The History of Load Participation in ERCOT

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In the Beginning....

2002

- Texas Energy Markets are opened to competition
- Legacy interruptible programs are eliminated
- Large Industrial customers want to participate in Ancillary Service Markets
- Market Rules (Protocols) changed to add new type of resource called Loads acting as a Resource (LaaR)
- Instantaneous Interruptible customers transition to Responsive Reserve Service (RRS)
- 10 minute and 30 minute customers initially consider providing Non-Spinning Reserve Service but quickly transition to RRS
- Limits placed on maximum participation (25% of RRS capacity)
- Loads must meet similar requirements as generators
  - Real Time Telemetry
  - Dispatchable via a verbal dispatch instruction
  - UFR for Frequency Response
2002 to 2004

• Deployments are done for System Capacity Insufficiency and Management of Zonal and Local Congestion
• Loads must have a relatively flat load profile in order to provide RRS (batch process loads are not allowed to provide service)
• Loads must pass a qualification test to provide service
• 25% limit is raised to 33%
• Protocols are changed to create a new type of Resource called a CLR but system changes are extensive and not implemented
• Numerous deployments for Zonal and Local Congestion
2005 – 2006

• Protocols are changed to remove zonal deployments
• 33% limit is changed to 50%
• Firm Load Shed in April 2006 and first system wide deployment of LaaRs
• Some Performance Issues Identified
  – 20 minute initial response times
  – Real time telemetry issues
  – Qualification tests allow simulated testing
2007 – 2010

- Protocol changes implemented to correct issues
  - Simulated testing no longer acceptable – qualification tests must include an actual deployment
  - Tightened telemetry standards
  - Provisions added to suspend LaaRs that fail to perform
- Response times go from 20 minute timeframe to 7-8 minutes
- Tests run to demonstrate viability of CLR
- Zonal market ends in December 2010
• Nodal Market Implementation
  – Deployments now include XML message prior to the verbal dispatch instruction
  – Split deployment stack created
  – Full implementation of CLR
Load Resources Registered and Qualified for ERCOT AS Market
### ERCOT Load Resources Participating in Responsive Reserve Market Summary

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011***</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Participants</strong></td>
<td>130</td>
<td>130</td>
<td>143</td>
<td>160</td>
<td>181</td>
<td>189</td>
</tr>
<tr>
<td><strong>Registered Load (MW)</strong></td>
<td>1966</td>
<td>2069</td>
<td>2153</td>
<td>2063</td>
<td>2382</td>
<td>2391</td>
</tr>
<tr>
<td>**Load Resource RRS Awards ($ millions) ***</td>
<td>48.4</td>
<td>53.2</td>
<td>115.8</td>
<td>41.6</td>
<td>54.1</td>
<td>108.3</td>
</tr>
<tr>
<td>**Estimate for Total Load Resource Contribution ($ millions) ****</td>
<td>130.0</td>
<td>125.7</td>
<td>267.9</td>
<td>95.5</td>
<td>89.5</td>
<td>182.9</td>
</tr>
<tr>
<td><strong>Weighted Average Price for RRS ($)</strong></td>
<td>12.93</td>
<td>12.61</td>
<td>28.68</td>
<td>10.17</td>
<td>9.03</td>
<td>25.27</td>
</tr>
</tbody>
</table>

* Represents only portion that was awarded through ERCOT AS Market Auction

** Estimate for Total Load Resource Contribution uses the weighted average price for RRS as a proxy price for self provided Load Resources

*** Results thru 9/30/2011
ERCOT Load Resource RRS Deployment 2/2/2011

Load Resources Deployed (MW) vs. Time (hr:mm)

Load Resources Deployed (MW) vs Time (hr:mm)
Emergency Interruptible Load Service (EILS)

- Service provided by end use customers willing to interrupt during an electric grid emergency
- An additional tool for ERCOT Operations, deployed ONLY in the late stages of a grid emergency
- Requirements:
  - Can be individual loads or aggregations
  - 15-minute interval metering or statistically valid sample approved by ERCOT
  - Capability of interrupting at least 1 MW of load on 10 minutes notice at any time during the committed hours
  - No telemetry required, and not modeled in the Network Operations Model
  - 3 Contract Periods per year, each has 4 time periods
  - Performance based on both availability and deployment metrics
  - Dispatching and financial performance is between ERCOT and a QSE