ENERGY STAR® Smart Thermostats

An Introduction for Energy Efficiency Program Sponsors

January 24, 2017

Agenda

- ENERGY STAR Smart Thermostats Overview
  - What's Covered?
  - Savings, Savings, Savings!
- Implications for Energy Efficiency Program Sponsors
- Timeline for Product Certification
- Co-Branding Opportunities
- Questions

Overview

- Connected Thermostats, Smart Thermostats, Wi-Fi Thermostats…

Is there a difference?

- Smart Thermostats (ST) differ from typical ENERGY STAR products in several important ways:
  - Energy savings are determined with masked real-world data to ensure savings exist.
  - The product combines hardware and service elements.
  - Potential partners use EPA-created software to analyze their own data, and submit the resulting metrics for certification.

Savings: The Big Picture

- Per ST: Approximately **$50 per year** or **8% savings.**
- Nationwide:

If all residential central heating and cooling controlled by a thermostat in the U.S. switched to an ENERGY STAR ST, it would save 56 trillion BTU and offset 13 billion pounds of greenhouse gas emissions, equivalent to the emissions of 1.2 million motor vehicles each year.

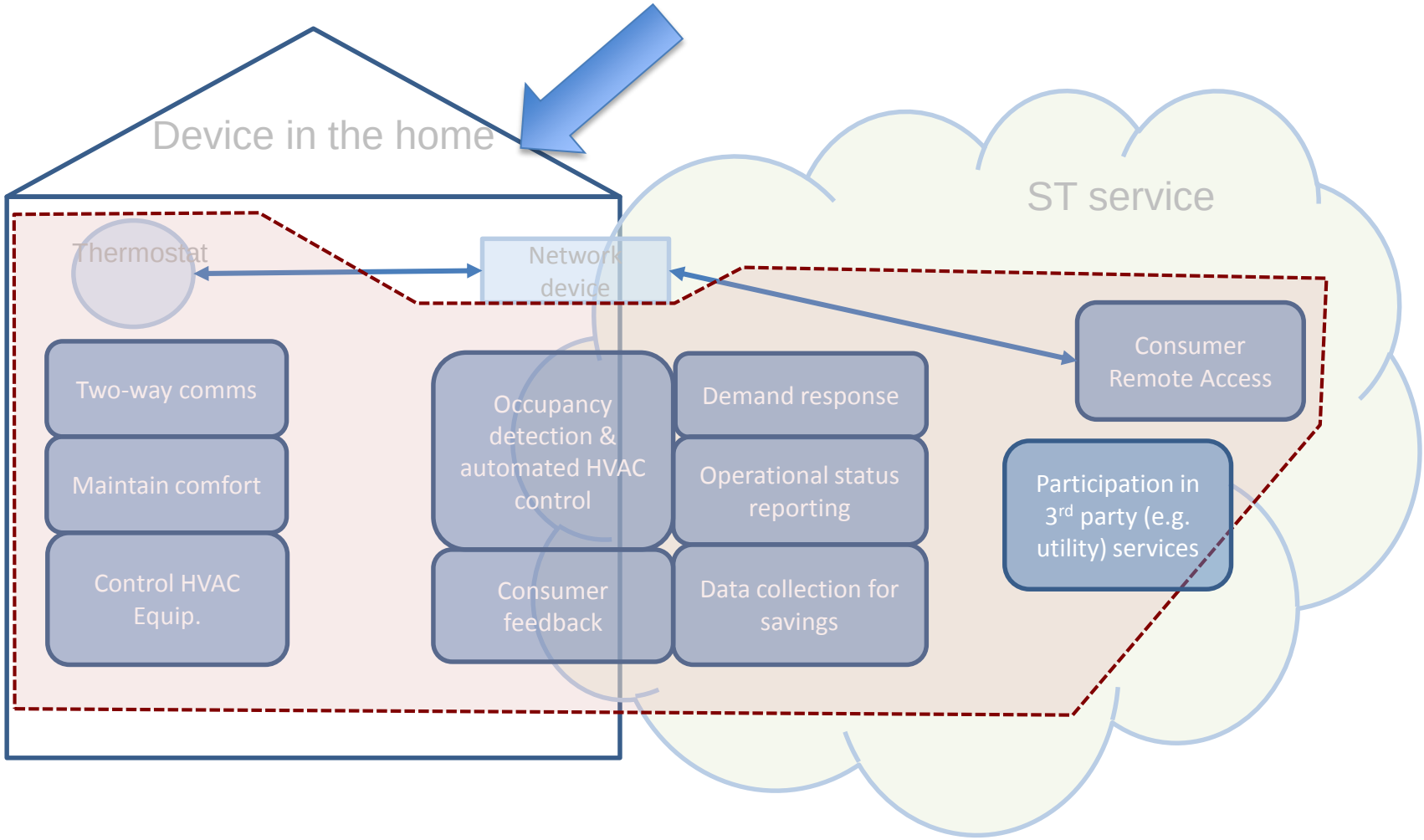
What's Eligible for Certification?

- **Eligible**: ST products, whether part of a larger product (e.g. security system) or not.

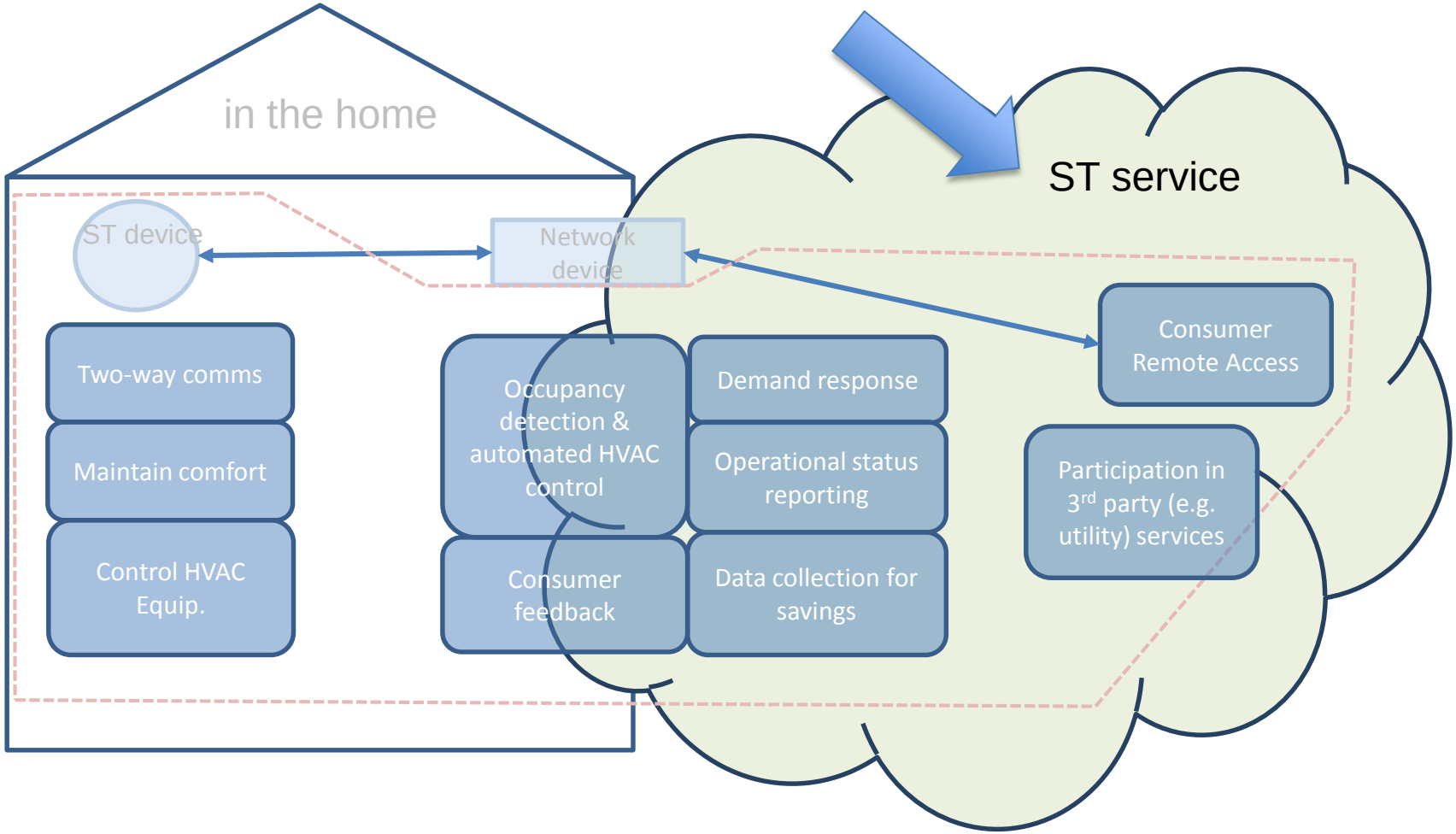
- **Not Eligible**:
  - Line voltage STs*
  - ST products that are unable to collect data required by the ENERGY STAR ST Field Savings software.

*- Line Voltage Thermostat: Thermostat that is powered by and/or switches >30Vac

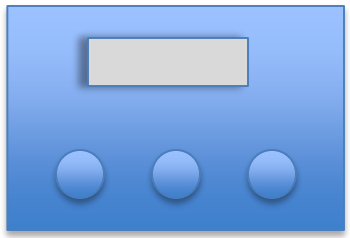
The Covered Product: Hardware + Service



Service Provider is the ENERGY STAR Partner

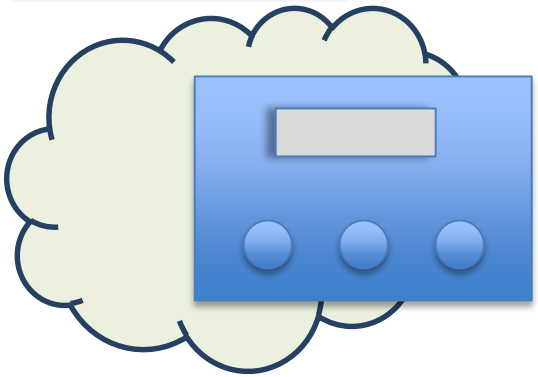


Earning the ENERGY STAR



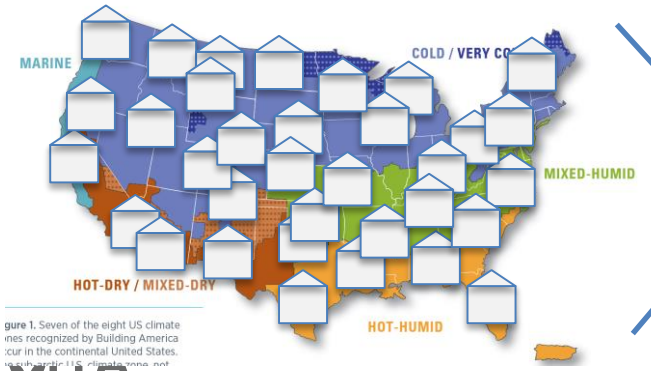
1. Thermostat device passes basic tests.

Report from laboratory testing



2. Thermostat product demonstrates basic capability.

Product examination



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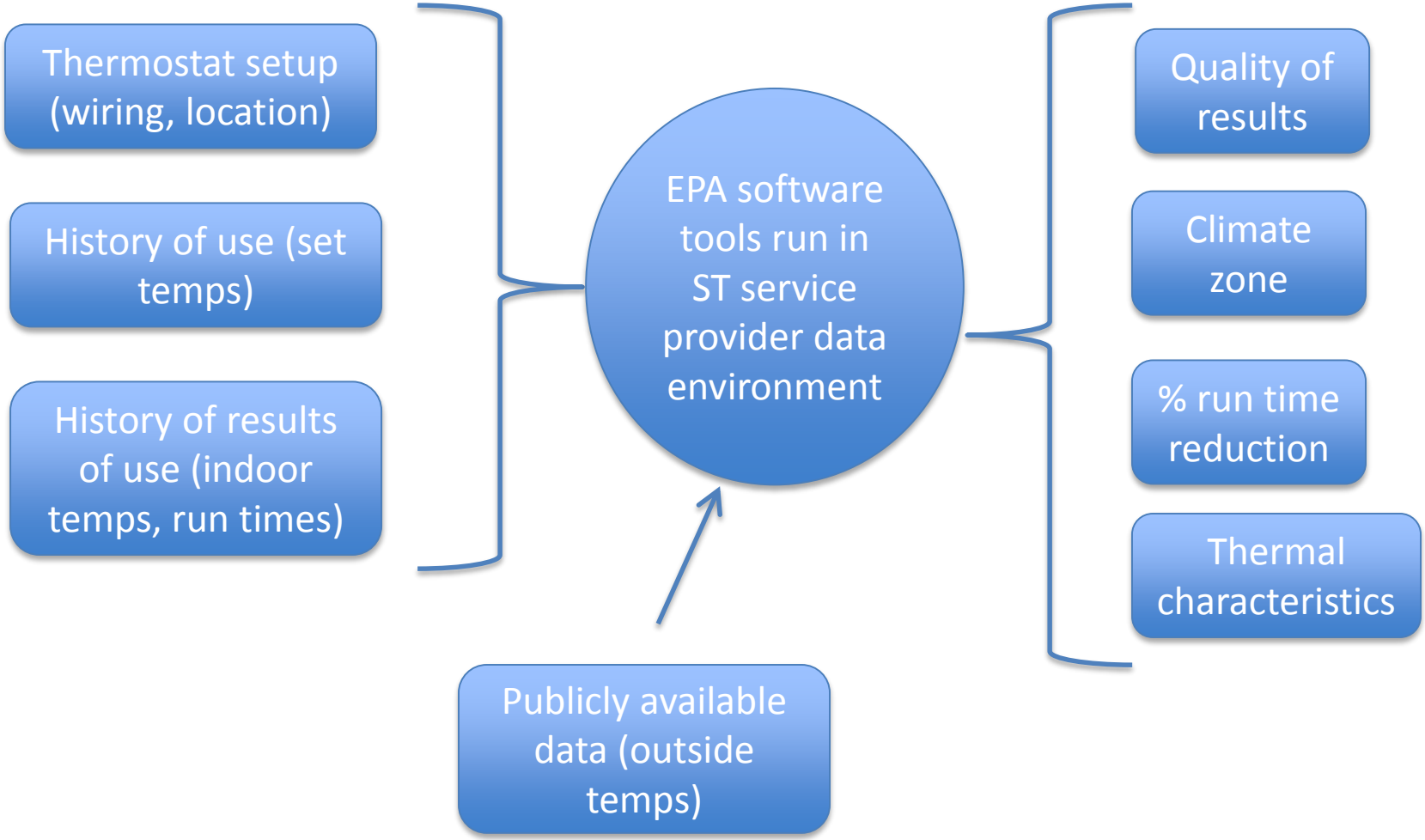
Heating savings

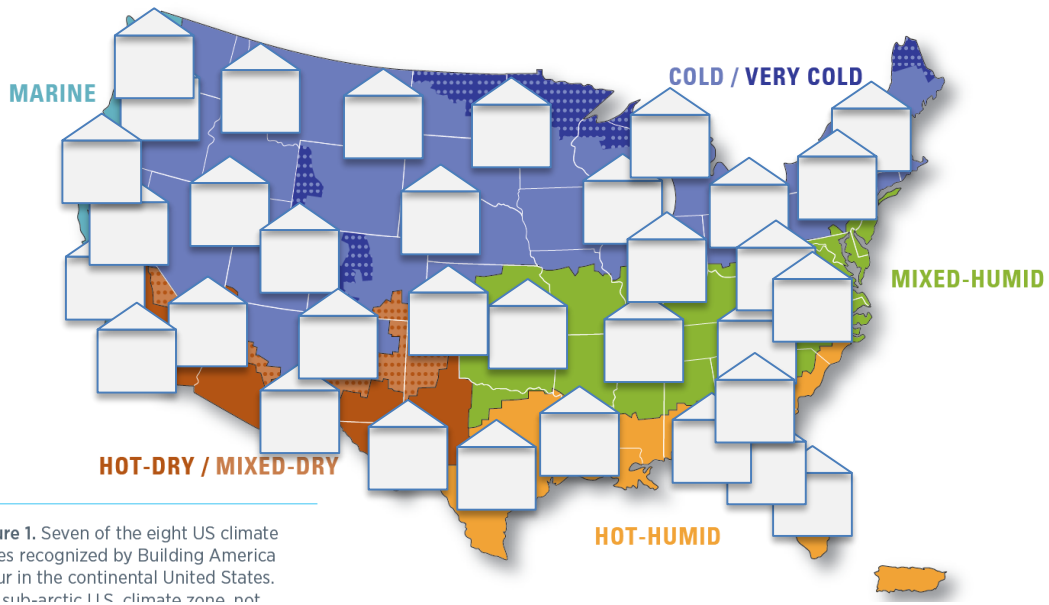
Cooling savings

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

Savings Metric For Each Home



Samples Hundreds of Homes



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- 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.

Qualification Criteria – Device and Product

- Device
  - In the absence of connectivity, acts as basic thermostat
  - Static temperature accuracy of ± 2°F
  - Network standby power ≤ 3 W
  - Time to standby ≤ 5 min
- Product
  - Users can set and maintain a schedule.
  - Feedback to occupants about energy impacts of their choices.
  - Provide users info related to their HVAC energy consumption, e.g., HVAC run time.
  - Can collect data needed for field savings metric calculation.
  - Includes basic Demand Response (DR) criteria.

Qualification Criteria – Field Savings

Metric	Statistical measure	Performance Requirement
Annual % run time reduction, heating (HS)	Lower 95% confidence limit of weighted national average	≥ 8%
	20th percentile of weighted national average	≥ 4%
Annual % run time reduction, cooling (CS)	Lower 95% confidence limit of weighted national average	≥ 10%
	20th percentile of weighted national average	≥ 5%
Average resistance heat utilization for heat pump installations (RU)	National mean in 5°F outdoor temperature bins from 0 to 60°F	Reporting requirement

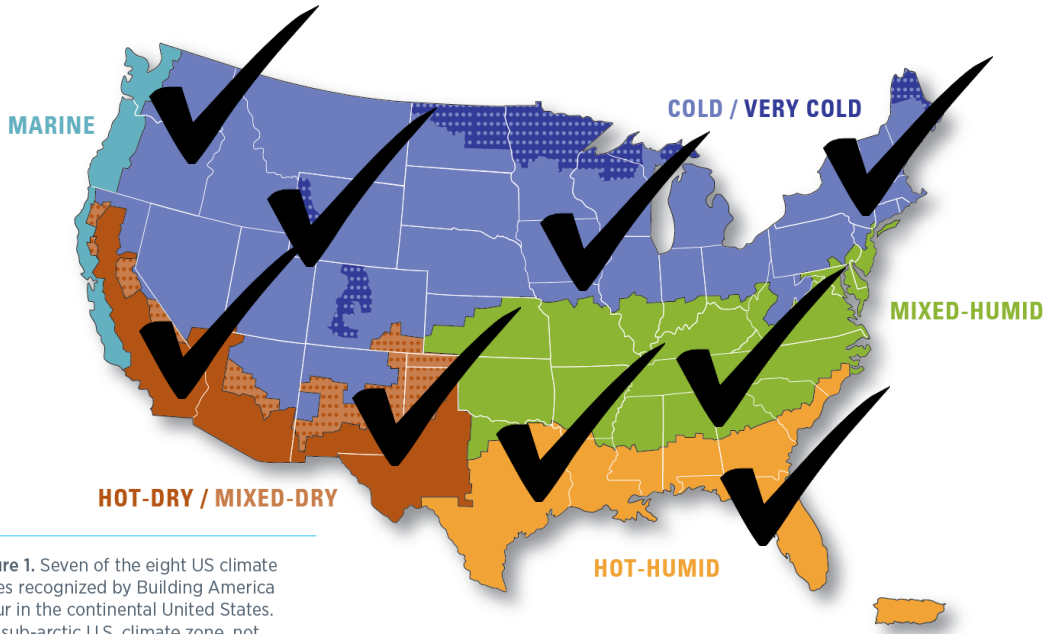
- Demonstrated by software output (.csv file) from CT service provider
- Alternate path: metric results still required, but field savings demonstrated by A/B test (agreed to by EPA) instead

Implications of Field Savings Criteria

- Ensures that a large group of **users will on average save a large amount of energy** (because of the lower 95% bound of average heating and cooling savings).
- Also ensures that the distribution isn't bimodal, with a few giant savers and a lot of losers. **At least 80% of users will see substantial savings** (because of the 20th percentile requirement).
- Metric can overestimate and underestimate savings:
  - Measures only savings from setback, not from better HVAC control or more energy sensible comfort temperatures
  - On the other hand, derives setback savings assuming no setback at all without the ST
  - In the end, these seem to be balancing out: **the average metric scores required (10% in cooling, 8% in cooling) are similar to the savings quoted for smart thermostats in utility pilot M&V studies.**

Surprisingly Little Regional Savings Variation

- Households in most regions will save a comparable amount of money – only in the mildest climates are the savings much lower
- Household conditions affect savings more
  - Is someone home all day?
  - Is it a low-load home?



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Implications for Utilities

- Many utilities already provide rebates for STs, but
  - Product mix and rebate levels are inconsistent.

- ENERGY STAR will introduce an apples-to-apples, neutral metric to evaluate energy savings (i.e., not reliant on manufacturer-funded white papers or studies).

- Not reliant on metered data. No need for exclusive data-sharing agreements between thermostat service provider & utility.

ENERGY STAR is the most trusted mark for energy efficiency and will lend existing incentive programs even more credibility and visibility!

Product Certification – Where are the Products?

- As of today, there are no certified ENERGY STAR ST products.
- EPA anticipates by the end of January/early February there will be 1-2 certified products.
- Notably, we *do not* believe that all popular models of STs will qualify.
- EPA anticipates many more entrants during 2017 and 2018, but vendors must have a year of data from a substantial number of homes around the country before they can calculate metric results.

Opportunities to Co-Brand

- Smart Thermostats are coveted products that engage the user in ways unique to the category:
  - Remote control.
  - Connected Home hub.
  - (Subjectively) can improve the aesthetics of a home.
- Given that, EPA expects this to be an enormously successful product category and, for perhaps the first time, serves as a way to make saving energy **fun!**

Marketing Opportunities

- Utilities and Implementers can take several concrete steps **right now** to begin marketing ENERGY STAR STs:
  - When populated, use the ENERGY STAR QPL as the baseline for your incentives.
  - Use the ENERGY STAR in conjunction with your consumer-facing marketing and messaging.
  - List your rebate in the ENERGY STAR Rebate Finder by contacting eeaccountmanager@icf.com
  - Participate in EPA's marketing campaign planned for September/October 2017. More details to come!

Thank You!

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