Preliminary Results from Portland General Electric’s Employee Smart Water Heater Pilot

2016 ACEEE Hot Water Forum

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Session 7C
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Portland General Electric is committed to demand response as part of a least-cost, reliable, and sustainable resource portfolio.

PGE believes DR can and should:
- Benefit all customers
- Be responsive to systems needs
- Fit customers’ lifestyles
- Realize multiple value streams
- Be reliable and low cost

Connected devices and the growing adoption of smart technologies provides an opportunity to provide a new form of cost-effective DR.

Smart water heaters provide the opportunity to cost-effectively meet all of these needs with minimal impact to customers.
Employee Smart WH Pilot

- Started in September 2015
  - Fully enrolled by November
- Provided complimentary water heaters contingent in participation
- 14 units installed:
  - 10 AO Smith PXNT-50
  - 4 Whirlpool Energy Smart
  - Thirteen 50-gallon units
  - One 80-gallon unit
- Called events for ~60 days:

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Sample Composition

- 14 participants
- 36% have children in the home
- 1.7 showers per day
- 0.2 baths per day
- 1 person with Jacuzzi
Data Collected

- Baseline survey data on household size and typical usage
- Ongoing weekly survey on occurrence, timing, and probable cause of loss of hot water
- Logger data
  - W
  - Present Wh
  - Total Wh
- Message data
- Configuration update logs
- Error logs
Example Data

- Raw text files from web-hosted platform
Example Data

- Extracted, transformed, and loaded into relational database
Impact Methodology

- Baselines were constructed for each employee based on the average of comparable non-event days
  - Matched by day of week, hour, and minute
    - Also excluded hours where an event had occurred less than six hours prior (in cases where late night events were called)
- Top X of Y methods not used because events were not called based on load conditions
- Weather effects were not significant in most cases and were therefore omitted
- Impacts for curtailment events were then simply calculated as:
  - Impact = Observed Usage – Baseline Usage
A Note About Water Heaters Usage…

- Average baseline usage in the sample
...there is a huge difference in how we use hot water.

- Average baseline usage by employee
Event Campaign

All Curtailments

Max. curtail, 0.000

All Impacts

Avg. impact, 0.000

Diagram showing data for different months (November, December, January, February) with hourly data and color-coded impact levels.
Example Day: Simple Shed

- Friday December 4, 2015
- Two events:
  - One-hour 50% curtailment + one-hour shed command
  - No reported loss of service