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

2016 ACEEE Hot Water Forum

Date: February 22nd, 2016

Session 7C

Presenter: Josh Keeling



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Background

- 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:

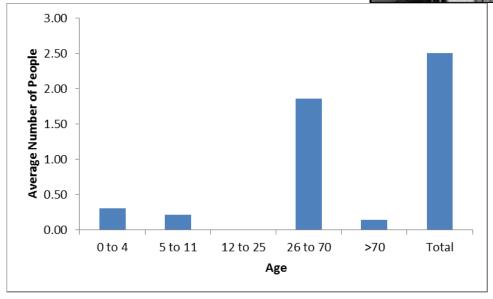
	Is Event Day	
	0	1
Sunday	9	7
Monday	5	12
Tuesday	7	8
Wednesday	7	8
Thursday	8	8
Friday	7	8
Saturday	8	8



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

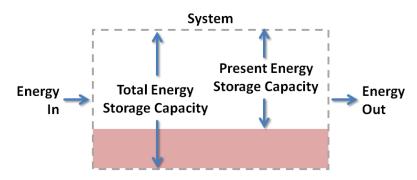
Ongoing weekly survey on occurrence, timing, and probable cause of

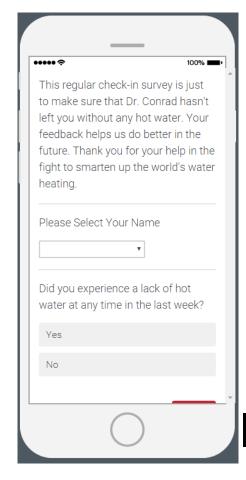
loss of hot water

Logger data

- o W
- Present Wh
- Total Wh
- Message data
- Configuration update logs

Error logs





Example Data

 Raw text files from webhosted platform

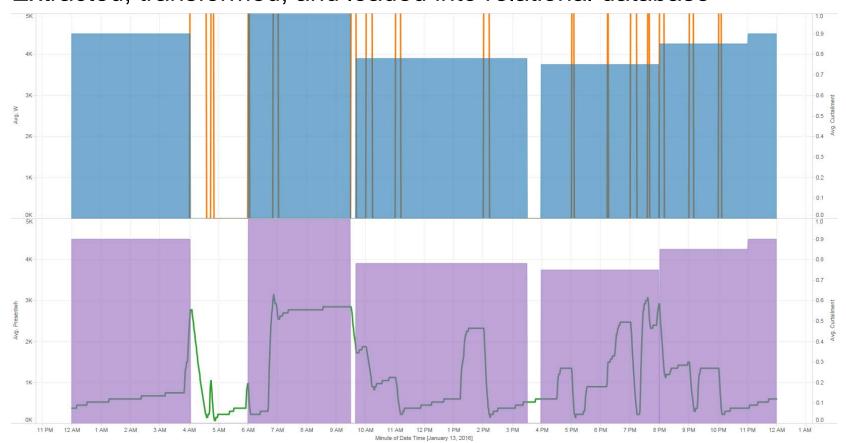
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Example Data

Extracted, transformed, and loaded into relational database



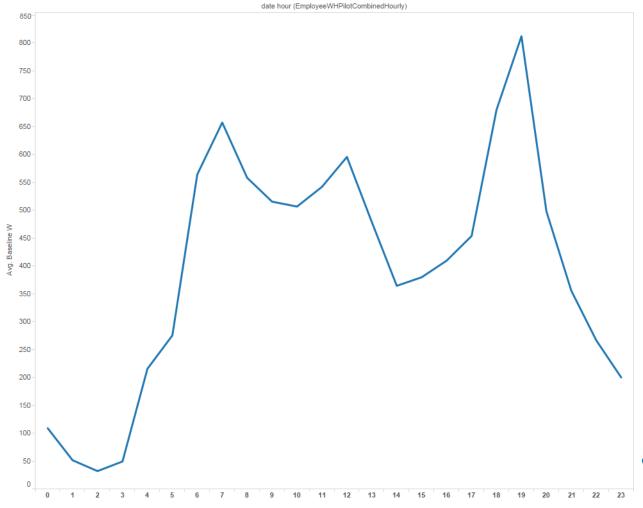
Impact Methodology

- 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...

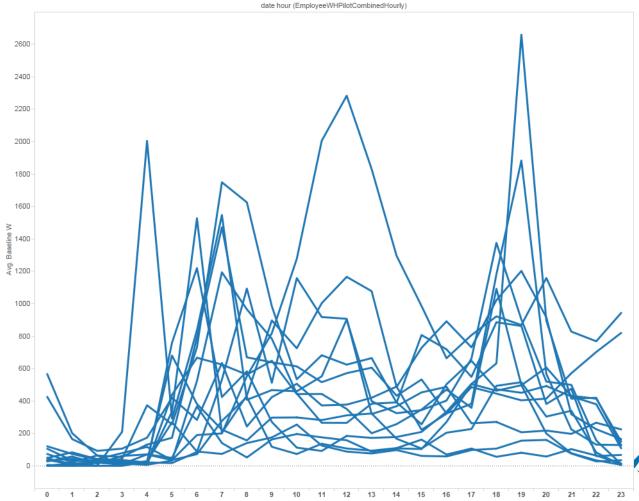
Average baseline usage in the sample





...there is a huge difference in how we use hot water.

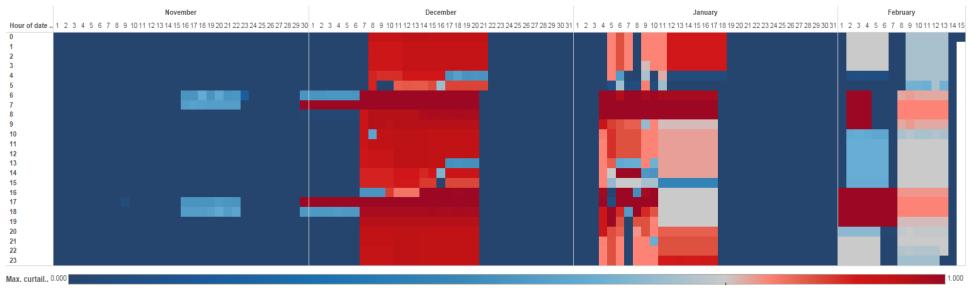
Average baseline usage by employee



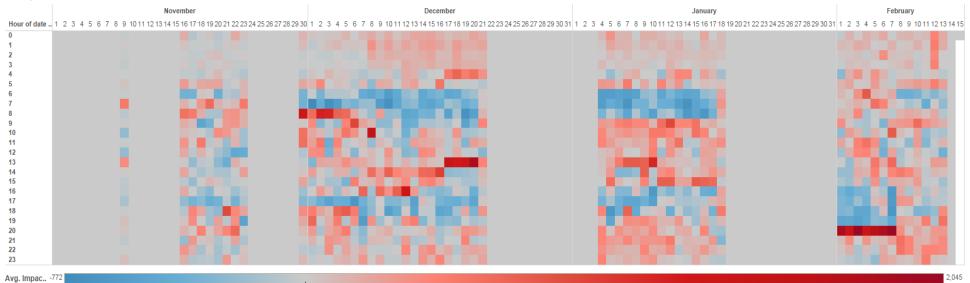


Event Campaign

All Curtailments



All Impacts



Example Day: Simple Shed

Friday December 4, 2015

Two events:

