

ENERGY STAR. The simple choice for energy efficiency.



# ENERGY STAR Certified Homes

## Sales & Savings: Smart Thermostats for ENERGY STAR Certified Homes

January 30, 2018



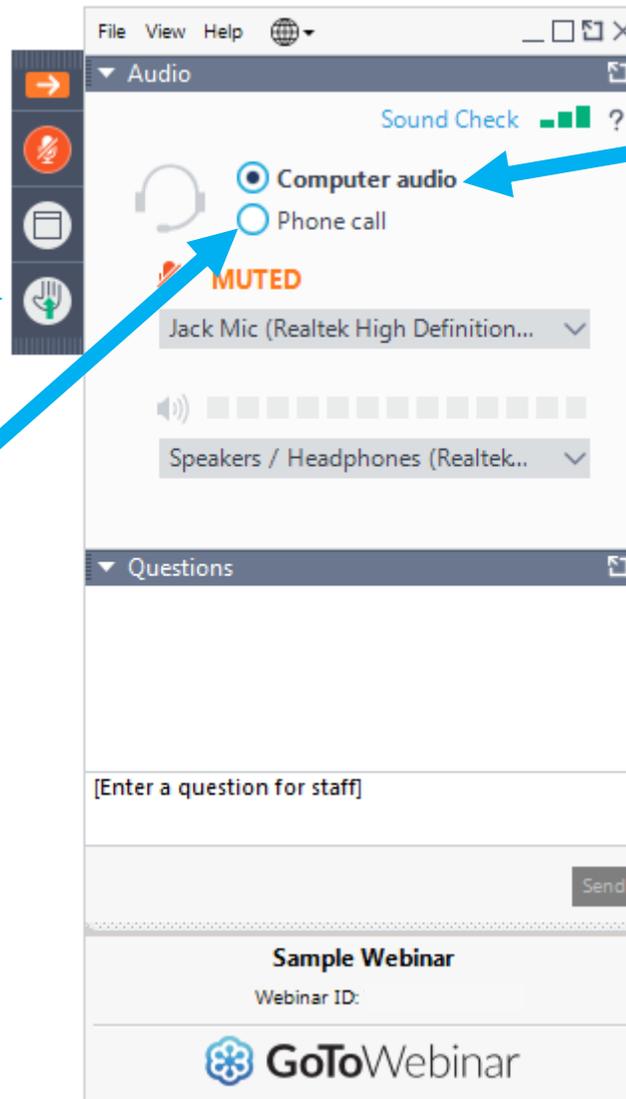
# Tips for Participating in today's Webinar

Use this button to expand or minimize your toolbar at any time.

Use this button to indicate your response to Agree/Disagree and Y/N questions.

If you are using your telephone:

- Select “use telephone” button
- Dial in and enter your access code
- Enter your audio pin and press #



If you will listen in using the speakers on your computer:

- Select the “Computer Audio” button
- Unmute your desktop
- Click on [Audio Setup](#) if you're having any difficulty.

Everyone will be muted, but you can type in questions at any time and we'll answer them at the end of the presentation.



## Learning Objectives

- Learn about the smart thermostat market and key trends.
- Discuss energy savings associated with ENERGY STAR certified smart thermostats.
- Discuss best practices for installing and communicating value of smart thermostats to homebuyers.
- Identify available financial incentives.
- Hear from the top manufacturers of smart thermostats on new products and developments.
- Get your questions answered!



## Agenda

**1:00**      **Welcome**

**1:15**      **ENERGY STAR Savings & Incentives**  
Abigail Daken, EPA



**1:25**      **Smart Thermostat Benefits & Market Trends**  
Hannah Bascom, Nest



**1:35**      **Smart Thermostat Benefits & Market Trends**  
Sarah Colvin, Ecobee



**1:45**      **Q&A**



# Q&A

The screenshot shows a software window with a menu bar (File, View, Help) and a globe icon. The main content is divided into two sections: 'Audio' and 'Questions'.  
The 'Audio' section includes:

- 'Sound Check' with a volume indicator and a help icon.
- Radio buttons for 'Computer audio' (selected) and 'Phone call'.
- A red microphone icon and the word 'MUTED' in red.
- A dropdown menu for 'Jack Mic (Realtek High Definition...)'.
- A volume slider.
- A dropdown menu for 'Speakers / Headphones (Realtek...)'.

The 'Questions' section includes:

- A text input field with the placeholder text '[Enter a question for staff]'. A large blue arrow points to this field from the left.
- A 'Send' button.
- Footer text: 'Sample Webinar' and 'Webinar ID: .....'. The GoToWebinar logo is at the bottom.

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to place your order and confirm  
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# ENERGY STAR Certified Homes

## Web:

Main: [www.energystar.gov/newhomespartners](http://www.energystar.gov/newhomespartners)  
Technical: [www.energystar.gov/newhomesguidelines](http://www.energystar.gov/newhomesguidelines)  
Training: [www.energystar.gov/newhomestraining](http://www.energystar.gov/newhomestraining)  
Products: [www.energystar.gov/products](http://www.energystar.gov/products)

## Email:

[energystarhomes@energystar.gov](mailto:energystarhomes@energystar.gov)

## Social Media:



@energystarhomes



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## Contacts:

### Brice Lang

EPA  
Partner Support  
ENERGY STAR Certified Homes  
[Lang.Brice@epa.gov](mailto:Lang.Brice@epa.gov)

### Cindy Wasser

ICF  
Partner Support  
ENERGY STAR Certified Homes  
[Cindy.Wasser@icf.com](mailto:Cindy.Wasser@icf.com)



# ENERGY STAR Smart Thermostats in New Homes

For more information, contact

Abigail Daken

[Daken.Abigail@epa.gov](mailto:Daken.Abigail@epa.gov)

202-343-9375

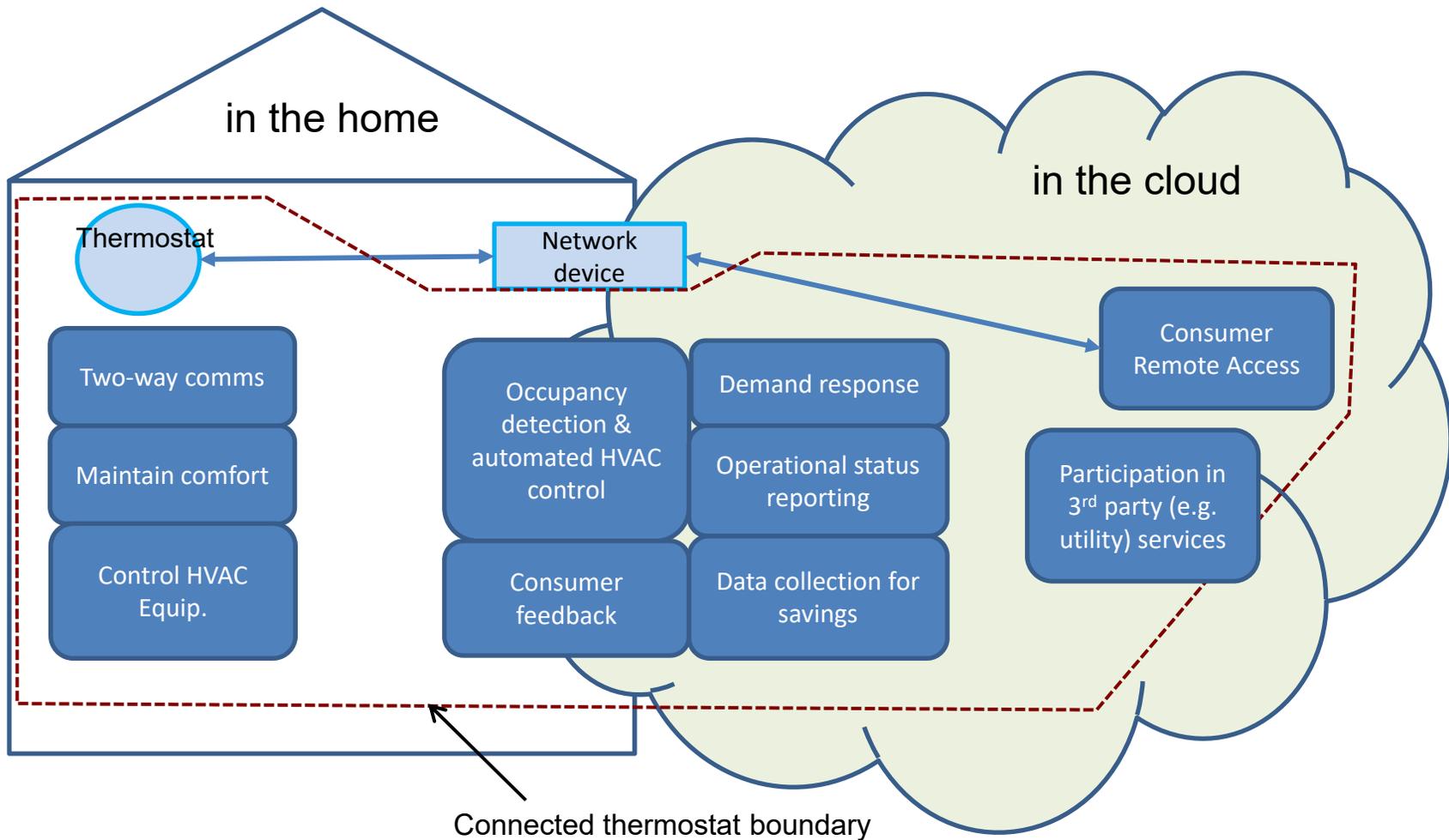
Jacob Bayus

[Jacob.bayus@icf.com](mailto:Jacob.bayus@icf.com)

202-791-8871

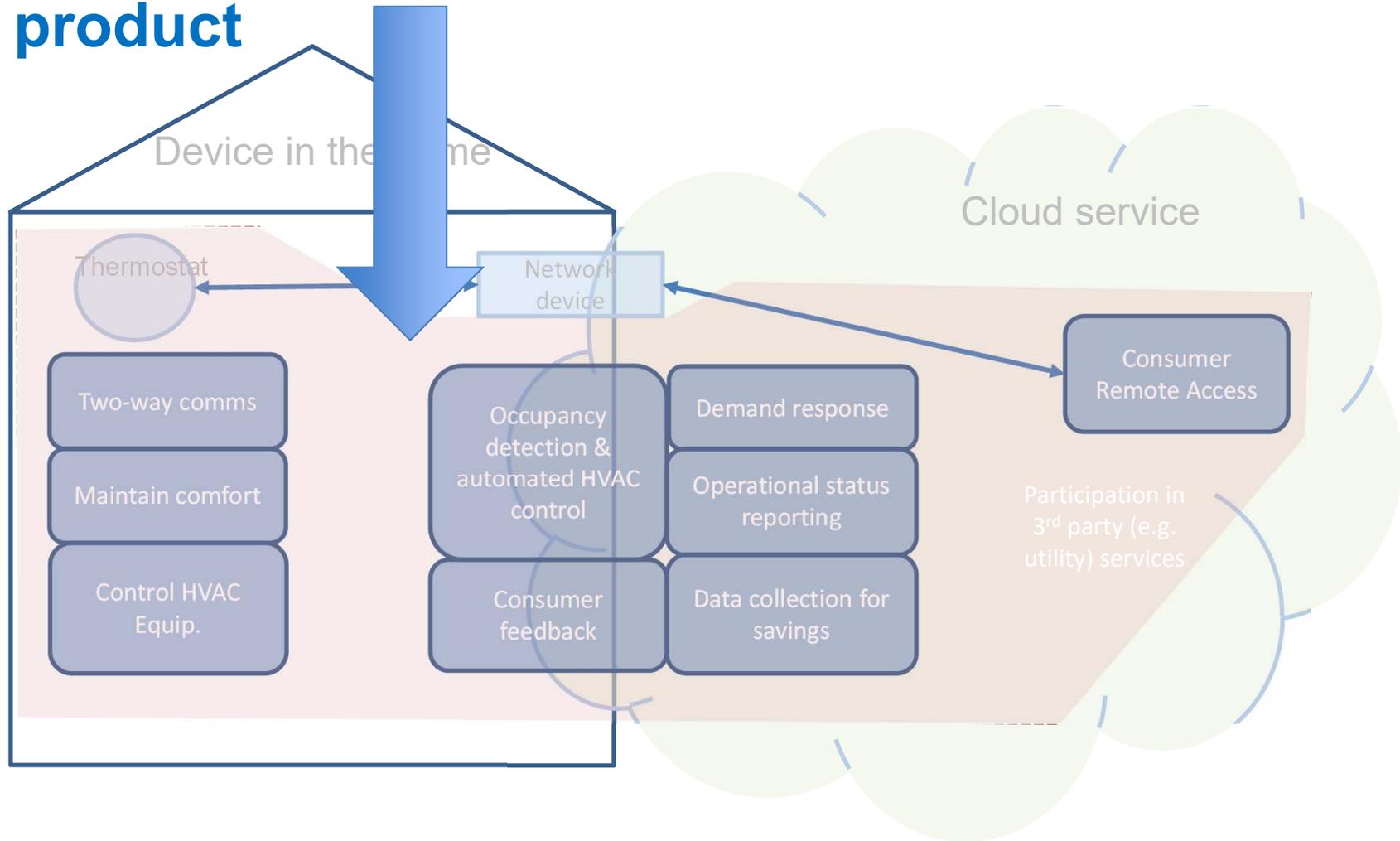


# What do we mean by connected thermostat?



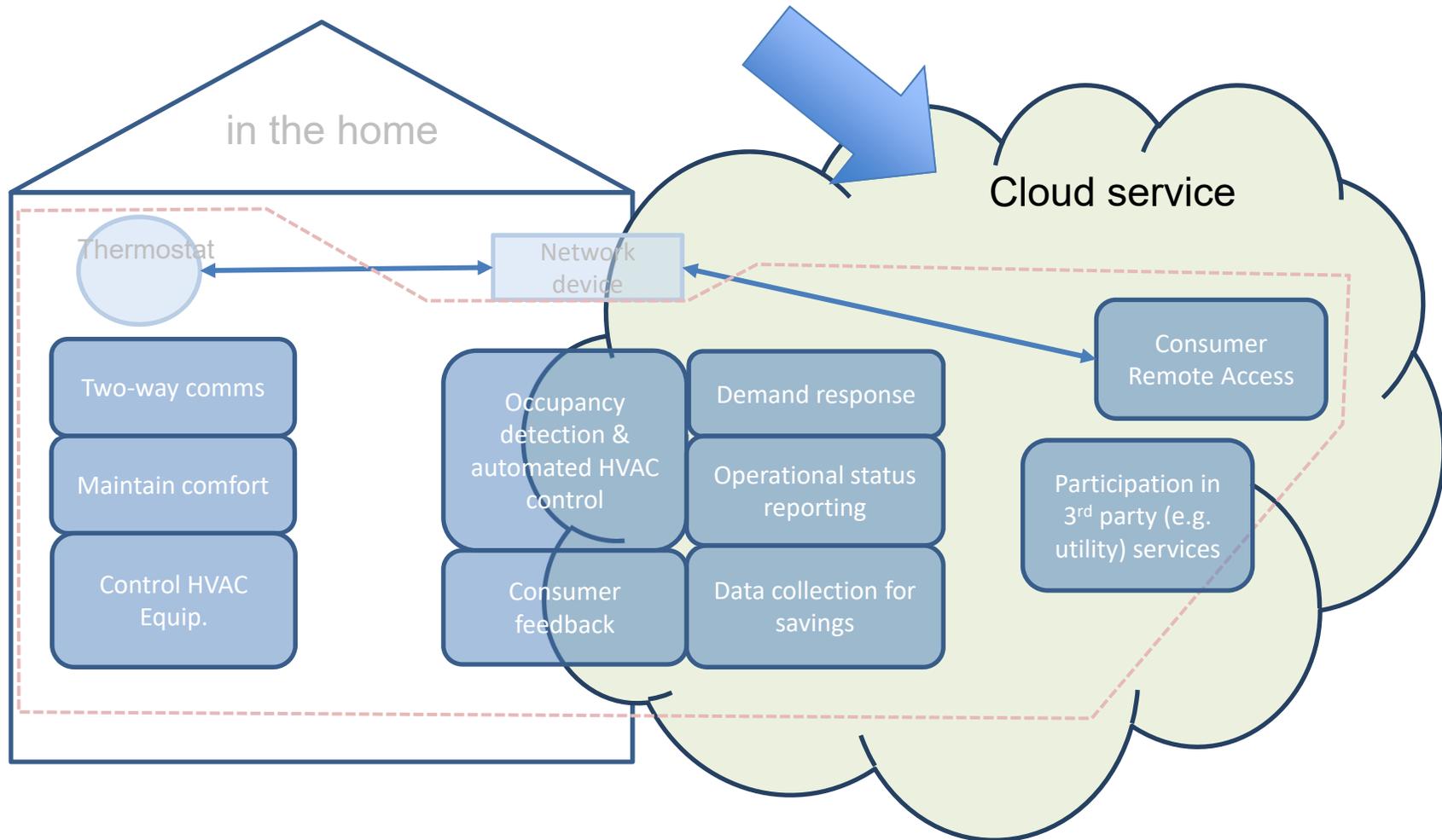


# Hardware + Service is the ENERGY STAR product



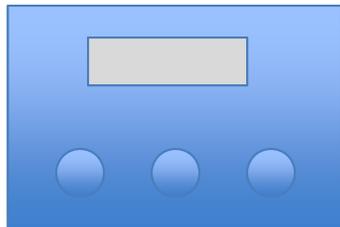


# Service Provider is the ENERGY STAR Partner

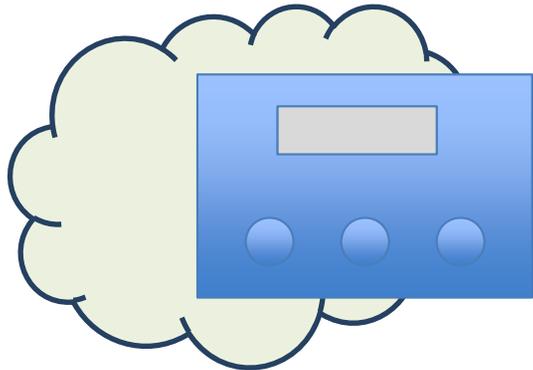




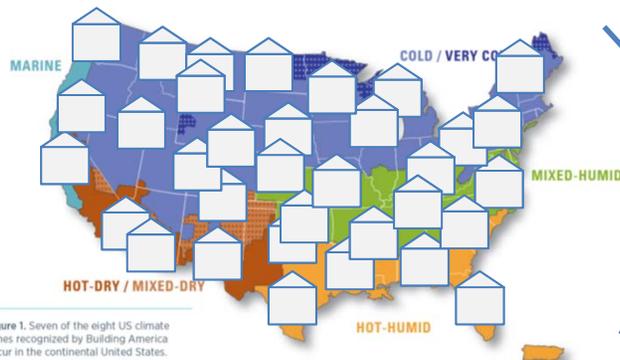
# Earning the ENERGY STAR



1. Thermostat device passes basic tests



2. Thermostat product demonstrates basic capability



Heating savings

Cooling savings

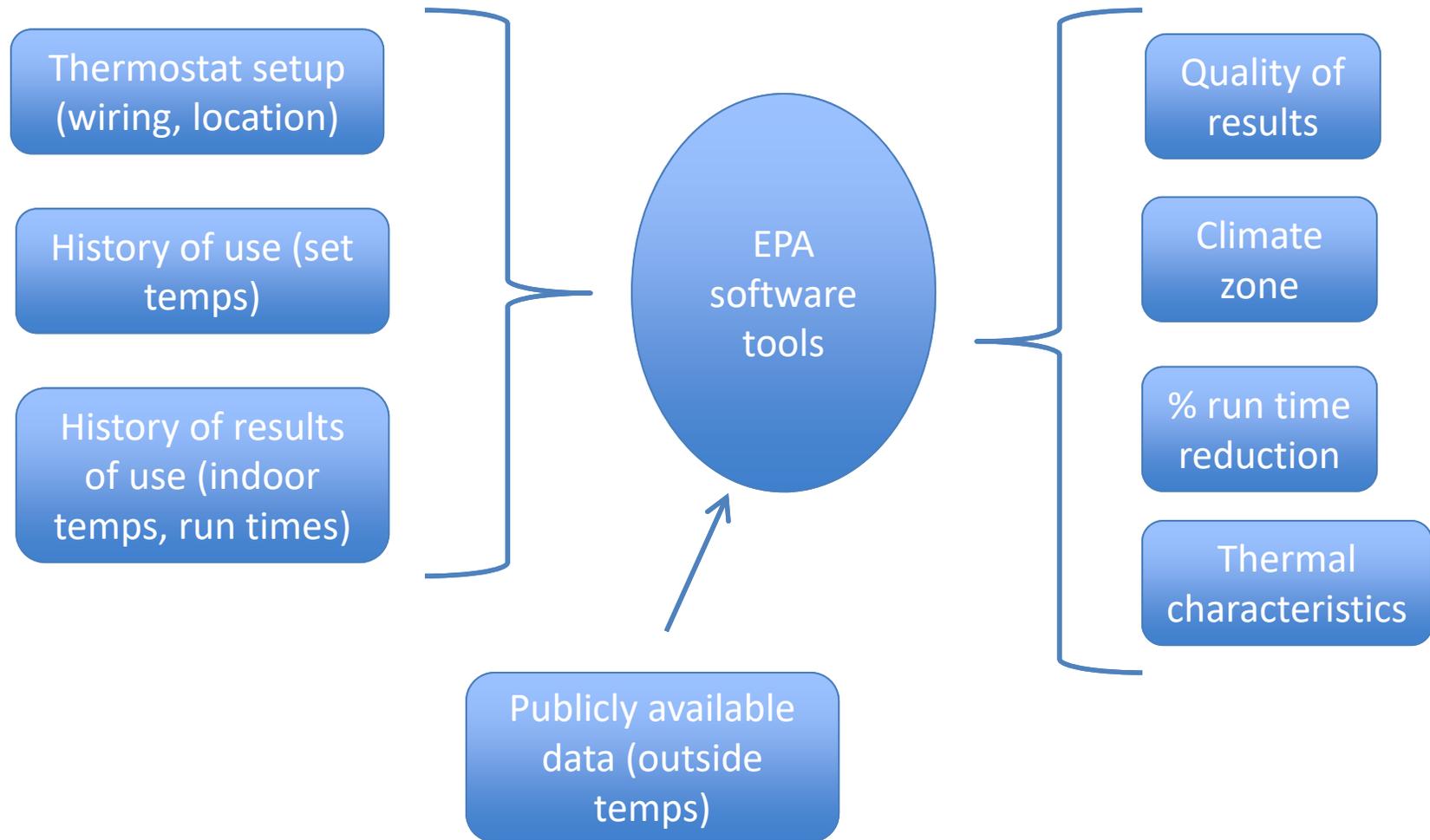
3. Demonstrate field savings using EPA software tools to analyze and aggregate data from hundreds of US homes

Figure 1. Seven of the eight US climate zones recognized by Building America cur in the continental United States. [http://www.nrel.gov/building\\_america/docs/figure\\_1\\_115\\_fig1a1a.png](http://www.nrel.gov/building_america/docs/figure_1_115_fig1a1a.png)





## Metric For Each Home



# For Sample of Hundreds of Homes

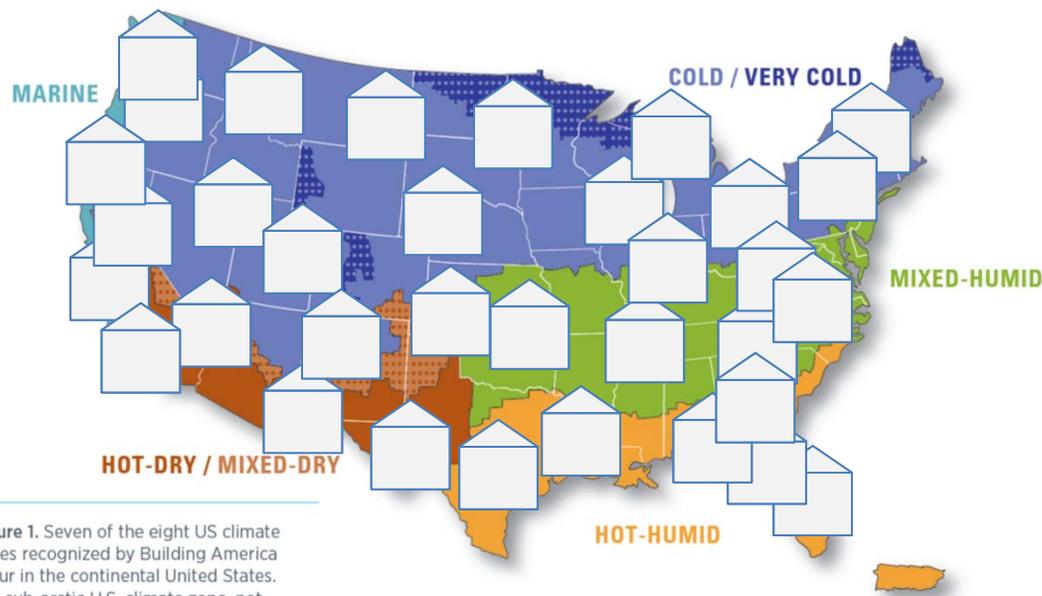


Figure 1. Seven of the eight US climate zones recognized by Building America curricula in the continental United States. The sub-arctic US climate zone is not shown.

- Cold/Very Cold
- Marine savings
- Mixed Humid
- Hot Dry/Mixed Dry
- Hot Humid savings
- Weighted average National savings
- Statistical information: deciles, standard error of the mean, etc.



## Advantages of proposed approach

- Not HOW energy savings are achieved, just WHETHER they are
- Accommodates wide variety of products
- Can credit savings achieved through services
- Wide scope for innovation, including behavioral



## Certified Products as of 1/29/2018: 12 products

- Nest service with 2 Nest devices
- Honeywell service with 4 Honeywell Lyric devices
- EcoFactor service with EcoFactor Simple 100 B
- Ecobee service with 3 ecobee devices:
- Carrier service with Carrier Cor
- Bryant service with Bryant Housewise



## Certified products list continues to grow

- EPA knows of five other thermostat providers interested in certifying; expects the list to grow by the end of 2018
- This includes some thermostats that are sold as part of a home alarm system and/or smart home platform
- If you offer an alarm system or smart home platform to your home buyers, talk to your product provider about whether they can now, or plan to in the future, offer an option for an ENERGY STAR certified thermostat
- You can always find the most up-to-date list at [energystar.gov](https://www.energystar.gov/productfinder/product/certified-connected-thermostats/results)  
<https://www.energystar.gov/productfinder/product/certified-connected-thermostats/results>



## Smart Thermostat Savings

- EPA's nationwide estimate: 8% of heating & cooling costs, or \$50
  - Similar across climates, though very mild climates will save less; some climates save more on cooling, others on heating
  - The real differentiator: households which are sometimes unoccupied have a higher savings potential
  - This doesn't even include savings from better control of heat pumps to avoid use of auxiliary resistance heating.
- Pilot projects continue to show variable results; hard to compare because participant selection and study conditions are different
- Smart thermostats can earn HERS points as programmable thermostats
- EPA is working (with others) toward more HERS points for smart thermostats



## Utility Incentives for Smart Thermostats (as of 1/29/18)

- The following entities, covering more than 16 million households (14% of population), provide incentives for ENERGY STAR certified smart thermostats:
  - Pacific Gas & Electric
  - Colorado Spring Utilities
  - Hawaii Energy (launching in 2018)
  - Ameren Illinois
  - ComEd
  - Delmarva Power
  - Pepco
  - Southern Maryland Electric Cooperatives (launching in 2018)
  - Baltimore Gas & Electric (launching in 2018)
  - AEP Ohio
  - Columbia Gas of Ohio
  - Dayton Power & Light
  - Efficiency Smart
  - PPL
  - UGI Utilities
  - Efficiency Vermont
  - Puget Sound Energy
  - SMUD
  - Centerpoint Arkansas & Oklahoma
  - Mississippi Power
- We know of at least one more program sponsor that plans to rely on ENERGY STAR in 2018.



## Installation of smart thermostats

- ENERGY STAR certified smart thermostats are no harder to install than any other thermostat, though many do recommend a “C” wire for new installations.
- Any HVAC contractor will be able to set one up
- Connecting to WiFi: To get the full benefit of their new thermostat, home buyers will need to connect it to their WiFi once they move in
  - Allows them to change their thermostat any time, from anywhere
  - Provides feedback about how their heating and cooling choices affect energy use
  - May make setting up a schedule easier
  - Many other functions, depending on the particular product



## Important Caveat: Variable Speed Equipment

With the **highest efficiency HVAC equipment (variable speed) use the thermostat recommended by the equipment manufacturer,** rather than an ENERGY STAR certified one.

- For this equipment, OEM thermostats are specialized to provide the highest energy savings and most reliable operation.



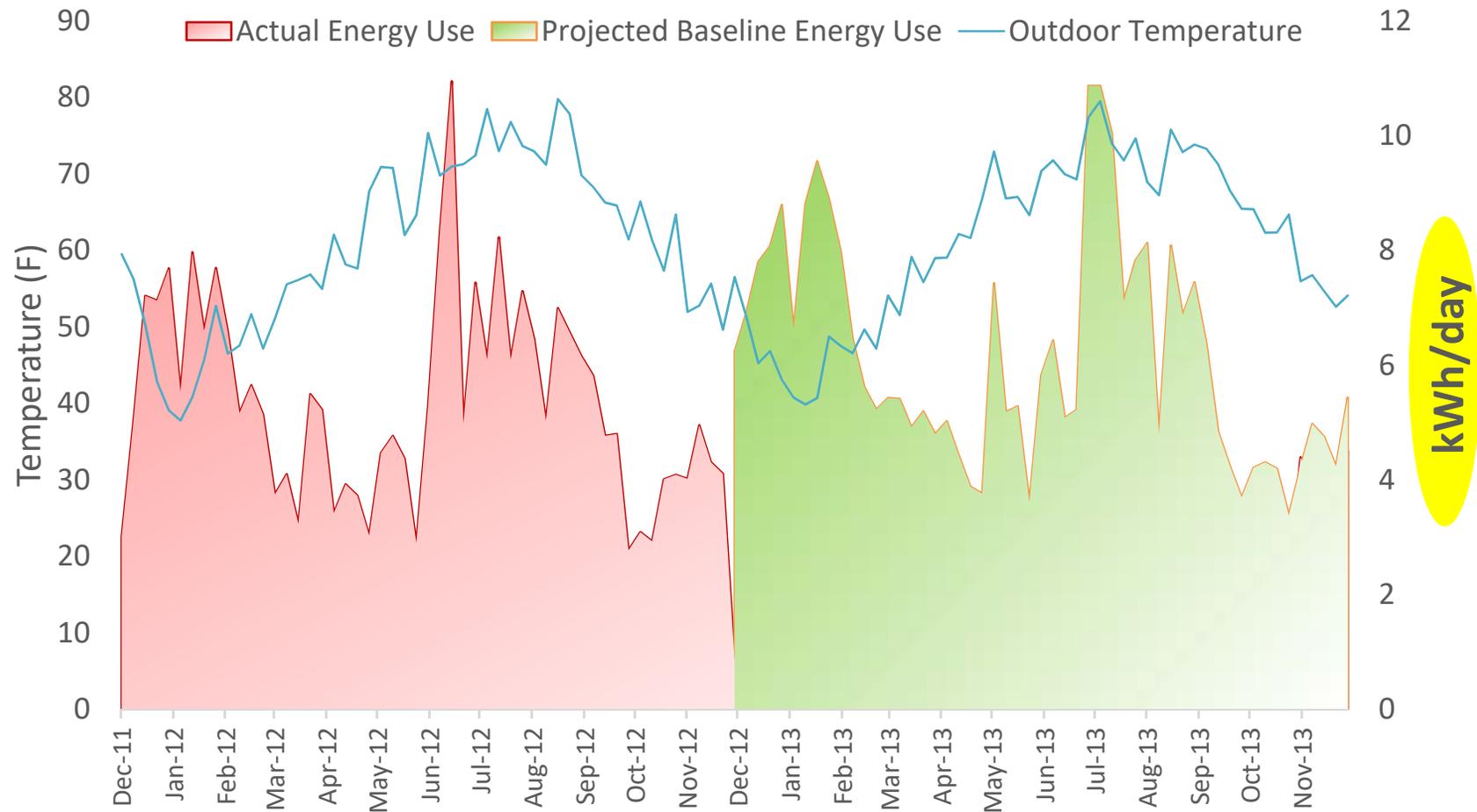
## Selling the benefits

- **Control** – change your thermostat setting at any time, from anywhere
- **Convenience** – set a schedule from your phone or tablet, or don't set one at all and let the thermostat do it for you
- **Automatic savings** – most of these products have simple strategies to help you save with little or no effort on your part
- **Comfort** – many users report increased comfort from smart thermostats. Note that several have the option for additional temperature sensors elsewhere in the house
- **Aesthetic appeal** – among the most attractive thermostats on the market today are ENERGY STAR certified smart thermostats



# Data and goals are different from M&V: meter data

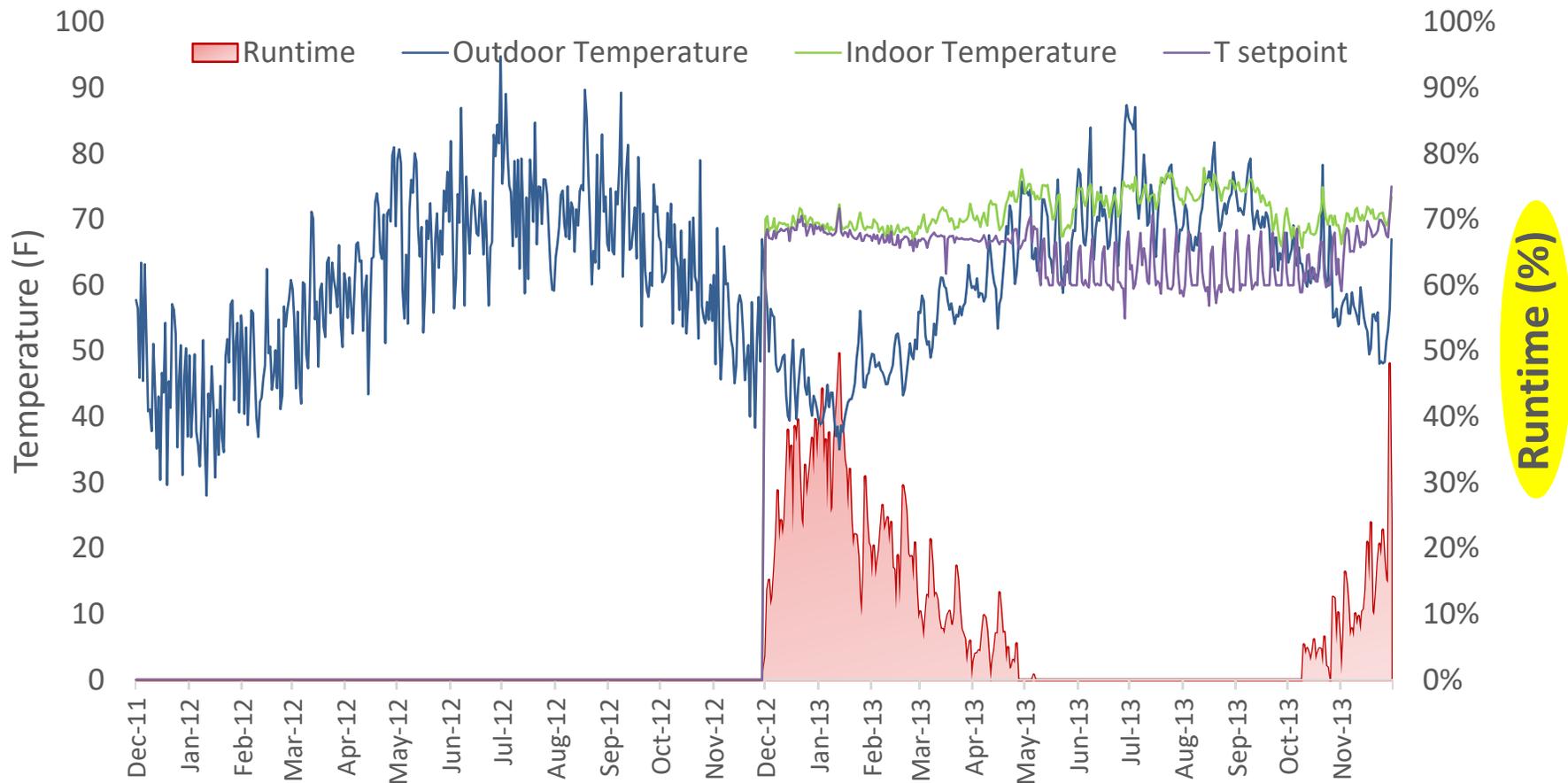
## Traditional M&V





## Data and goals are different from M&V – CT data

### Connected Thermostat Dataset



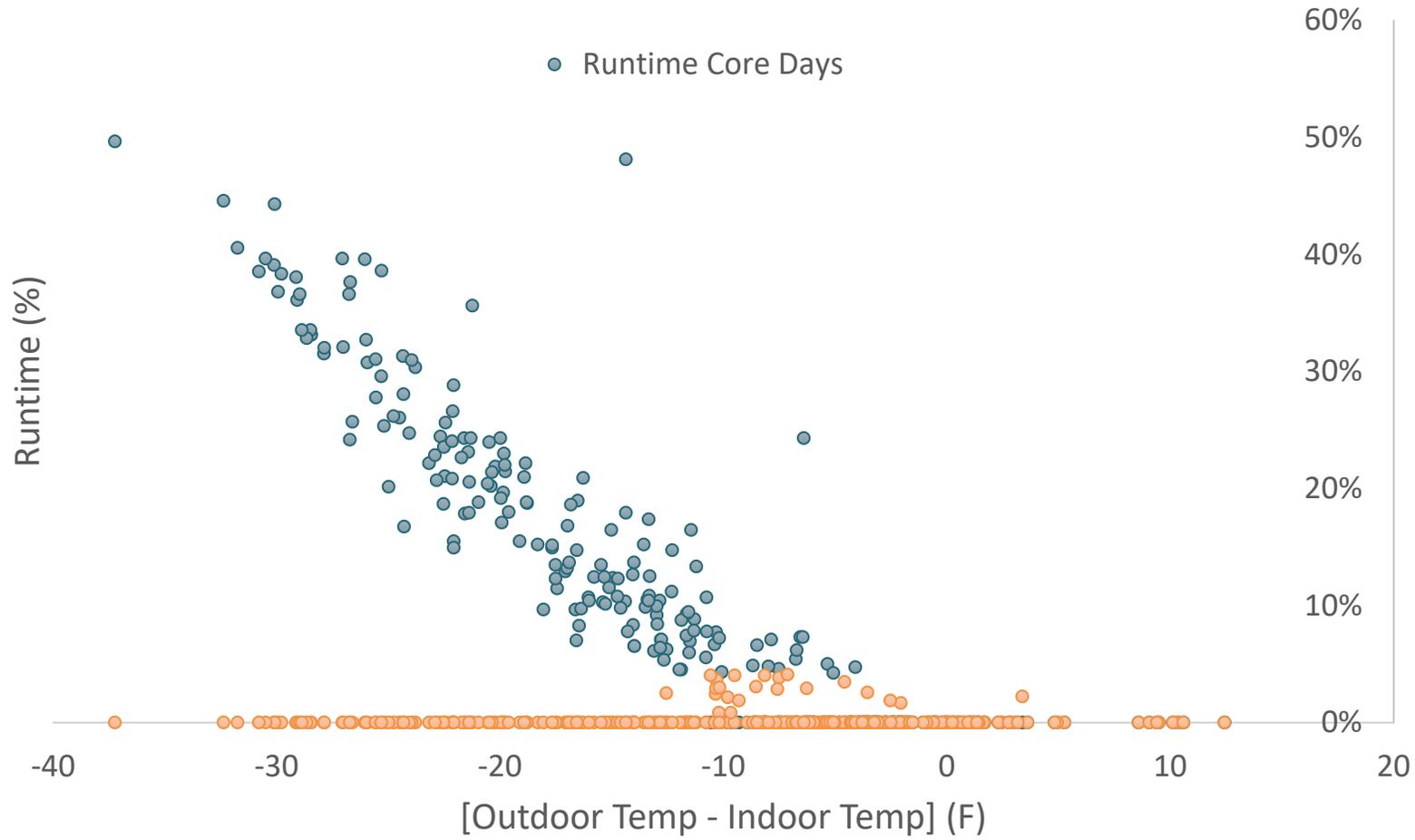


## Building science – estimating savings for an individual home

- Develop a model for that home that correlates  $\Delta T$  and HVAC run time during core heating days
  - core heating days have > 30 min of heating and no cooling
  - $\Delta T$  is the difference between indoor and outdoor temperatures
- Define baseline comfort temperatures
- Calculate baseline run time associated with baseline comfort temperatures choices
- CT savings is % run time reduction of actual vs baseline

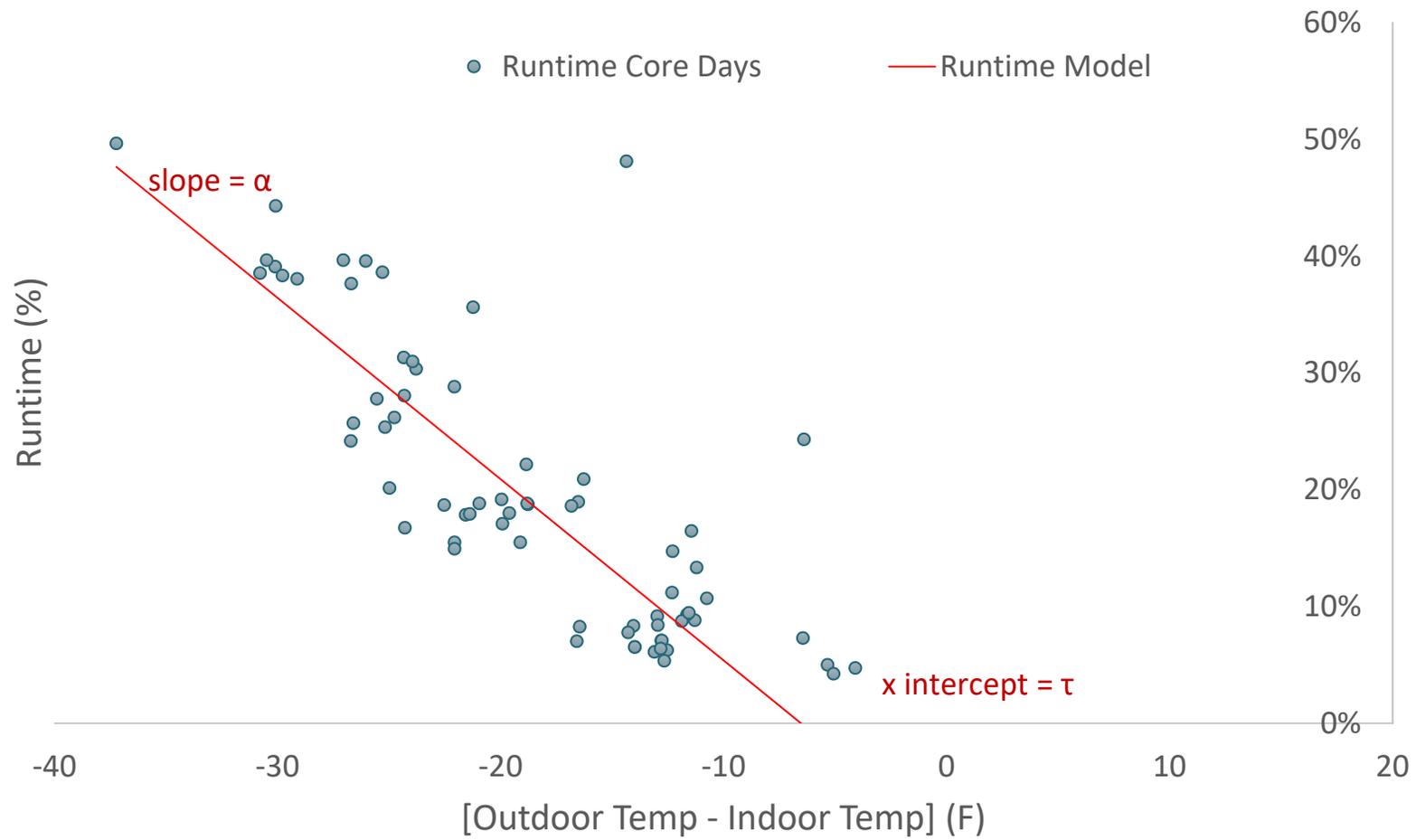


### Core Heat Days



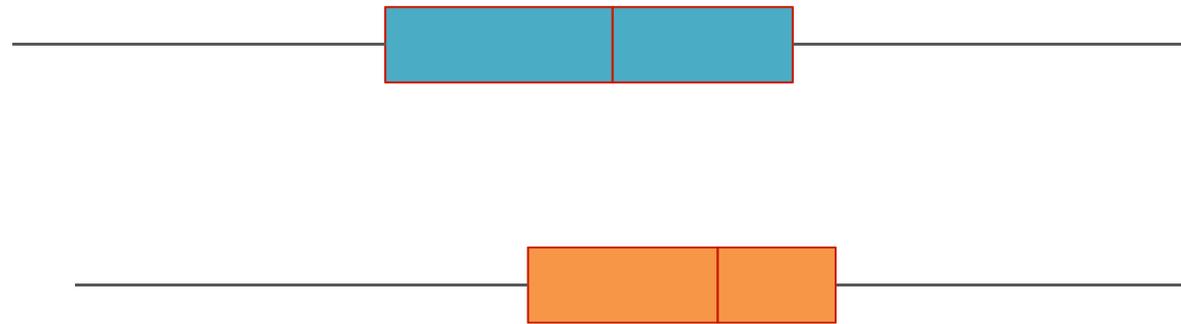
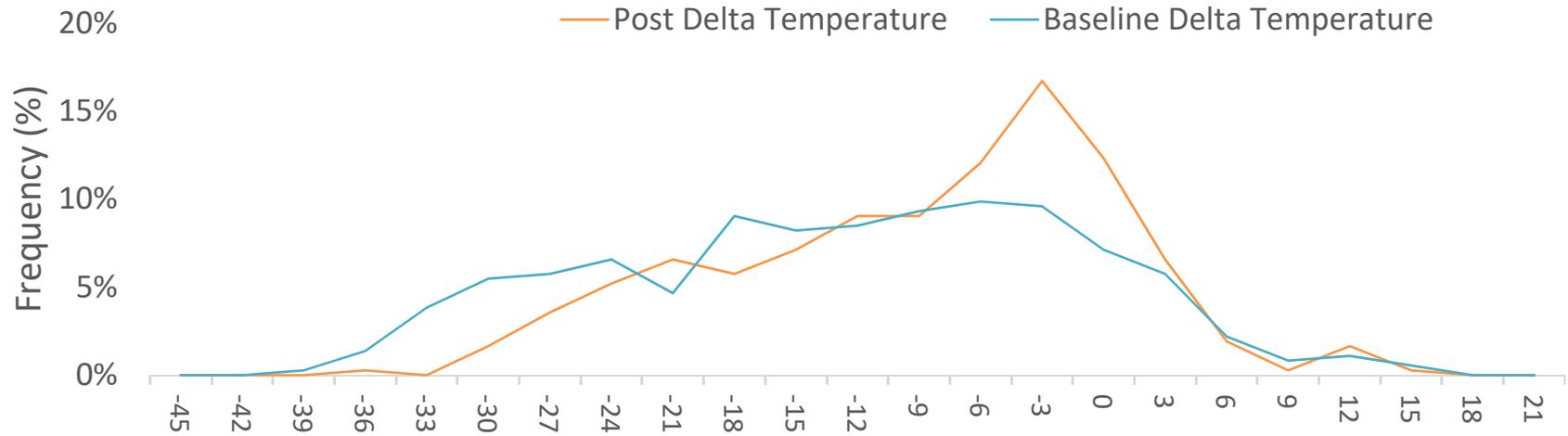


## Core Heat Days



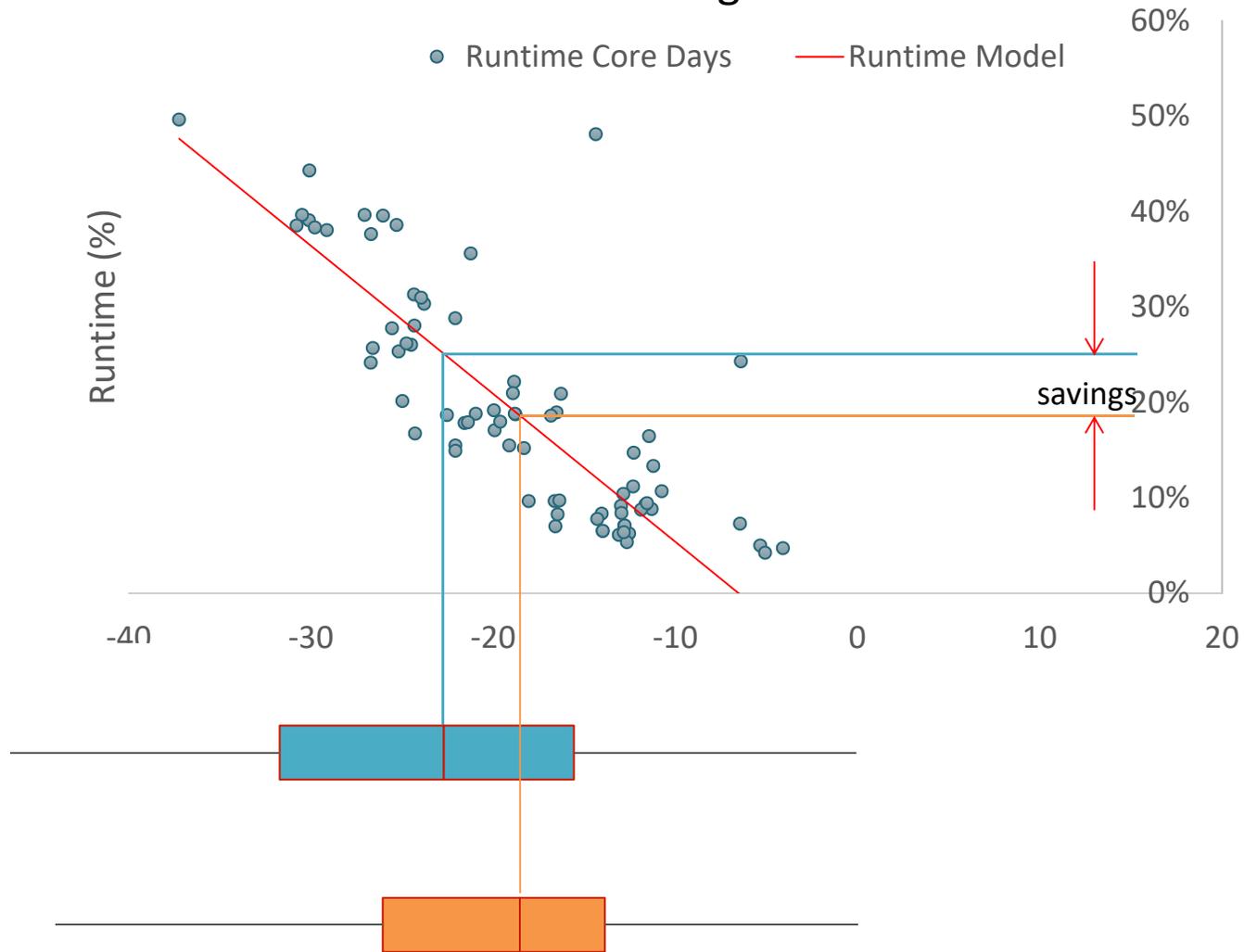


### Distribution of Delta Temperature



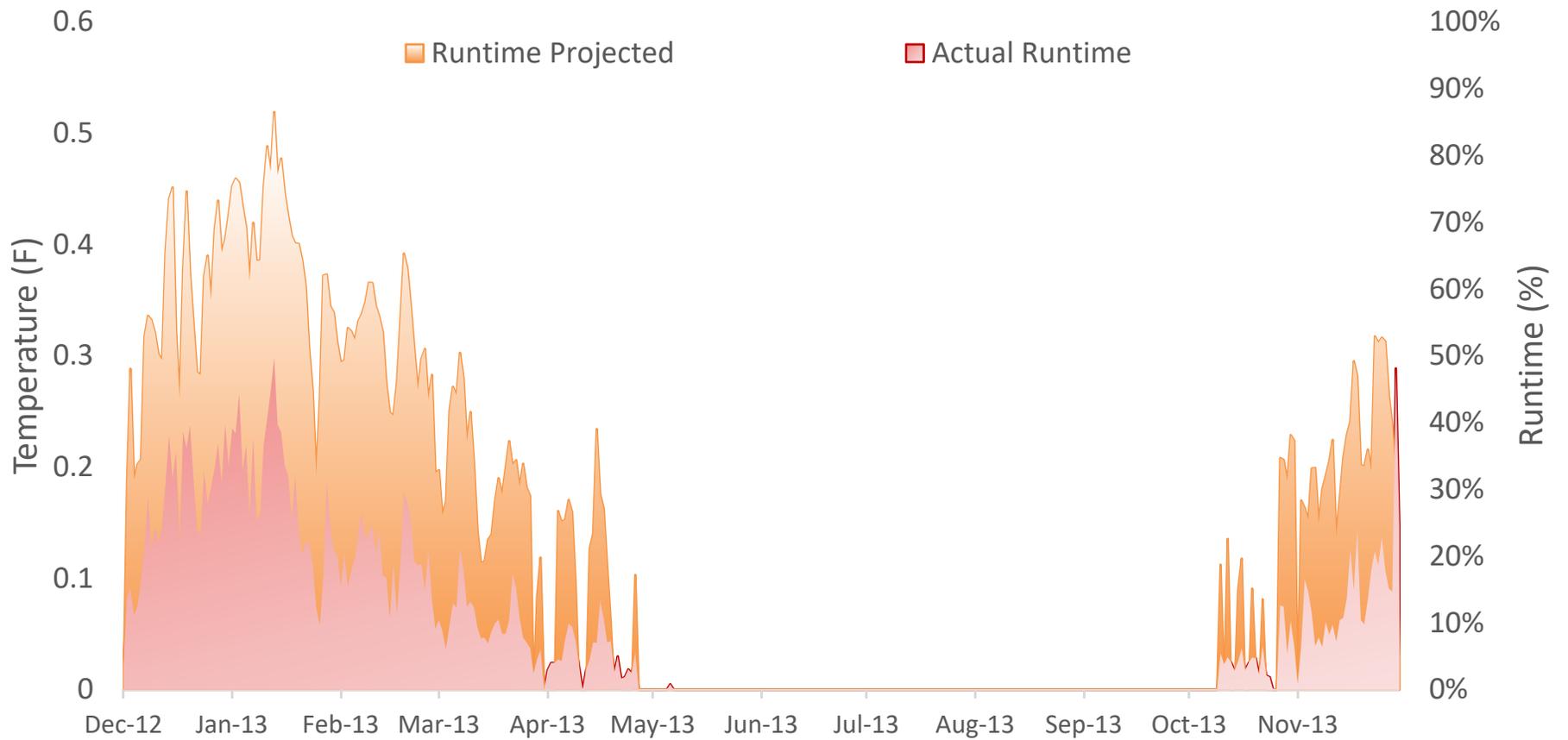


### Savings





## Savings



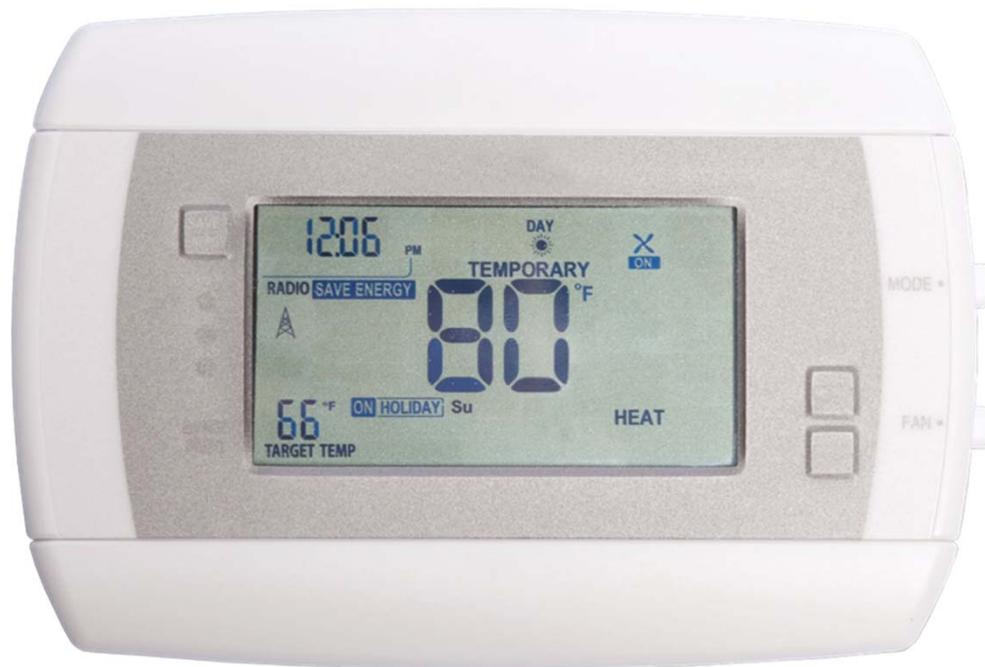


## All about that Bass .... Baseline, that is

- Currently: Comfort temperature from indoor temp history, captures savings from setback only
- Possible in the future: Regional indoor temperature, could capture savings from setback and from more conservative comfort temperature
- Only a baseline of run time would capture savings from less run time without changing temperature, e.g. shading, night flushing, etc.



Energy Star Webinar  
January, 2018





In 2011, Nest launched the Nest Learning Thermostat.



Nest Labs Confidential



## EPA Finalizes ENERGY STAR Ratings For Smart Thermostats, Nest First To Qualify

March 9th, 2017 by [Joshua S Hill](#)



The US Environmental Protection Agency has finalized its first-ever ENERGY STAR specifications for smart thermostats, a move which resulted in the Nest Learning Thermostat becoming the first smart thermostat to receive an ENERGY STAR rating.

The first-ever ENERGY STAR specifications for smart thermostats were determined back on December 23, 2016, but only announced this month by the Environmental Protection Agency (EPA). Unlike other ENERGY STAR-rated products, however, smart thermostats provided a challenge for the EPA, which explained that the "challenge in identifying household thermostats that save energy is accounting for how an individual

# Energy Star standard – good for programs and consumers

Preferences among individuals 25-34 years, by the numbers



81%

Interested or strongly interested  
in smart thermostats



36.5%

Look for Energy Star products  
when shopping for a new home

## Slide 5

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- 1 +bfarhi@google.com I was thinking about these figures overnight and I'm very skeptical of the \$39 one. I took these stats from a conference supplement that Ben Waltzer shared with me. They're from an NMHC report but we can't access the full version without paying for it. The first two seem feasible, but \$39/mo defies willingness to pay logic for a Nest. I'd suggest deleting it and just having the two on the slide.  
Tenley Ghan, 10/19/2017
- 1 thx - i took that point out  
Brian Farhi, 10/19/2017

## And lower price points increase accessibility

AutoSchedule  
Home/Away Assist (optional geo-fencing)  
Eco Mode  
Nest Leaf (behavioral feedback)  
Airwave  
Heat Pump Balance  
True Radiant  
Energy History  
Sunblock



# Nest Thermostats in AvalonBay Communities

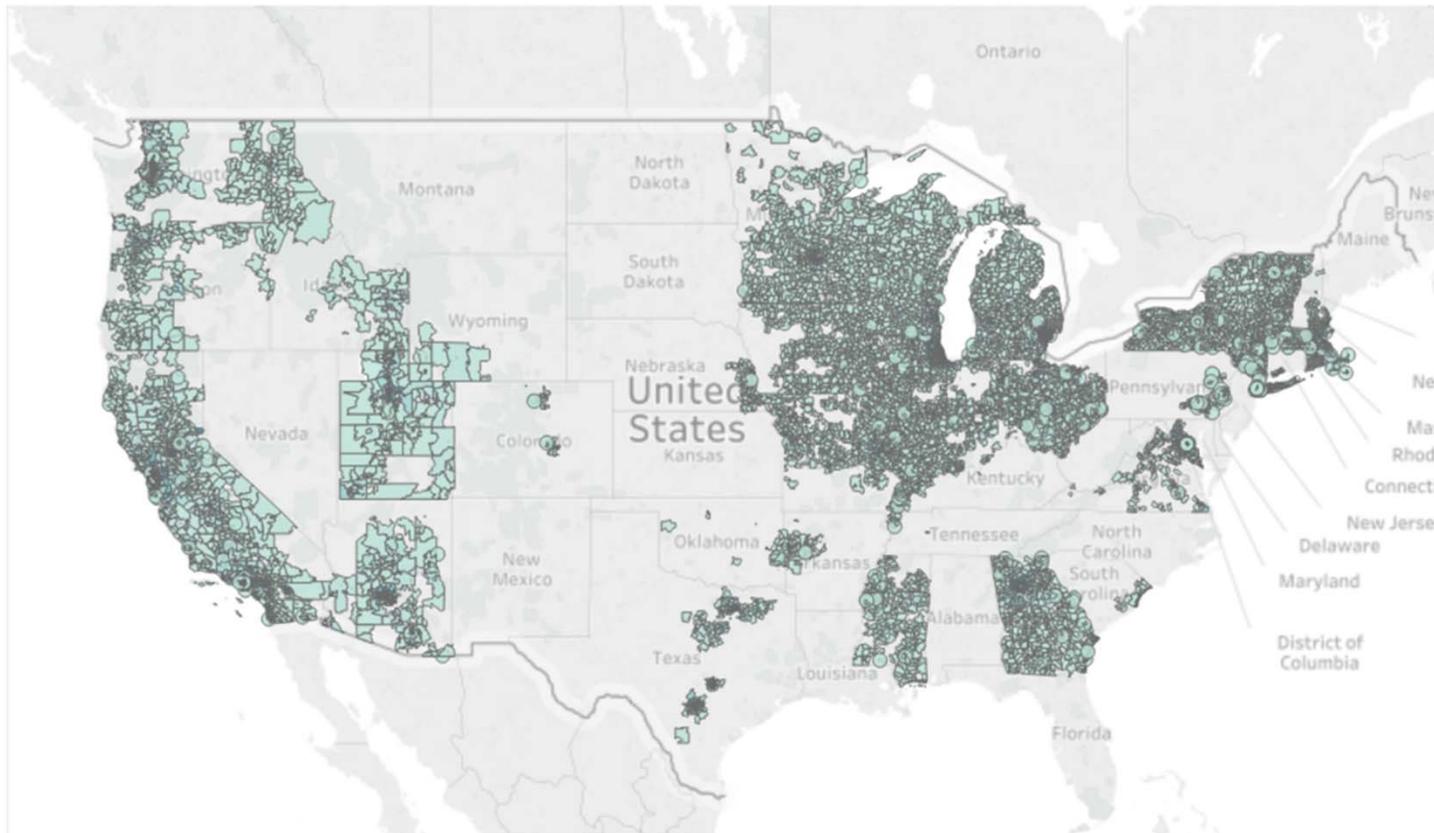
Randomized controlled trial to test energy savings in multifamily building

- **17.1%** less energy use among units with Nests
- **>10%** residents said that a Nest thermostat were a factor in decision to renew their lease
- **51%** of respondents would be likely to refer the building following receipt of the Nest Thermostat



# The power of Smart Thermostats: A Journey

Rebates are available to >55% of the US population



And that's just the foundation...

Customers say they buy Nest Thermostats for comfort, convenience, and to help them save energy.



# Energy services to help customers manage their usage...



# A complete portfolio of products, all in one app...



# And a growing ecosystem for the connected home...







**Our Vision:**

# **The Connected Home**

**Senses what you need, where you need it, and responds.**

## **Comfort**

Conditions the rooms that matter most.

## **Control**

Use your voice, phone or PC to control everything.

## **Savings**

Don't use resources when you don't need them.

## **Peace of Mind**

Get notified when something is abnormal at home.



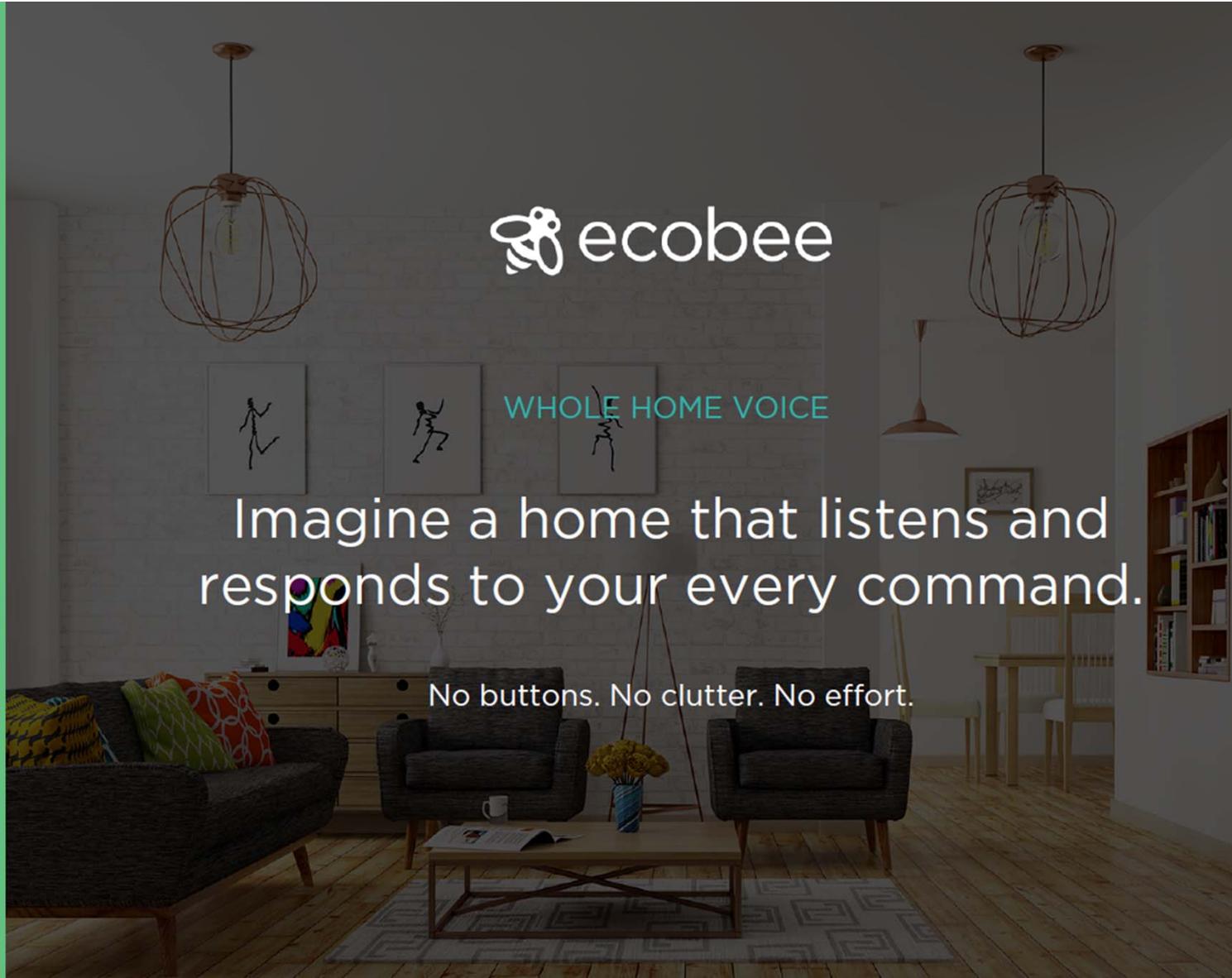
ecobee

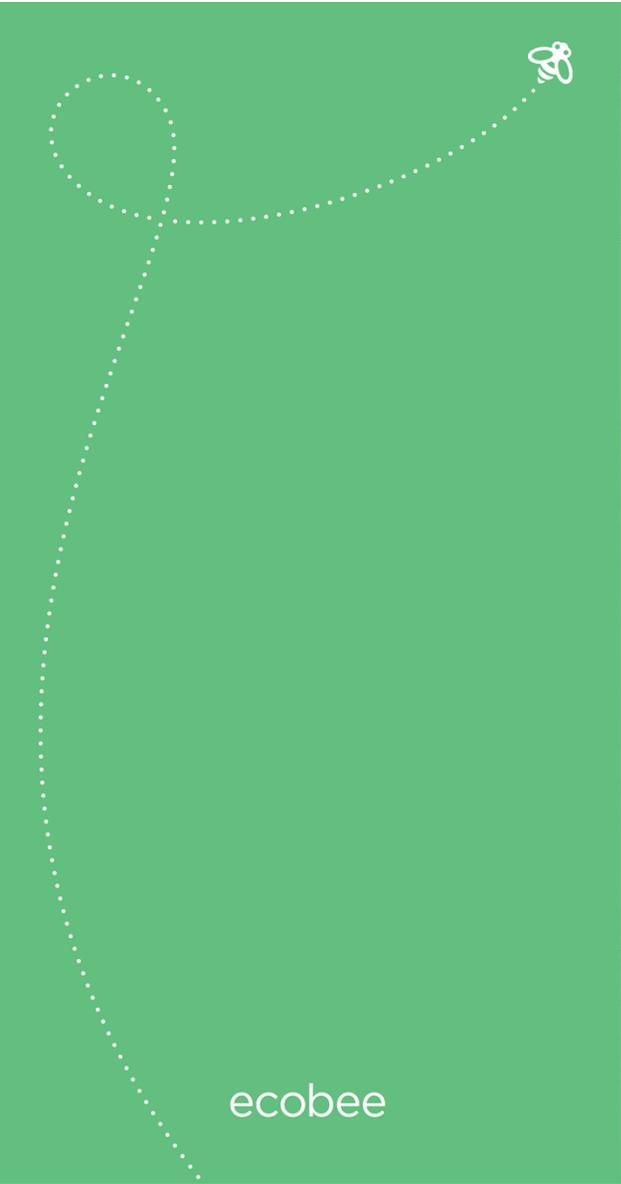


WHOLE HOME VOICE

Imagine a home that listens and responds to your every command.

No buttons. No clutter. No effort.





Building for  
whole home  
voice.



# Growing Market

ecobee

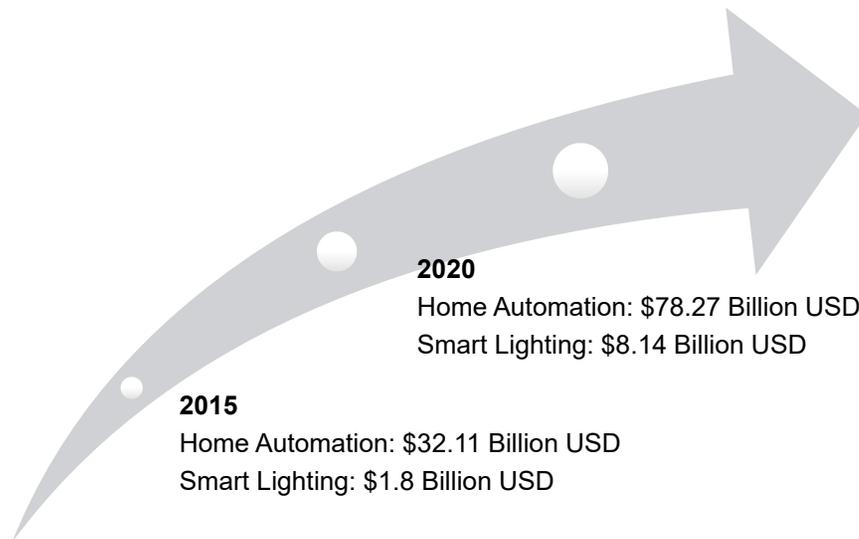
Amazon, Google, Apple, Sonos, Microsoft



# The smart home category.

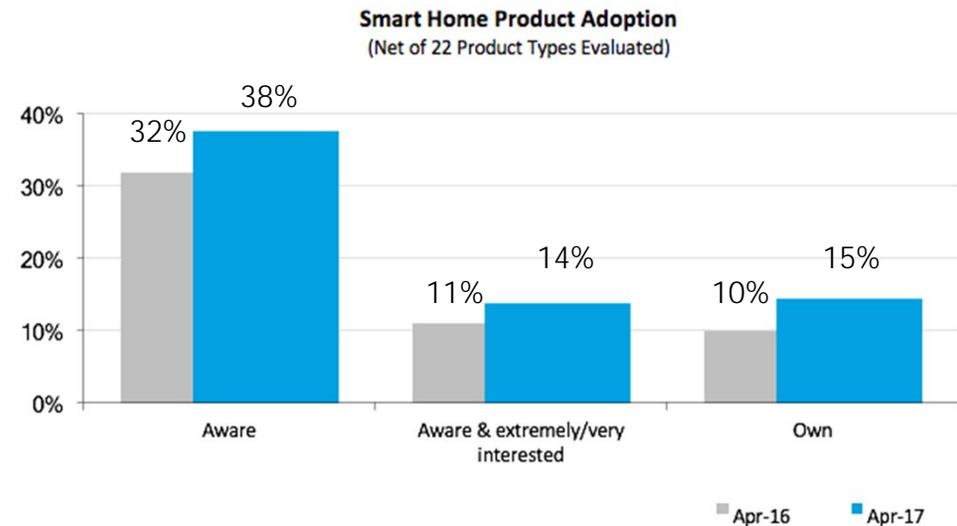
The smart home category is poised for explosive growth, reaching \$78B USD by 2020

- Within home automation, smart light and smart thermostats are expected to grow at the highest rate
- CAGR for smart light switches is forecasted at 22%



US households are adopting smart home / home automation tech at rapid rates:

- 16% of homeowners own a smart home device, 12% of renters do as well



Base: U.S. Internet households  
Interest rated on a 5-point scale  
Source: The NPD Group/Connected Intelligence, Connected Home Automation

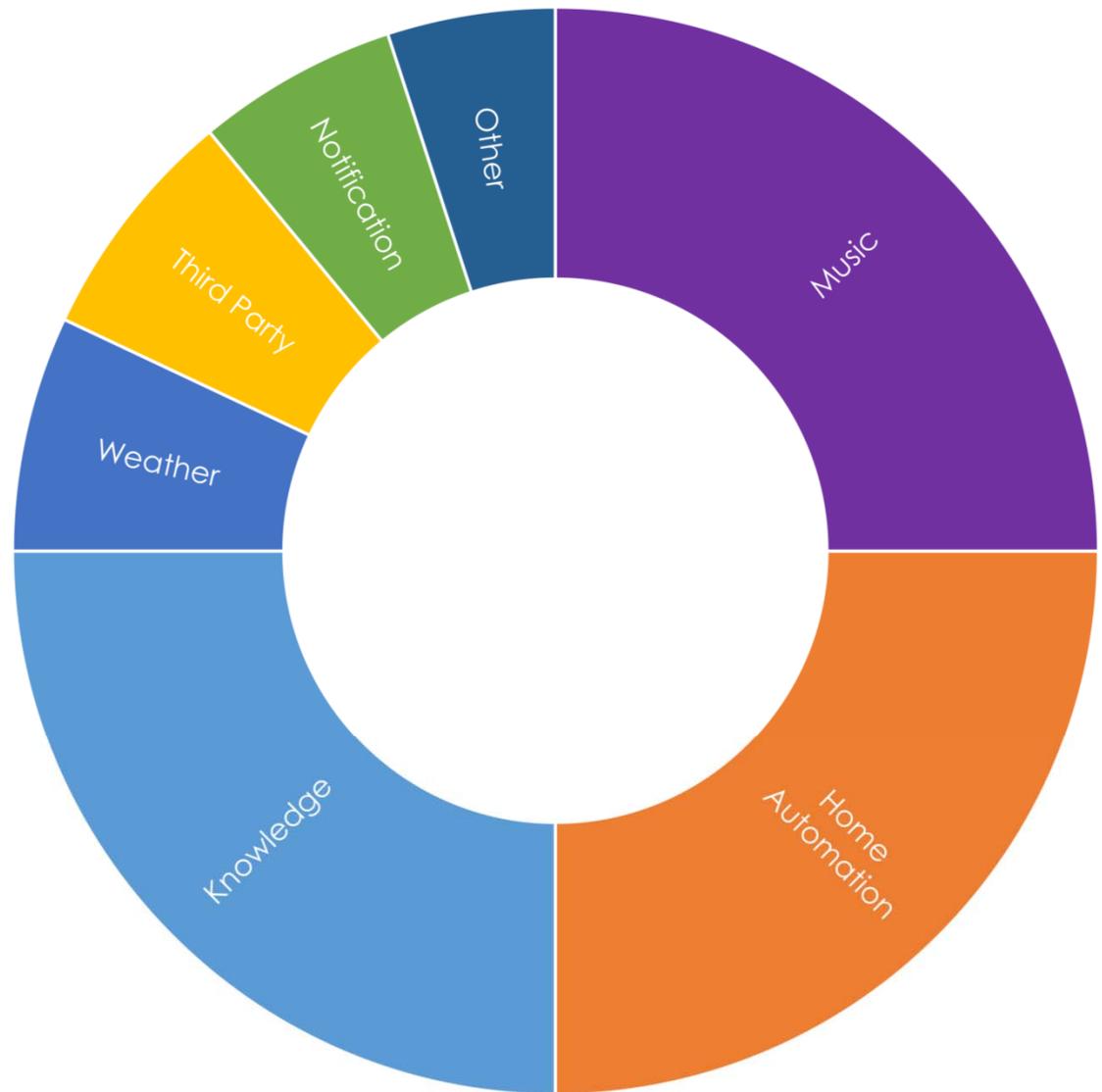


Adoption of smart  
thermostats has reached  
13% in broadband  
households

More than half of  
broadband households  
plan to purchase a  
connected device this year

# Voice Engagement

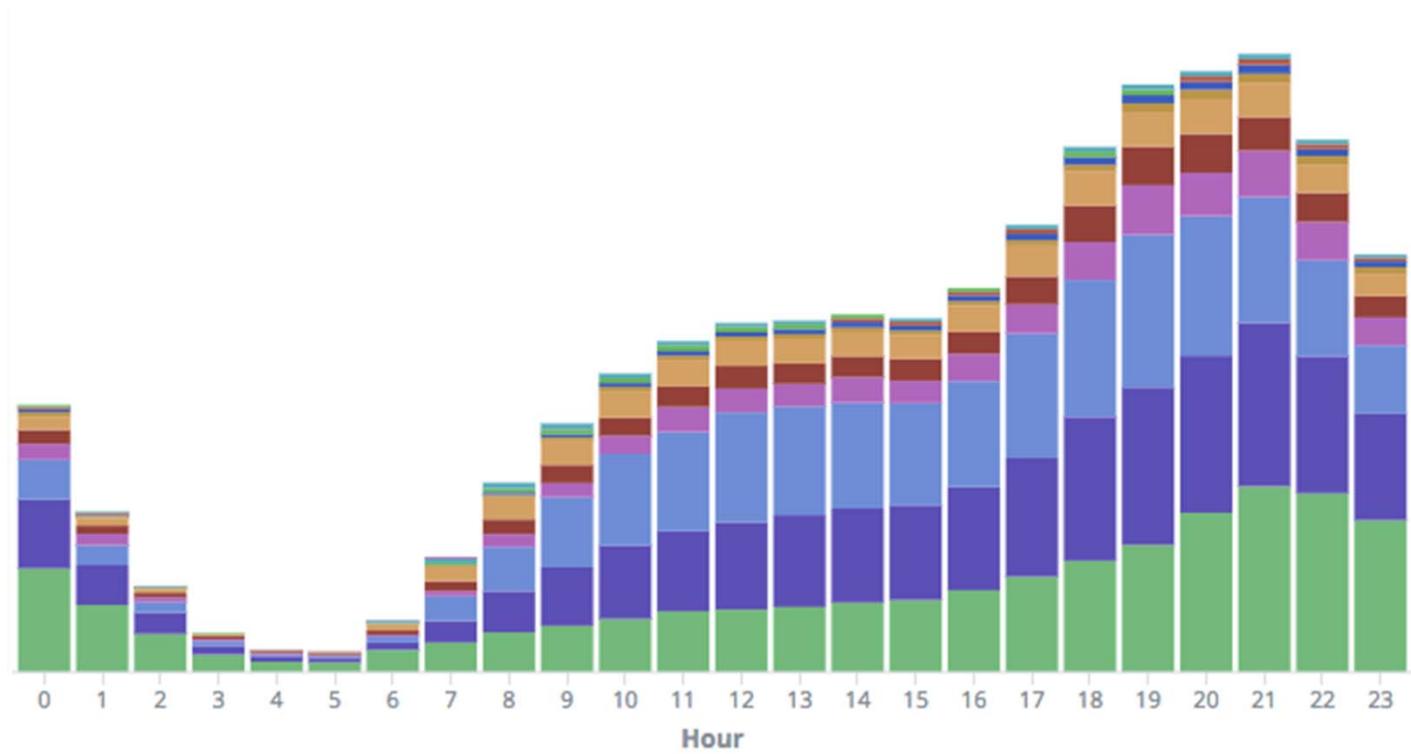
ecobee





# Voice Engagement

ecobee





ecobee

Date	Time	System S	System M	Calendar	Program	Cool Set	Heat Set	Current T	Current H	Outdoor T	Wind Spe	Cool Stag	Heat Stag	Fan (sec)	DM Offse	Thermost	Thermost	Thermost	Bedroom	Bedroom	Office (F)	Office2	Basement
9/7/2017	0:00:00	off	heatOff		Sleep	77	64.4	67.9	54	49.4	1	0	0	0		69	54	0			68.7	0	66.9
9/7/2017	0:05:00	off	heatOff		Sleep	77	64.4	67.9	54	49.4	1	0	0	0		68.9	54	0			68.7	0	66.9
9/7/2017	0:10:00	off	heatOff		Sleep	77	64.4	67.8	54	49.4	1	0	0	0		68.8	54	0			68.7	0	66.9
9/7/2017	0:15:00	off	heatOff		Sleep	77	64.4	67.8	54	49.4	1	0	0	0		68.7	54	0			68.7	0	66.9
9/7/2017	0:20:00	off	heatOff		Sleep	77	64.4	67.7	54	49.4	1	0	0	0		68.6	54	0			68.7	0	66.9
9/7/2017	0:25:00	off	heatOff		Sleep	77	64.4	67.7	54	49.4	1	0	0	0		68.6	54	0			68.5	0	66.9
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9/7/2017	2:00:00	off	heatOff		Sleep	77	64.4	67.5	54	47.6	4	0	0	0		68.1	54	0			68.3	1	66.9
9/7/2017	2:05:00	off	heatOff		Sleep	77	64.4	67.5	54	47.5	4	0	0	0		68	54	0			68.3	1	66.9
9/7/2017	2:10:00	off	heatOff		Sleep	77	64.4	67.5	54	47.5	4	0	0	0		68	54	0			68.3	1	66.9
9/7/2017	2:15:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		67.9	54	0			68.3	0	66.9
9/7/2017	2:20:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		67.9	54	0			68.3	0	66.9
9/7/2017	2:25:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		67.9	54	0			68.3	0	66.9
9/7/2017	2:30:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		67.9	54	0			68.3	0	66.9
9/7/2017	2:35:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		67.8	54	0			68.3	0	66.9
9/7/2017	2:40:00	off	heatOff		Sleep	77	64.4	67.3	54	47.6	4	0	0	0		67.8	54	0			68.3	0	66.9
9/7/2017	2:45:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		67.9	54	0			68.3	0	66.9
9/7/2017	2:50:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		67.9	54	0			68.3	0	66.9
9/7/2017	2:55:00	off	heatOff		Sleep	77	64.4	67.4	54	47.6	4	0	0	0		68	54	0			68.3	0	66.9
9/7/2017	3:00:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		68	54	0			68.3	0	66.7
9/7/2017	3:05:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		68	54	0			68.1	1	66.7
9/7/2017	3:10:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		68	54	0			68.1	1	66.7
9/7/2017	3:15:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		68	54	0			68.1	0	66.7
9/7/2017	3:20:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		68	54	0			68.1	0	66.7
9/7/2017	3:25:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		68	54	0			68.1	0	66.7
9/7/2017	3:30:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		67.9	54	0			68.1	1	66.7
9/7/2017	3:35:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		67.9	54	0			68.1	1	66.7
9/7/2017	3:40:00	off	heatOff		Sleep	77	64.4	67.3	54	47.9	2	0	0	0		67.9	54	0			68.1	0	66.7
9/7/2017	3:45:00	off	heatOff		Sleep	77	64.4	67.2	54	47.9	2	0	0	0		67.8	54	0			68	0	66.7
9/7/2017	3:50:00	off	heatOff		Sleep	77	64.4	67.2	54	47.9	2	0	0	0		67.7	54	0			68	0	66.7
9/7/2017	3:55:00	off	heatOff		Sleep	77	64.4	67.1	54	47.9	2	0	0	0		67.6	54	0			68	0	66.7
9/7/2017	4:00:00	off	heatOff		Sleep	77	64.4	67.1	54	46.1	3	0	0	0		67.5	54	0			68	0	66.7
9/7/2017	4:05:00	off	heatOff		Sleep	77	64.4	67	54	46.1	3	0	0	0		67.4	54	0			68	0	66.7
9/7/2017	4:10:00	off	heatOff		Sleep	77	64.4	67	54	46.1	3	0	0	0		67.4	54	0			68	0	66.7
9/7/2017	4:15:00	off	heatOff		Sleep	77	64.4	67	54	46.1	3	0	0	0		67.3	54	0			68	1	66.7
9/7/2017	4:20:00	off	heatOff		Sleep	77	64.4	67	54	46.1	3	0	0	0		67.3	54	0			68	1	66.7
9/7/2017	4:25:00	off	heatOff		Sleep	77	64.4	67	54	46.1	3	0	0	0		67.3	54	0			68	1	66.7
9/7/2017	4:30:00	off	heatOff		Sleep	77	64.4	67	54	46.1	3	0	0	0		67.3	54	0			67.9	1	66.7
9/7/2017	4:35:00	off	heatOff		Sleep	77	64.4	67	54	46.1	3	0	0	0		67.3	54	0			67.8	1	66.7
9/7/2017	4:40:00	off	heatOff		Sleep	77	64.4	66.9	54	46.1	3	0	0	0		67.3	54	0			67.8	0	66.5
9/7/2017	4:45:00	off	heatOff		Sleep	77	64.4	66.9	54	46.1	3	0	0	0		67.3	54	0			67.8	0	66.5
9/7/2017	4:50:00	off	heatOff		Sleep	77	64.4	66.9	54	46.1	3	0	0	0		67.3	54	0			67.8	0	66.5
9/7/2017	4:55:00	off	heatOff		Sleep	77	64.4	66.9	54	46.1	3	0	0	0		67.3	54	0			67.8	0	66.5
9/7/2017	5:00:00	off	heatOff		Sleep	77	64.4	66.9	54	46.1	2	0	0	0		67.3	54	0			67.8	0	66.5
9/7/2017	5:05:00	off	heatOff		Sleep	77	64.4	66.8	54	46.1	2	0	0	0		67.2	54	0			67.7	1	66.5



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[sarahc@ecobee.com](mailto:sarahc@ecobee.com)

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