Demand Response
Where customers are rewarded for temporarily reducing electricity use
Agenda

- Intro to Demand Response (DR)
- Hawaiian Electric DR Programs
- DR Case Study
- Benefits of DR
- References
Demand Response + Energy Efficiency

Demand Response (DR) is a partnership between the customer and the utility company, in which the customer reduces demand (or electricity use) in response to requests from the utility. In return, the utility compensates the customer for temporarily reducing electricity use.

Courtesy of: Integral Analytics, Inc. and the Power Shift Atlantic Project

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Balancing the Grid

- Defer building new fossil fuel generation
- Avoid start-up of costly generators
- System emergencies
- Frequency stabilization
- Integration of renewable resources

Courtesy of: Hawaiian Electric Renewable Planning Division
Hawaiian Electric DR Programs

**Commercial**
- **Large**
  - Customer Count: 80
  - Load: 22 MW
  - Launched: 2004
- **Small & Medium**
  - Customer Count: 200
  - Load: 1 MW
  - Launched: 2008

**Residential**
- **Water Heater**
  - Customer Count: 34,000
  - Load: 14 MW
  - Launched: 2005
- **Central A/C**
  - Customer Count: 4,000
  - Load: 3 MW
  - Launched: 2007
Legacy DR Program Architecture

Utility sends a DR alert to the paging service

Third party paging service

Load Control Receiver (LCR)

Commercial & Residential

Large Business:
- EMS
- ATS
- Lighting

Residential:
- Turn off water heaters
- Cycle Central A/C
- Increase t-stat by 2 degrees*
- Turn on and off water heaters*
- Switch off Plug in wall A/C units*

*Future initiatives
Commercial DR Program Architecture

Utility sends alert to alert via Internet

OpenADR 2.0b gateway device retrieves the alert

Facility’s EMS carries out the predetermined directives

Types of shed strategies being implemented:
- Raise set point on A/C units
- Shut down supply and exhaust fans
- Reduce VFD speeds or cycle AHU’s
- Shut down heat pumps, pool pumps, and fountain equipment
- Demand limit or shut down chiller plant
- Reset chilled water supply temperature
- Shut off water pumps or waste water plant
DR Case Study

- Enrollment process
- Upgrades & equipment installation
- Architecture
- Testing
- Benefits of DR
Commercial DR Process

Sales

Contract with Technical Coordinator

Perform Audit

Customer Contract

Install Equipment

Internal Facility Test

Commissioning Test

Submit Closing Documents

Hawaiian Electric

Technical Coordinator (TC)
DR Case Study

Results of Audit
- Available Load: 60kW
- Load Type: 262 tons of cooling across 25 packaged HVAC units
- Estimated costs

Equipment Installation
- TC: Regen Energy
- 25 Controllers
- 1 OpenADR gateway
- Install Ethernet for communication to gateway
- Install telephone line for whole building meter data
DR Case Study

Utility sends alert to alert via Internet

OpenADR 2.0b

OpenADR 2.0b cloud service retrieves the alert

Gateway sends control signals to end device

Gateway

Hawaiian Electric

Shed strategy: Cycle 25 package units

Courtesy of: Regen Energy, Inc.
DR Case Study

• 1-hour event
• 60 kW reduction
• 50% reduction of HVAC
• No customer concerns

Courtesy of: Regen Energy, Inc.
## DR Case Study

<table>
<thead>
<tr>
<th>TC Costs</th>
<th>TC Reimbursements</th>
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</thead>
<tbody>
<tr>
<td>TC cost to perform audit</td>
<td>TC cost to perform audit</td>
</tr>
<tr>
<td>TC cost to manage installation*</td>
<td>TC cost to manage installation</td>
</tr>
<tr>
<td>Cost of control vendor upgrade</td>
<td>Cost of control vendor upgrade</td>
</tr>
<tr>
<td>Cost for sub-contractors</td>
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</tbody>
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<table>
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<tr>
<th>Customer Costs</th>
<th>Customer Rebates &amp; DR Incentives</th>
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<tr>
<td>Monthly subscription</td>
<td>Hawaii Energy Rebate</td>
</tr>
<tr>
<td></td>
<td>DR Incentives**</td>
</tr>
</tbody>
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*No cost since control vendor was the TC*

**Incentives amounts depend on the on average performance per month
Benefits of DR

**Technical Coordinator**
- Reduces cost to your customer
- Leverage customer relationship
- Leverage vendor partnerships
- Experience in DR enablement

**Equipment Vendor**
- Monthly subscription by customer
- Reduces cost to the customer

**Utility**
- Grid Reliability
- Integration of renewables
- Leader in the DR

**Customer**
- Energy Efficiency
- Equipment upgrade
- Incentive payments
- Meter data
- Other rebates
References

Website: http://dr.heco.com
Email: energyscout@heco.com

Open ADR: www.openadr.org
Questions?
Thank you!