PowerStat Precooling Pilot

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Powering forward. Together.

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2012 PowerStat® Pilot Overview

Features

- Free communicating thermostat & installation
  - ✓ Honeywell UtilityPRO
  - ✓ $300 value
  - ✓ Remotely programmable by customer by Internet
- Temperature strategies
  - ✓ 0-4°F lower before event
  - ✓ 3°F higher during event
- Comfort surveys
  - ✓ pre-pilot, during, post-pilot

Structure

- Aug – Sept 2012
- 3 event strategies
  - ➢ No precool
  - ➢ 2°F precool for 6 hours
  - ➢ 4°F precool for 2 hours
- 6-10 PowerStat events
- Strategy rotation
  - ➢ 3 groups (1 per strategy)
  - ➢ 60 participants per group
- PowerStat® overrides unlimited

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Technology

- 3rd party load management system
- Customer portal for online control
- Events were dispatched through one-way paging network in 900 MHz band

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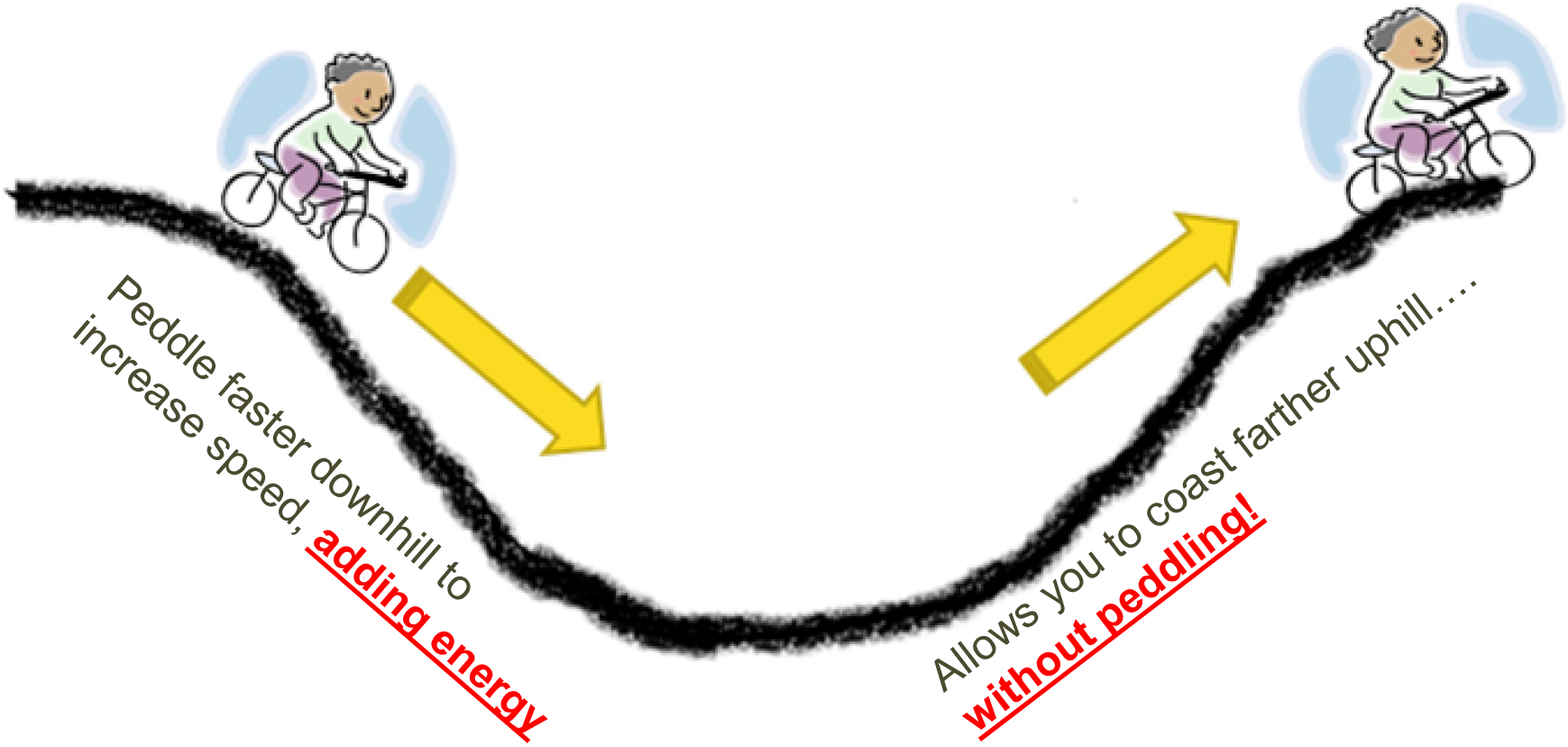
What is Precooling?: An Analogy



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Why is SMUD precooling?

Purpose of PowerStat® Pilot

- Evaluate impact precooling has on PowerStat® event and customer comfort levels
- Assess thermostat features for future programs
- Increase customer awareness and engagement with Direct Load Control programs
- Develop/record precooling and offset recommendations for customers on TOU rates
- Promote peak load reduction and energy efficiency

Customer Benefits

- Free thermostat and installation
- Latest technology
- Familiarity with preprogrammed temperature settings and schedules
- Ability to program temperature settings and schedules online from anywhere

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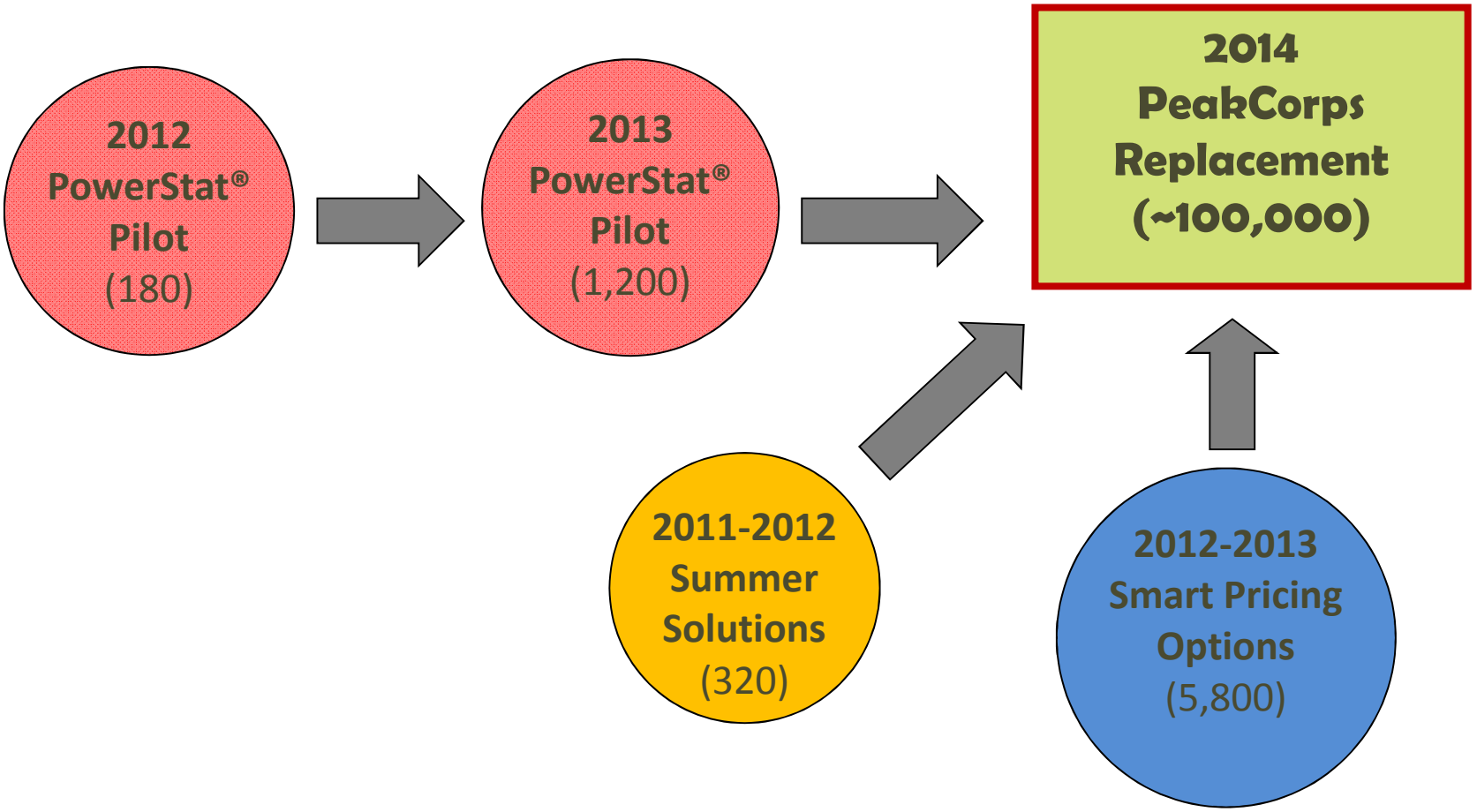
Why is SMUD precooling?: The BIG Picture



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Study Design

- Load Control Strategies

Treatment Group	Precool Duration*	Precool Offset	Peak Duration*	Peak Offset
No Precool	0 hours	-0 °F	3 hours	+3 °F
2 hours Precool	2 hours	-4 °F	3 hours	+3 °F
6 hours Precool	6 hours	-2 °F	3 hours	+3 °F

- 180 participants / 3 groups of 60
- Customers remained on their existing rate
- 8 events called between the 4 – 7 pm; Aug-Sept
- Customers were rotated between each of the treatments
- No limit to the number of participant opt-outs

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Customer Recruitment

- SMUD Direct Mail Recruitment Effort 14,223
- Total Customer Agreements Received 620
  - ➢Response Rate 4.36%
- "Rejected" Customer Agreements 150
- Total "Clean" Customer Agreements 470
- Target "Clean" Customer Agreements 238
  - ➢Oversubscribed by: 97.48%

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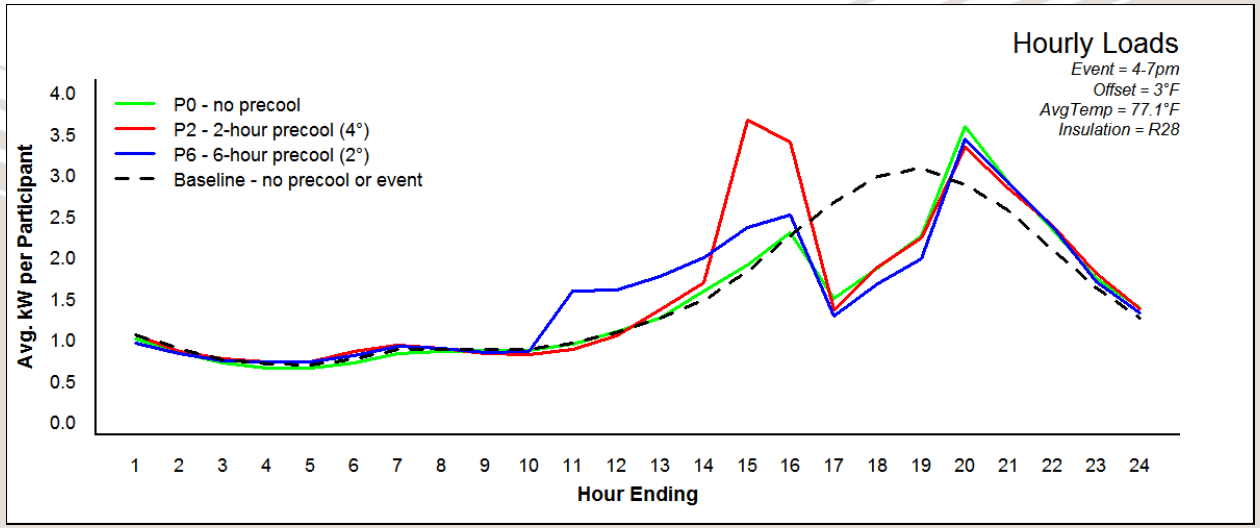
How did Precooling and Peak Offset Impact Loads

- Before the event, the 6 hour precool used significantly more energy
  - The 2 hour precool used the highest
- During the event, the 6 hour precool reduced the most
  - The 2 hour and no precool were similar
- After the event, no significant differences
- Total daily energy use was lowest under the no precool
  - The 2 hour and 6 hour precool were not statistically different



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Effects on Load Before, During and After the Event of Participants

- Before the event
  - 2 hr precool/4 degree decrease: 1.5 kW increase
  - 6 hr precool/2 degree decrease: 0.39 kW increase
- During the event
  - No precool: 1.0 kW reduction
  - 2 hr precool/4 degree decrease: 1.1 kW reduction
  - 6 hr precool/2 degree decrease: 1.3 kW reduction
- After the event
  - No precool: 0.30 kW increase
  - 2 hr and 6 hr precool: 0.26 kW increase

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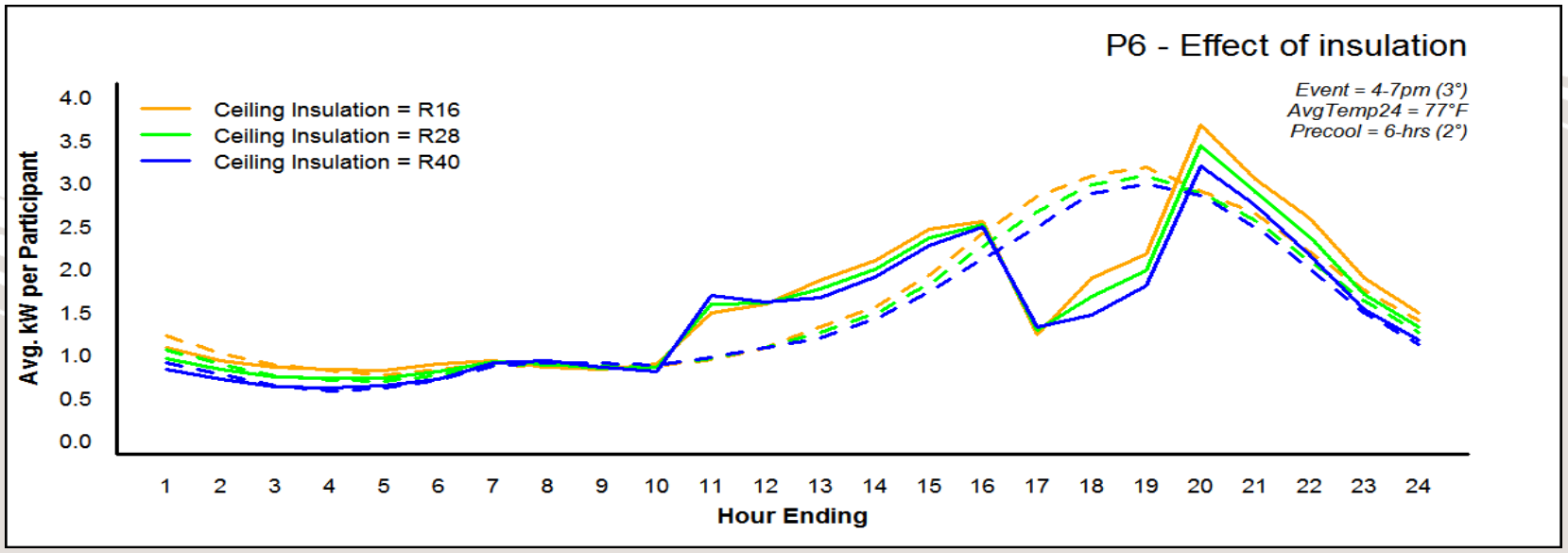
How did load impacts change with insulation levels

- Well-insulated buildings slow heat transfer
- One might think that precooling and offset strategies would use less energy and have greater impacts in homes with higher levels of insulation.
- Homes with higher insulation levels attained deeper load shed and smaller rebound effects than those with the lower insulation levels.



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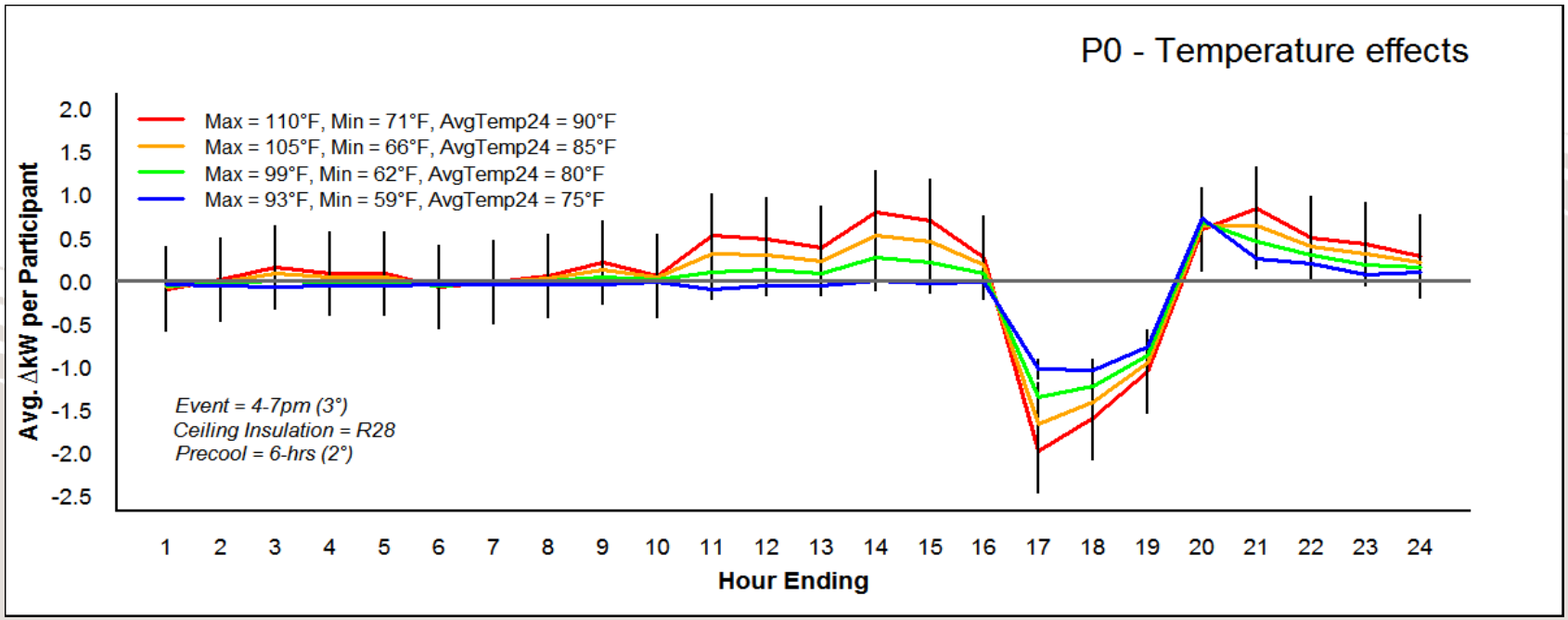
How did the load impacts change with the outdoor temperature

- In all cases, results show that higher temperatures increase pre-peak and post peak loads and lower peak loads



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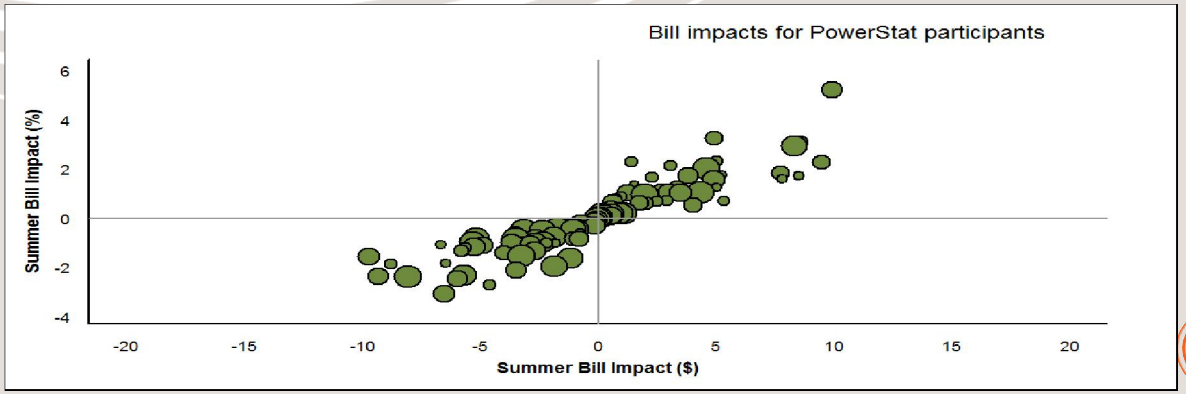
Electric Bill Impacts

- Average monthly bill impacts for PowerStat® participants ranged from a $2 monthly bill savings (-1.2%) to a $0.55 monthly bill increase (+0.5%)

Treatment	Average Monthly Bill Impact ($)	% Bill Impact
No Precool	- $2.03	- 1.2 %
2 hr precool	+ $0.55	+ 0.5 %
6 hr precool	- $0.20	- 0.1 %

- Bill impact estimates ranged from -$10 to $10 for the summer, representing between -3% and +5% of the August-September bills.



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Event Opt Outs

- Participants had ability to opt out of each event

Event	Date	Maximum Temperature	# Opt Outs	% Opt Outs
1	8/9/12	103	3	2.0%
2	8/13/12	105	4	2.6%
3	8/15/12	96	11	7.2%
4	8/17/12	95	6	3.9%
5	8/23/12	91	6	3.9%
6	9/4/12	95	4	2.6%
7	9/12/12	91	2	1.3%
8	9/14/12	92	9	5.9%

- Out Outs by treatment
  - P0: 3.3%
  - P2: 4.1%
  - P6: 3.7 %
- 49% opted out before control, 10% during precool, and 40% during peak

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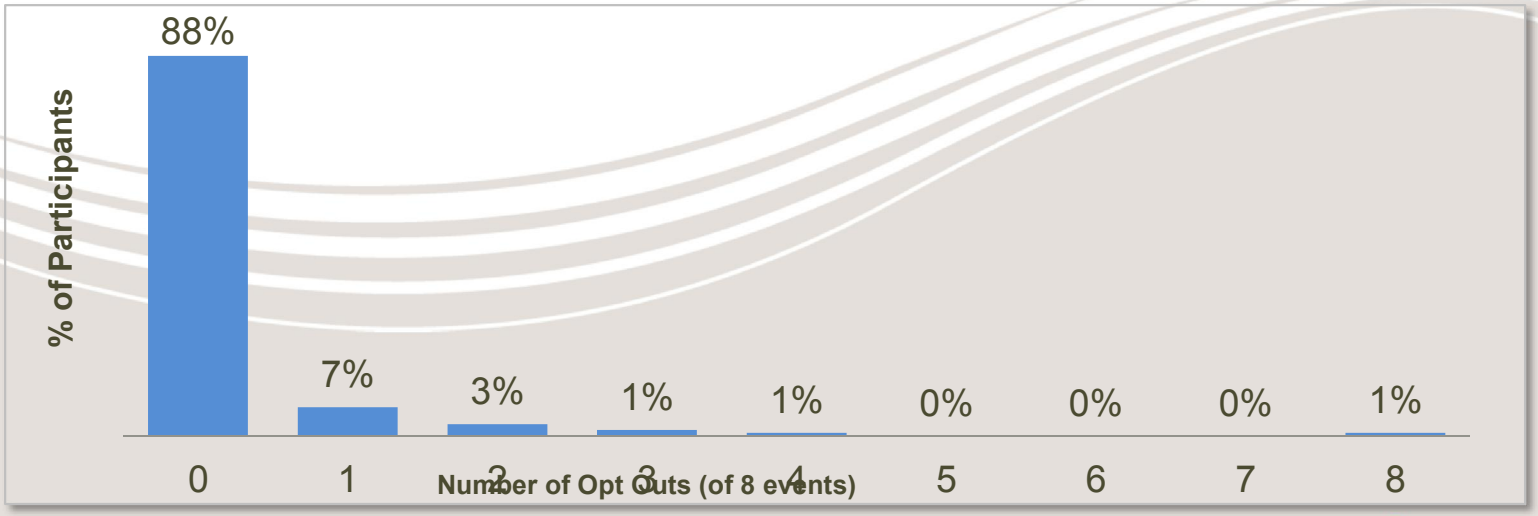
Opt Out Frequency

- 18 participants accounted for 45 opt outs used
- 88% never used the opt out
- 7% used it once
- 1% used it every time



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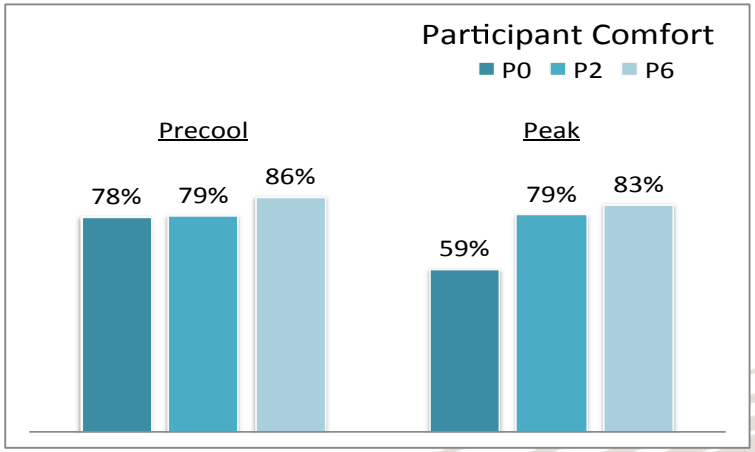
Comfort and Satisfaction

- Participants were most comfortable under the 6 hr precool



- 68% very satisfied; 25% somewhat satisfied with their PowerStat® program experience.
- 86% would recommend the program to a friend
- Nearly three quarters of customers said they would definitely or probably sign up again next summer.

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Reasons for Participating and Expectations

Pre-Pilot Survey Reasons for Participating

- Saving energy
- Saving money
- Free thermostat

Pre-Pilot Survey Expectations

- Learn how to better conserve energy
- Use less energy
- More control over their bill

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Questions?

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