Various categories of Demand Response

Administered by ERCOT

- ✓ Load Resource Participation in ERCOT’s Ancillary Services and Real-Time energy market
- ✓ Emergency Response Service (ERS)

Administered by Non-ERCOT

- ✓ TDSP Load Management Programs
- ✓ 4-Coincident Peak (CP) Load Reduction
- ✓ Price-responsive Demand response
- ✓ Distributed Generation Price Response
Demand Response (administered by ERCOT)

Load Resource Participation in ERCOT’s Ancillary Services and Real-Time energy market

• Controllable Load Resources (CLR) – Load Resources capable of following SCED base points
  – 18 CLRs ≈ 940 MW of registered capacity
  – Does not include Energy Storage (charging CLRs)

• Non-Controllable Load Resources – Blocky loads with both a 10-minute ramp capability for manual deployments and automatic deployment through Under Frequency Relay
  – 575+ Load Resources with ≈ 8,300 MW of registered aggregate capacity
  – General observation across Summer Peak

  ➢ Willing Participation (Offers+Self Arranged) ≈ 3,500 MW
  ➢ Actual Participation (Awards+Self Arranged) ≈ 1,380 MW
  ➢ Available Quantity from Willing Participation ≈ 1,720 MW
Demand Response (administered by ERCOT)

- Emergency Response Service (ERS)
  - Four ERS service types:
    - Non-Weather Sensitive in 10 and 30 minute ramps
    - Weather Sensitive in 10 and 30 minute ramps
  - Four Standard Contract Terms (SCT) per year
    - 4-month SCTs for high-risk: Winter and Summer
    - 2-month SCTs for shoulder: Spring and Fall
  - Capacity is purchased for 8 time periods per SCT
    - Hourly blocks of varying length based on risk of deployment
  - $75M per year spend limit, with addition $25M for renewals in case of exhaustion
    - Exhaustion occurs when deployment exceeds a total of 24 hours in the December-March SCT and 12 hours in all other SCTs
  - Typically 900-1,000 MW per time period and >24k sites participating
  - Weather Sensitive service type dominated by >10k residential aggregations
TDSP Load Management Programs (Summer)

- Programs administered by the 4 Transmission and Distribution Service Providers (Oncor, CenterPoint, AEP, TNMP)
- Available
  - Weekdays only from June 1 through September 30
  - Between the hours of 1 p.m. to 7 p.m.
- Historically ≈ 250-350 MW available
- Summer 2022 Participation ≈ 269 MWs
- Summer 2023 Projected Participation - 198 MWs
- Can be deployed through ERCOT instruction during Energy Emergency Alert Level 2
- No deployment events in 2022
TDSP Load Management Programs (Winter)

- Winter programs are relatively new (2021 and 2022 winter seasons)
- Programs administered by the 4 Transmission and Distribution Service Providers (Oncor, CenterPoint, AEP, TNMP)
- Winter Availability
  - Varies by TDSP with start dates ranging from 10/1/2022 to 12/1/2022 and end dates ranging from 2/28/2023 to 3/31/2023
  - All hours during program period
- Winter 2022 Participation ≈ 35 MWs
- Winter 2023 Projected Participation - 69 MWs
- Deployment through ERCOT instruction during Energy Emergency Alert Level 2
4-Coincident Peak (CP) Load Reduction

• The Four Coincident Peaks in ERCOT are the highest-Load 15-minute settlement intervals in each of the four summer months (June, July, August, September)

• Current estimated value of 1 MW 4CP load Reduction for a Transmission connected IDR customer on Oncor’s system ~$38,000

• There were 41 Near CP Event Days during 2022

<table>
<thead>
<tr>
<th>Date</th>
<th>ESIIDs</th>
<th>HE 17 Reduce MW</th>
<th>NOIEs</th>
<th>HE 17 Reduce MW</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>23-Jun</td>
<td>4,005</td>
<td>1,863</td>
<td>18</td>
<td>1,275</td>
<td>3,138</td>
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<tr>
<td>20-Jul</td>
<td>3,525</td>
<td>1,915</td>
<td>21</td>
<td>1,771</td>
<td>3,687</td>
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<tr>
<td>2-Aug</td>
<td>3,326</td>
<td>1,616</td>
<td>15</td>
<td>1,068</td>
<td>2,684</td>
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<tr>
<td>20-Sep</td>
<td>4,602</td>
<td>2,002</td>
<td>17</td>
<td>978</td>
<td>2,980</td>
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</tbody>
</table>

*The 4-CP days in the tables above are from 2022*
REP/NOIE Demand Response + 4CP

- July 11, 2022 – Largest system wide DR response in 2022 – 4,710 MW

- 4CP day with high prices in all zones
  - High price > $200

- Greatest contributor was 4CP response

<table>
<thead>
<tr>
<th>Day</th>
<th>Day Type</th>
<th>Total System DR</th>
<th>4CP Competitive</th>
<th>4CP NOIE</th>
<th>Indexed Real-Time (RT)</th>
<th>Indexed Day-Ahead (DA)</th>
<th>NOIE Price Response</th>
<th>Peak Rebate (PRI)</th>
<th>Other Direct Load Control (OLC)</th>
<th>EIS Load Competitive</th>
<th>Category Total</th>
<th>Overlap</th>
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<tbody>
<tr>
<td>11-Jul-22</td>
<td>NearCP, High Prices All Zones</td>
<td>4,710</td>
<td>1,947</td>
<td>2,507</td>
<td>1,018</td>
<td>31</td>
<td>2,370</td>
<td>57</td>
<td>89</td>
<td>8,019</td>
<td>3,310</td>
<td></td>
</tr>
</tbody>
</table>

Observation: High price days rarely occur on 4CP days during years with greater reserve margin
Settlement-Only Distribution Generators

SODGs are:
- 10 MW or less and connected to the distribution system
- If > 1 MW and inject to grid, must register with ERCOT
- If < 1 MW, registration is optional

<table>
<thead>
<tr>
<th>Current SODGs</th>
<th># Registered</th>
<th>MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Renewable</td>
<td>298</td>
<td>524.37</td>
</tr>
<tr>
<td>Renewable + Storage</td>
<td>55</td>
<td>319.17</td>
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<tr>
<td>Totals</td>
<td>353</td>
<td>843.54</td>
</tr>
</tbody>
</table>

### Registered SODGs MW

- Total Registered SODGs
- Total MW
- Non-Renewable SODGs
- Non-Renewable MW
- Renewable + Storage SODGs
- Renewable + Storage MW
FERC Order 2222

- This rule enables DERs to participate alongside traditional resources in the regional organized wholesale markets through aggregations, opening U.S. organized wholesale markets to new sources of energy and grid services.

- This rule also allows several sources of distributed electricity to aggregate in order to satisfy minimum size and performance requirements that each may not be able to meet individually.

- ERCOT has implemented rules pertaining to Distributed Generation separately from Demand Response.

- ERCOT is closely monitoring development in other regions.
Key Issues for Demand Response

- Price Responsive Demand Response misaligned with local reliability objective
  - Demand Response today responding to Zonal price versus Locational Marginal Price (LMP) signal
  - Demand Response can play more effective role in resolving local reliability issues
  - Misalignment may be exacerbated by sharp increases in localized loads (e.g., construction of large data mining facilities)

- 4-Coincident Peak (CP) Load Reduction
  - Historically, Peak Load hours and energy scarcity hours coincided
  - Scarcity hours in summer continue to shift from Peak Load hours to Net-Peak Load hours, which raises a question about the long-term efficacy of 4-CP Load Reduction

- Explore removal of 60% limit on Load Resources providing RRS
  - Requires NPRR
  - Minimum 1390 MW of RRS must come from PFR type Resources based on NERC Assessment, requirement will continue to remain
Recent Demand Response Developments

- Enable NCLRs to participate in Non-Spin
  - NPRR1093 Load Resource Participation in Non-Spinning Reserve was implemented in May 2022 – slow initial response is picking up
- ERCOT Contingency Reserve Service (ECRS) is scheduled for implementation in June 2023 which will enable more Load Resource participation in ERCOTs Ancillary Services Markets
- Aggregated Load Resources
  - Pilot Project initiated in early 2023 to aggregate small Distributed Energy Resources, including energy storage. Participation includes TDSPs to evaluate effects on distribution systems
Thank You!