale sale of electricity
• Finds it does not legally “affect rates, terms and conditions”
• Demand response clears outside the market?
• Demand response simply as a load reduction reflected in the load forecast?
• Demand response simply as a load reduction reflected in the load forecast?
• Verifiable and controllable demand response receives a capacity credit?
• Future of aggregation?
• Demand response tied to CO2 reduction state plans?
LET’S TALK…

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