

Random assignment + billing
analysis + thermostat data =
reliable savings estimates for
smart thermostats?



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EM&V by Applied Energy Group



Smart Thermostat Trial

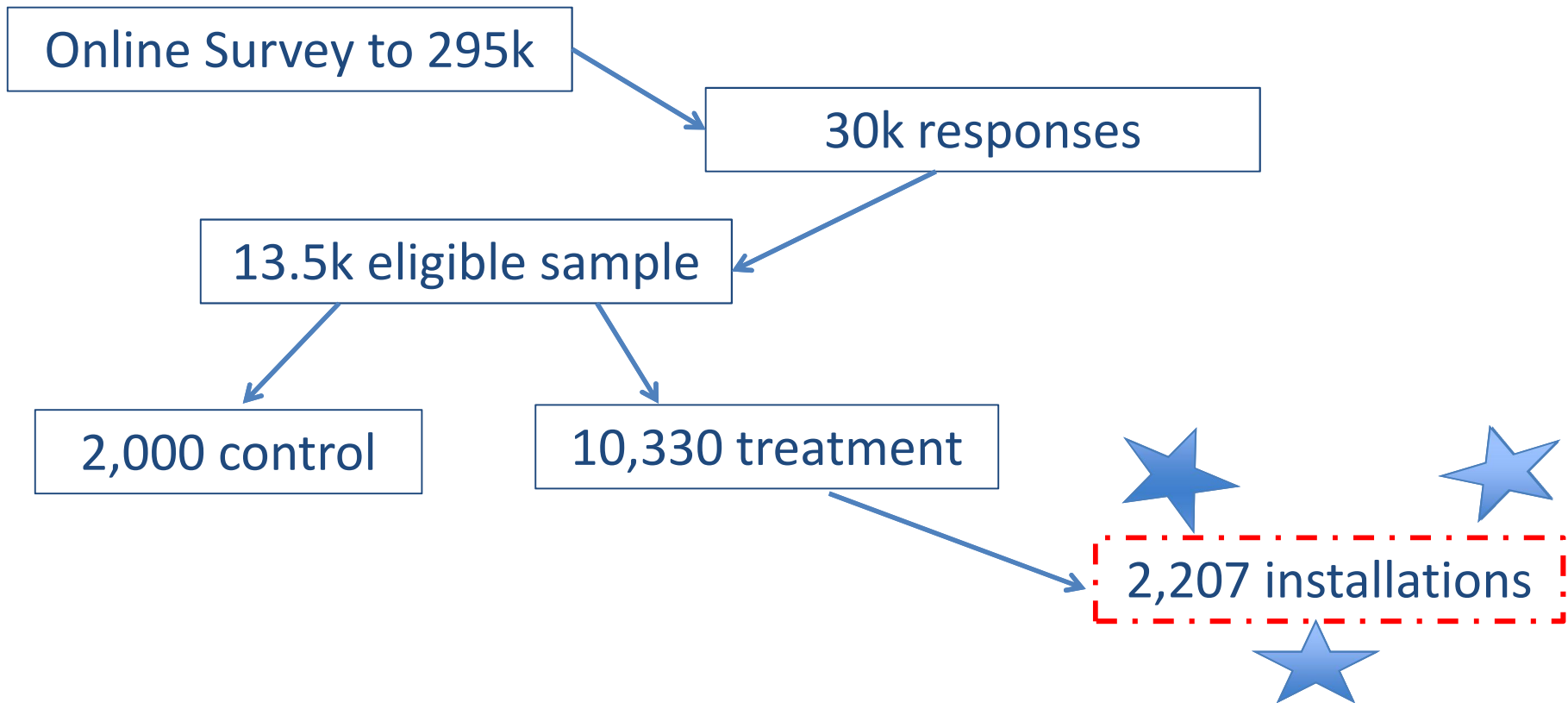
3 thermostats

3 hot climate zones

4 customer segments



Randomized Encouragement Design (RED)





Randomization Check

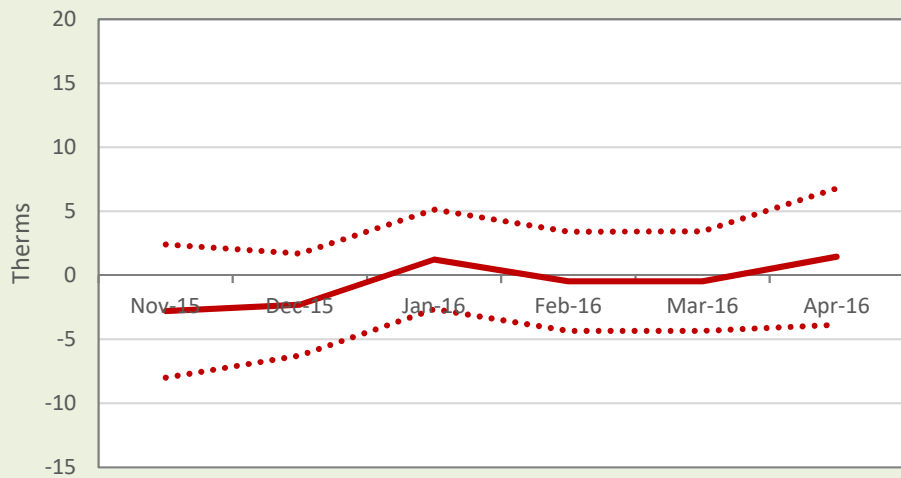
- Assigned v. Control – no differences
- Installed v. Control group -
 - Pattern of lower average household kWh consumption in installed group (significant for 2 of 3 t-stats)
 - To be expected



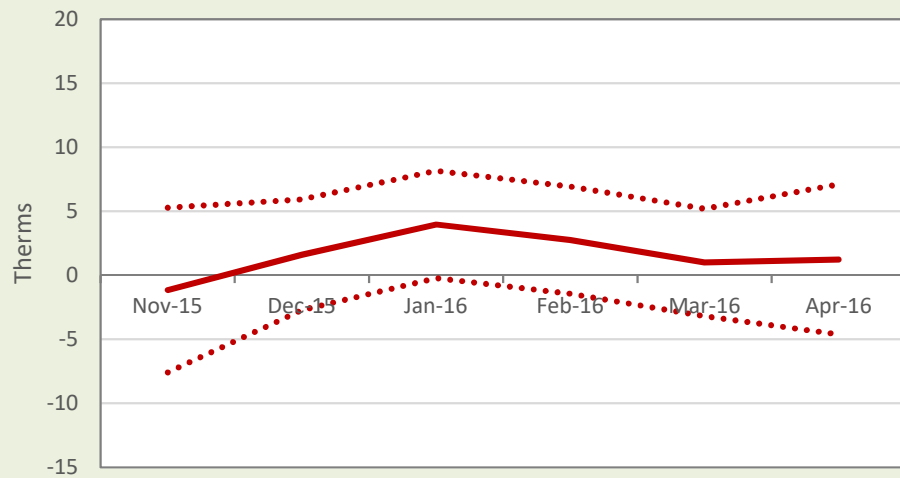
Challenges and Learnings

- When you say smart t-stat...
- Random assignment \neq cost-effective installation approach
- Quality checks are important:
 - Eligibility
 - Device ID
 - Wi-Fi password
- “Don’t mess with my RCT/RED!”
- **Make sure you can go beyond “the number”**

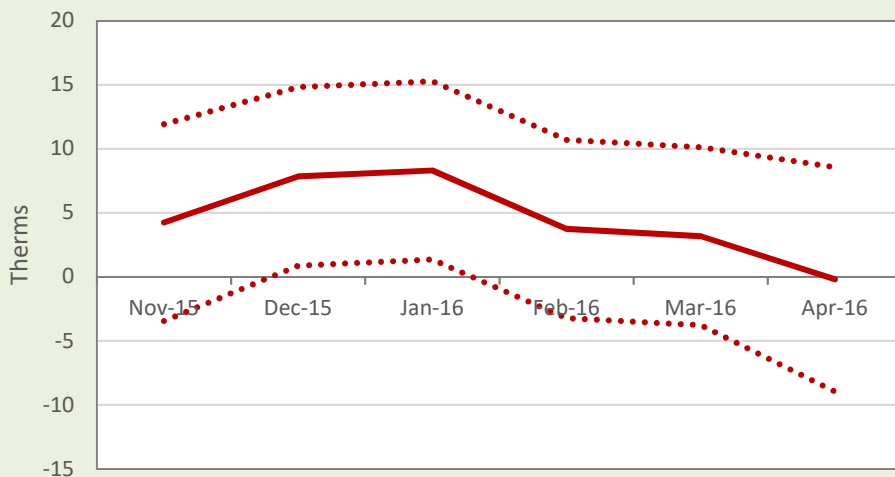
T-Stat 1



T-Stat 2



Above zero indicates
therms saved



95% CI



What's Next?

- Analyze full year of therms and kWh billing data
 - Extend trial? → post-trial survey of treatment and sample of control
- Working with vendors to get device-level data
- Can we build a more insightful picture using AMI + t-stat + self-report?
 - What did they do before – what's the opportunity to save?
 - How might home demographics affect savings?
 - What features are people using and how do they affect savings?
 - Are savings different for behind-the-scenes smart vs. user-reliant smart?

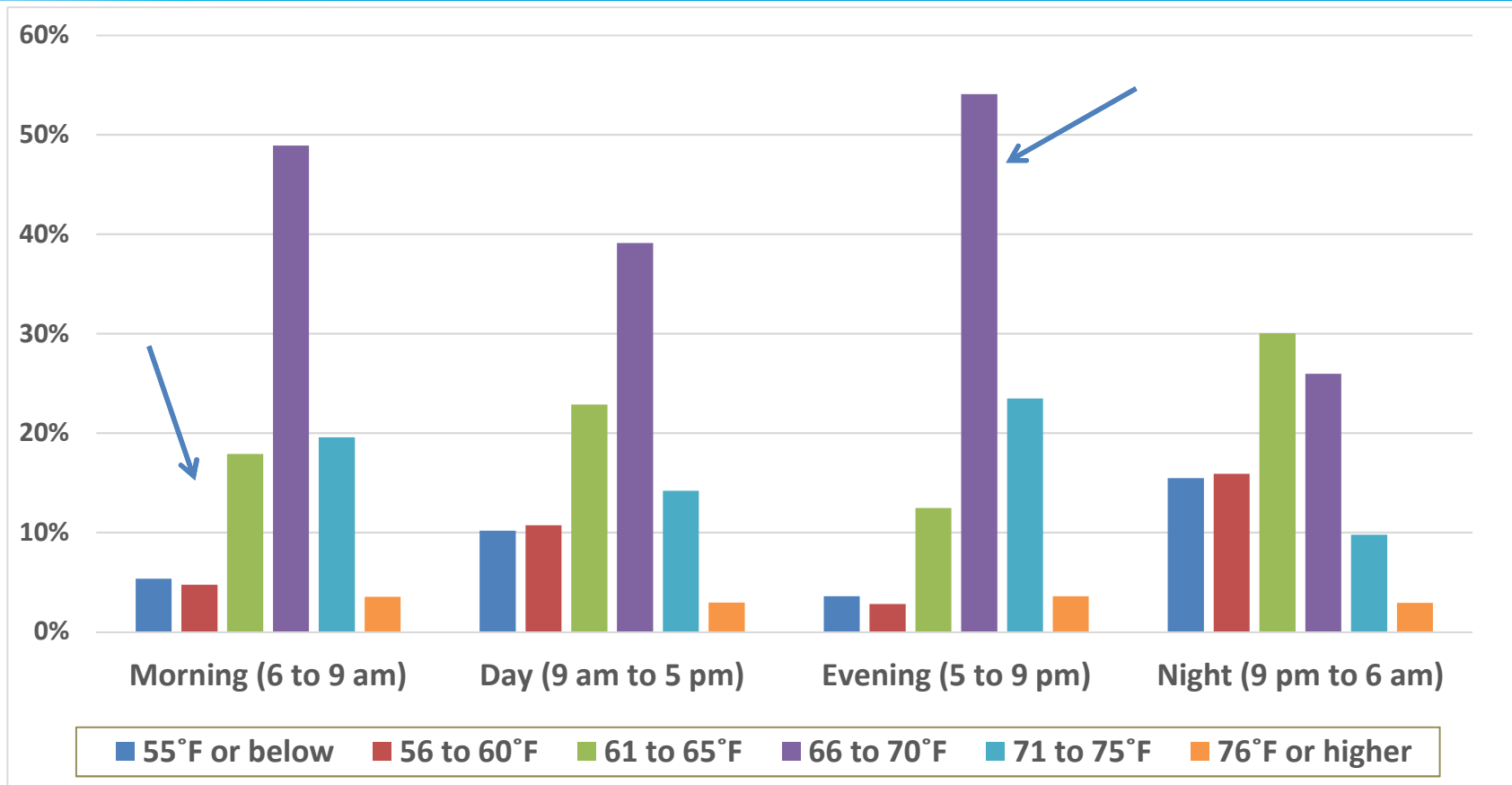


Key Insights: Post-Installation Survey

- Online survey - 85% response rate (1,895)
 - **Previous thermostat** – 85% had programmable t-stat
 - 84% setback when away for extended periods (vacation)
 - **Satisfaction** with the enrollment and installation process
 - **Satisfaction** with the smart thermostat – 72% very satisfied
 - **Energy-related changes** in past 12 months – 26% made a change
 - **Home demographics**
 - Ex: most built after 1970; 40% are 1,500-2,000 sqft; 87% gas furnace
 - 67% typically have someone home during weekdays in winter; 73% in summer

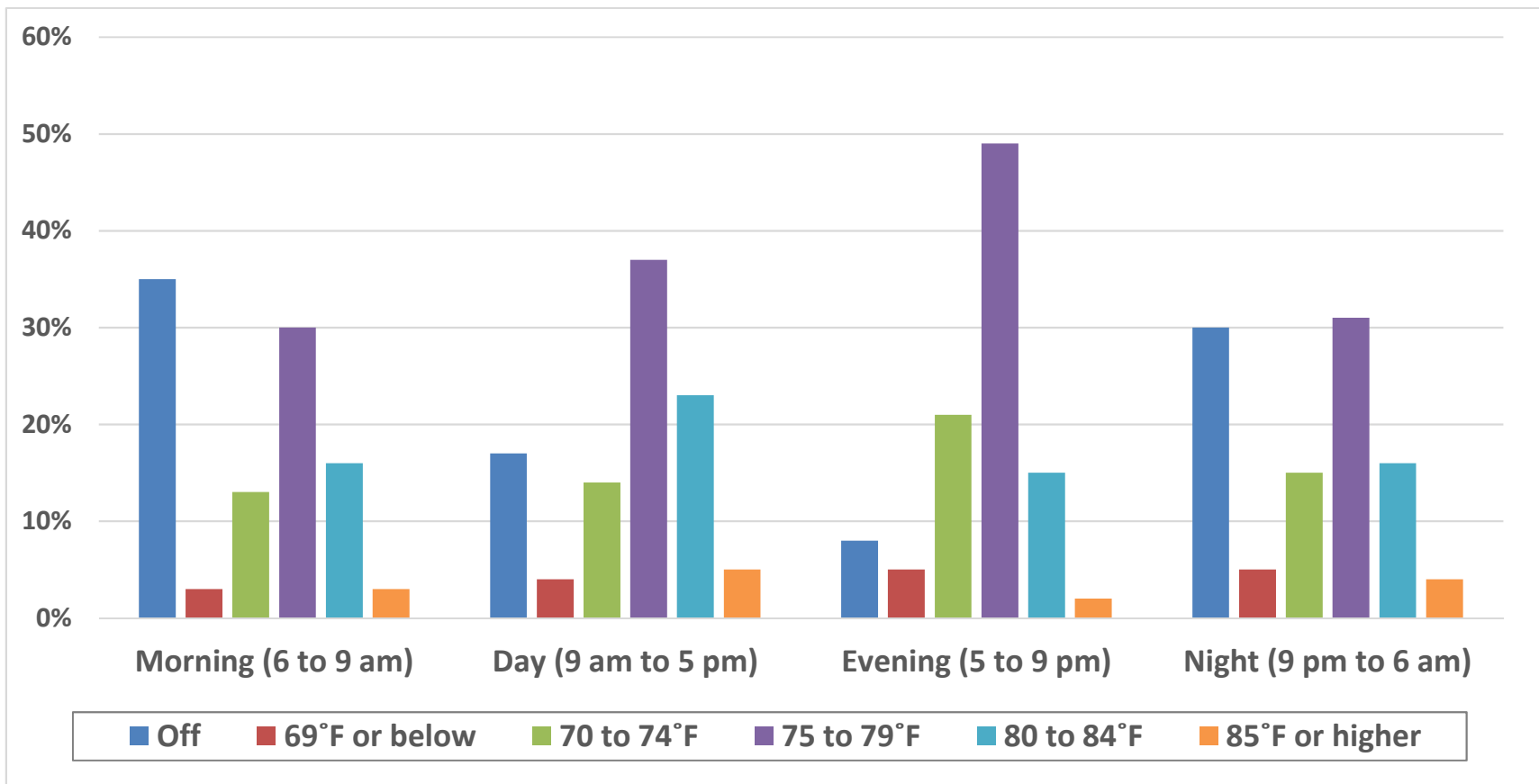


Pre-trial Heating Set Points (self-reported)



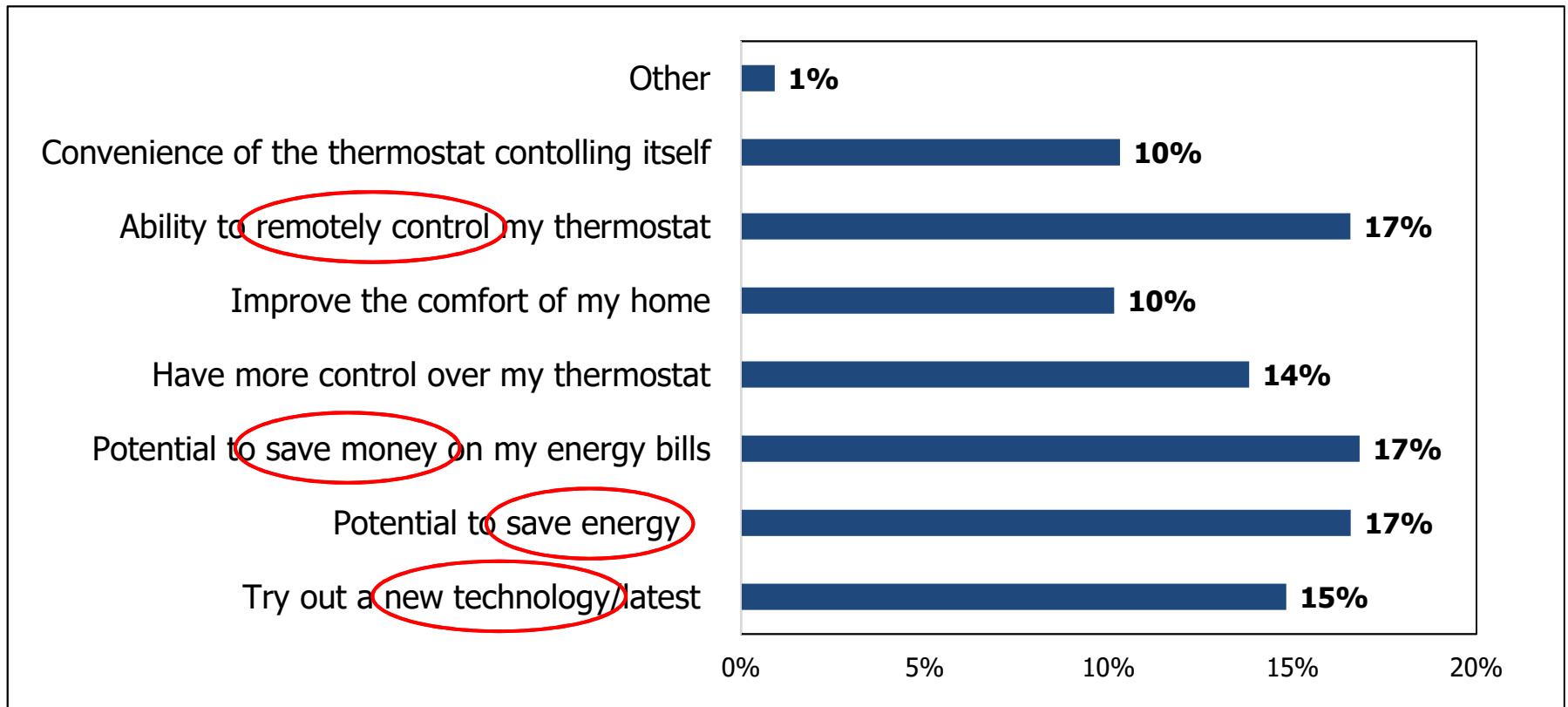


Pre-trial Cooling Set Points (self-reported)





Might Motivation Affect Savings?

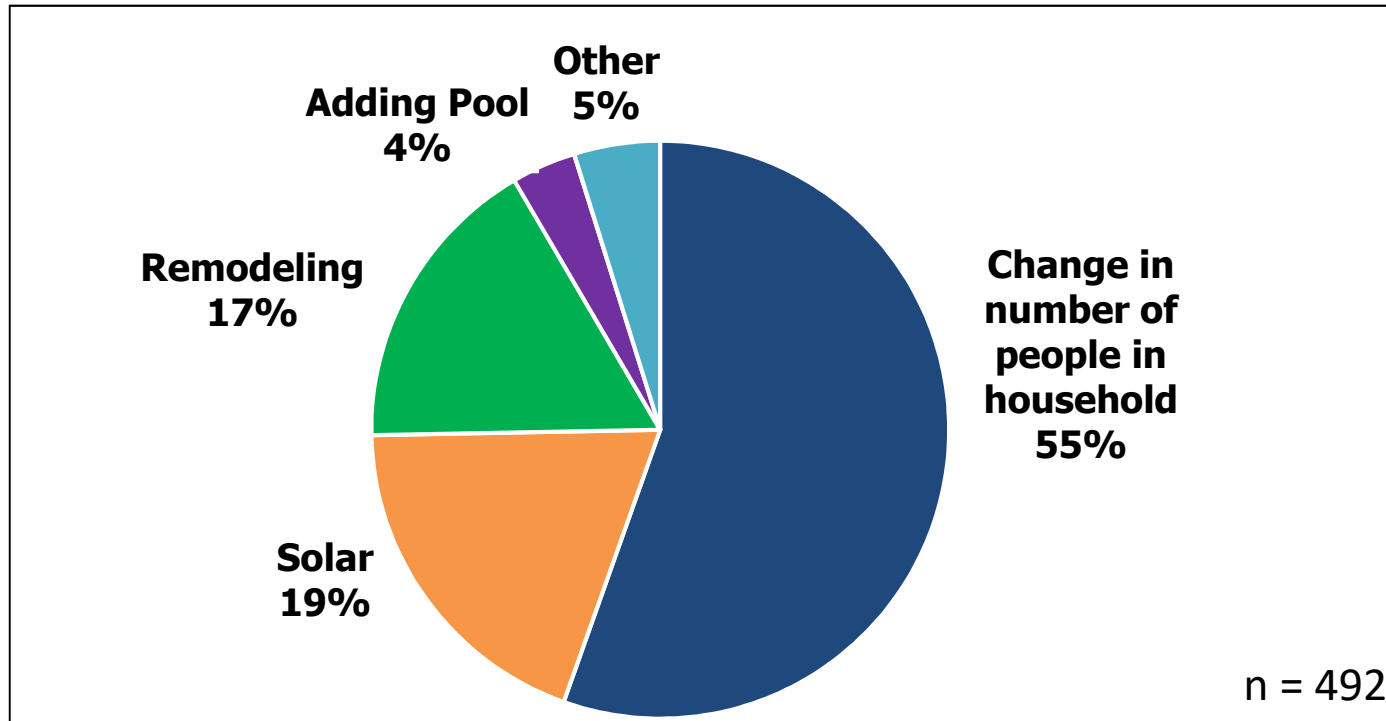


“What made you want to try a smart thermostat?”



What is the Influence of Other Factors?

“Have there been any changes in your household in the last 12 months that might have affected your home’s energy use?” Yes = 26%



Questions?

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1 SUBJECT LINE: Are smart thermostats in your future?

[Español](#)

You're invited to help set the future
of home temperature control.



Dear <<Customer Name>>,

If "smart" home products live up to expectations, they'll prove to be a great example of technology and innovation combining to provide more intuitive, user-friendly control over your home energy use. That's why Pacific Gas and Electric Company (PG&E) is launching a study to evaluate the next generation of smart thermostats in 3,000 homes in your area.

Please take 2 minutes to fill out this confidential [survey](#) to answer questions about your home and to see if you are eligible for the study. Your response would be appreciated. If you are selected to participate, the smart thermostat will be installed in your home for free and it will be yours to keep.

We look forward to your response!

[BEGIN SURVEY](#)



2. SUBJECT LINE: Get a free smart thermostat for participating in a study.

[Español](#)

Help set the future of home temperature control.



Dear <<Customer Name>>,

New, innovative technologies like “smart” thermostats are designed to help your household easily manage home temperature control and reduce energy use. Pacific Gas & Electric Company (PG&E) would like your help in developing a better understanding of this advanced technology. That’s why you are invited to participate in a study of smart thermostats in homes like yours.

Take 2 minutes to fill out our short, confidential [survey](#) to see if you’re eligible to participate. This opportunity will be ending very soon so your prompt response would be greatly appreciated. Remember, there’s no cost to participate and the smart thermostat will be yours to keep.

We appreciate your prompt response!

[BEGIN SURVEY](#)