Hawaiian Electric Demand Response Programs

OpenADR Alliance

May 13, 2015
Background

- One utility grid per island; no interconnections
- 400,000+ customers (Oahu, Maui County, Hawaii)
- Hawaii’s State goal - 100% renewables by 2045 awaiting governors approval
- FastDR Pilot started using OpenADR in 2012
  - 0 min notification and 10 min response
  - Currently transitioning all customers (40) to OpenADR 2.0b
Program Design

Grid Service Need Definition
- Needs Assessment
- Program Design

Technology Capability
- Ability to meet system needs
- Technical readiness

Cost Effectiveness Analysis
- DR Potential
- Avoided Costs

Program Activation
- PUC application & approval
# Grid Service Products

<table>
<thead>
<tr>
<th>Description</th>
<th>Response Speed</th>
<th>Response Duration</th>
<th>AGC/ Freq Required</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capacity</strong></td>
<td></td>
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<tr>
<td>Used to meet demand plus reserve margin; supplied by on-line and off-line resources, including interruptible load. Test Requirements: HI-Mod-0025 and HI-Mod-0010</td>
<td>1-3hrs</td>
<td>0-4 hrs</td>
<td>No</td>
<td>must be predictable</td>
</tr>
<tr>
<td><strong>Regulating Reserves</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Used to provide normal frequency regulation</td>
<td>2 sec</td>
<td>30 min</td>
<td>AGC</td>
<td>0.1MW</td>
</tr>
<tr>
<td><strong>Contingency Reserve</strong></td>
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</tr>
<tr>
<td>Reserves deployed in response to loss of the largest single resource on each island.</td>
<td>7cycles 11.7ms</td>
<td>na</td>
<td>Freq</td>
<td>± 0.02 Hz and ± 0.0167 cycles</td>
</tr>
<tr>
<td><strong>Time Delay</strong></td>
<td></td>
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<tr>
<td>Slower contingency reserves. Test Requirements: HI-Mod-012, HI-Mod-010, and HI-Mod-025,26,27</td>
<td>0.5-30 sec</td>
<td>na</td>
<td>Freq</td>
<td>± 0.02 Hz and ± 0.02 seconds</td>
</tr>
<tr>
<td><strong>10- Minute Reserve</strong></td>
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<td></td>
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<td></td>
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<tr>
<td>Offline resource used to restore regulating and contingency reserves</td>
<td>10min</td>
<td>2 hrs</td>
<td>AGC</td>
<td>must be predictable</td>
</tr>
<tr>
<td><strong>30- Minute Reserve</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offline resource used to restore regulating and contingency reserves</td>
<td>30min</td>
<td>3 hrs</td>
<td>AGC</td>
<td>must be predictable</td>
</tr>
<tr>
<td><strong>Long Lead-Time (Non-AGC) Reserve</strong></td>
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<tr>
<td>Resources that can be available for quick start and can add to system ramping capability</td>
<td>30 min (&lt;2 min Angle)</td>
<td>2-3 hrs</td>
<td>Yes/No</td>
<td>must be predictable</td>
</tr>
<tr>
<td><strong>Inertial or Fast Frequency Response</strong></td>
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<tr>
<td>If the inertia are supplied from a resource that cannot sustain the load, primary or secondary resources must be available to take over without a drop in system frequency.</td>
<td>11.7ms</td>
<td>2-3 sec</td>
<td>Freq</td>
<td>must be predictable</td>
</tr>
<tr>
<td><strong>Secondary Frequency Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same req as Reg Res</td>
<td>2 sec</td>
<td>30 min</td>
<td>AGC</td>
<td>0.1MW</td>
</tr>
<tr>
<td><strong>Accelerated Energy Delivery</strong></td>
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<tr>
<td>Shifting the demand for energy from high demand periods to lower demand periods</td>
<td>na</td>
<td>na</td>
<td>No</td>
<td>must be predictable</td>
</tr>
</tbody>
</table>

*Status as of today*
FastDR Current Requirements

- OpenADR 2.0b certified
- VEN’s Approved by Hawaiian Electric’s Information Assurance
- Meter telemetry reported to VTN every 5 minutes using EiReport
- Event Dispatch

Current

- Cyber Security
  - Certification Process
- Encourages innovation
  - Rapid connection of utility
- Stranded Assets
  - Paging towers leaving
- Market Competition
  - Selection of Vendors
Desired Technology Capabilities

- **Event Activation**
  - EMS/AGC to DRMS
  - DNP3 and RTU for integration
  - Multiple communication options
    - AMI, Wi-Fi, Broadband
  - 3rd party integration
  - Frequency/Voltage trip at VEN
  - Locational dispatch

- **Forecasting**
  - Real Time equipment status
  - Real Time meter data
  - Hourly forecasting
  - Day-ahead forecasting