



ENERGY STAR Connected Thermostats Draft 2 Version 1.0

**Stakeholder Webinar and Discussion
Abigail Daken, U.S. EPA**

December 10, 2015



Agenda

- Welcome & Introduction
- What is ENERGY STAR?
- Version 1.0 Draft 2 – What's changed & why
 - Device Requirements
 - Product Requirements
 - Test Requirements
 - Labeling with the ENERGY STAR
- Method to Demonstrate Field Savings
- Data Request
- Timeline and discussion



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ENERGY STAR

For more than 20 years, EPA's ENERGY STAR program has identified the most energy efficient **products, buildings, plants, and new homes** – all based on the latest government-backed standards and a rigorous third-party certification process.





ENERGY STAR Program Overview



ENERGY STAR® is the simple choice for energy efficiency. For more than 20 years, EPA's ENERGY STAR program has been America's resource for saving energy and protecting the environment.

From 1993 to 2013 Americans have purchased more than 300 million products that earned the ENERGY STAR across **more than 70 product categories**. That's more than 4.8 billion products, about 58 million vehicles off the road, and **\$30 billion saved!**

ENERGY STAR. The simple choice for energy efficiency.



Today,
this little blue label
does all the hard work
of certifying outstanding
energy efficiency in:

70

**Product
Categories**



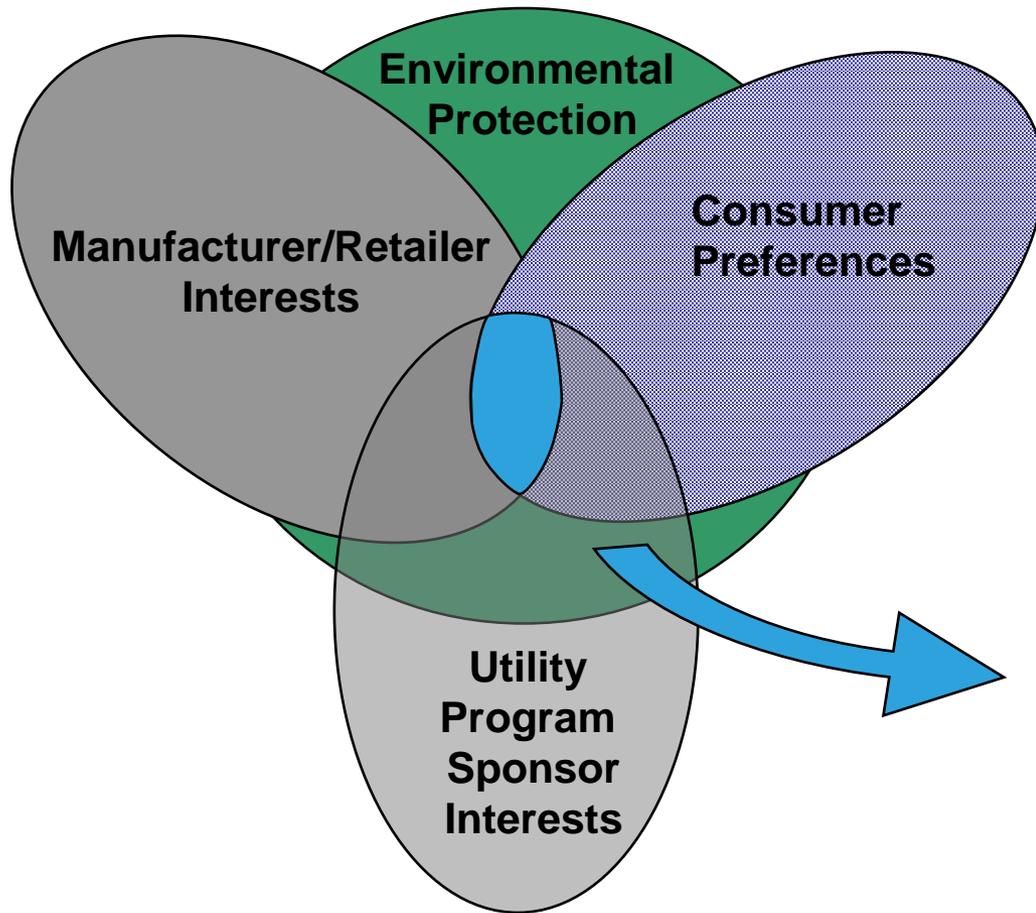
Every single day,
consumers choose
ENERGY STAR
products more than

800,000 times





ENERGY STAR's Focus



- Cost-effective
- No Sacrifice in Performance
- Government backed

Consumer is Key



Specification Development Cycle





Important Process Elements

- Consistency
- Transparency
- Inclusiveness
- Responsiveness
- Clarity



ENERGY STAR CTs - EPA Goals

- Recognize CT Products that save energy
- Labeling opportunities for both hardware-centric and service-centric CT products
- Recognize CTs using varying energy saving strategies
- Reward continuous improvement
- Robust participation by:
 - Hardware manufacturers
 - Service Providers
 - EEPS & Utilities
- Prominence of ENERGY STAR CTs in the marketplace



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CT Device Requirements: Temperature (Draft 1)

- Droop
- Operating differential
- Static temperature accuracy $\pm 0.5^{\circ}\text{F}$



CT Device Requirements: Temperature (Draft 2)

- ~~Drop~~
 - Not a concern for electronic thermostats
- ~~Operating differential~~
 - Best result for environment and consumers by allowing providers leeway to adjust
 - Removed definitions for Droop and Operating Differential
- Static temperature accuracy ~~$\pm 0.5^{\circ}\text{F}$~~ $\pm 1.0^{\circ}\text{F}$
 - $\pm 1.0^{\circ}\text{F}$ sensors have provided acceptable performance for years, will not affect metric results b/c of self-baselining
 - Retained to address consumer quality concerns
 - Test protocol for static temperature accuracy added to spec



CT Device Requirements: Temperature

Q 1: Are modern electronic LINE VOLTAGE thermostats still subject to droop?

Q 2: It may serve us later to ensure that static temperature reporting is repeatable in various operating conditions (good correction for self-heating, for instance) to ensure that there are no systematic biases between hardware devices. Do any test protocols exist for this, including internal to manufacturers?



CT Product Requirements (Draft 1)

- Ability for consumers to set and modify a schedule.
- Presence detection/occupancy signal
- Feedback to occupants re energy impact of their choices
- Consumer access to information re HVAC energy consumption
- Basic demand response using open standards (TBD)



CT Product Requirements (Draft 2)

- ✓ Ability for consumers to set and modify a schedule.
- ~~Presence detection/occupancy signal~~
 - One solution for savings among many
- ✓ Feedback to occupants re energy impact of their choices
- ✓ Consumer access to information re HVAC energy consumption
- **Basic demand response using open standards**
- Ability to collect CT data needed to demonstrate field savings



CT Demand Response

- Draft 1 requirements were TBD
- Proposed detailed requirements in September, similar to requirements for other ENERGY STAR products
- Comments on proposal, and discussions, highlighted key ways CTs are different
 - For other products, requirements are highly focused on device capabilities
 - For CTs, EPA partner is service provider
 - DR is part of the service, and several robust business models coexist in the market
- Proposed requirements drastically simplified and incorporated into Draft 2 product requirements



CT Field Savings

- Metric Performance unchanged
 - Percent savings remains TBD and will be informed by the responses to the data request
- New A/B Study option
 - Alternate path to demonstrate field savings
 - Intended for CT Products with savings not fully captured by the field savings metric
 - Rigor similar to metric performance requirements
 - Certainty of results
 - Level of indicated savings
 - Similar accounting of regional savings
 - Study must be pre-approved
 - Results of all approved studies posted at energystar.gov



Test Requirements

- Standby power and time to standby
 - References IEC 62301, Edition 2.0 2011-01
 - Specific guidance on how it applies to connected thermostat devices
- Static temperature accuracy
 - Based on but not referencing NEMA DC-3
 - Soak thermostat in ~ 70 °F chamber for 1 hour
 - Compare displayed temperature to that of calibrated thermometer
- Field Savings
 - Refers to ENERGY STAR Method for Demonstrating Connected Thermostat Field Savings (Draft 1 released concurrently)



Test Requirements

Q 3: Accuracy of temperature reported over the communication link is more important, but that data may not be accessible by test labs. Is this distinction important? If so, how would we read the reported temperature?

Q 4: Is it important to specify whether the standby test takes place in a stabilized temperature environment? This would ensure that the device will not need to send a temperature change signal during the test, and could also be used to ensure that there is no call for heating or cooling during the test. Or, if appropriate, it could ensure that there *is* a call for HVAC operation.



Labeling with the ENERGY STAR

- Revised requirements in response to stakeholder feedback
- Labeling required on web interface and apps
 - At least 76 x 78 pixels
 - Web: main screen or main settings screen
 - App: Main menu
- Dedicated devices require hardware labeling; electronic label is acceptable alternative
- Non-dedicated devices: electronic labeling of device
- Device electronic labels: main menu, $\geq 76 \times 78$ pixels
- EPA will consider alternate proposals case-by-case



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Method to Demonstrate Field Savings

- Draft 1 proposal
- Formalizes procedure to build a representative sample and run the software module
 - Samples are expected to be representative of geographic spread of service providers' US users
 - Based on discussion of data request Friday 12/4, expect feedback on this requirement
 - Size of sample is determined by required certainty (TBD)
- Many questions remain on the software, but few on this method.

Q 5: What would be an appropriate level of certainty to require?



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Data Request

- EPA requests data from CT service providers to:
 1. Inform selection of a single Field Savings Metric
 2. Inform minimum metric performance criteria
- The data request will use the Field Savings software, currently under development
- The Field Savings software output file may be edited prior to submission
- Proposal of data elements in request was discussed Friday, December 4, and the request updated in response



Data Request Final – Changes since Nov 30

- Only regional data is requested, no national summary
 - EPA and stakeholders will consider appropriate weighting for national summary score; suggestion to weight by provider's customer base distribution is not supported
 - Suggestions include weighting by typical household heating & cooling energy use in the region, or by % of total national heating and cooling energy used in the region
 - Thus, sample selection altered from that in Draft 1 Method for Demonstrating Field Savings
- The Field Savings software output file slightly updated, and data elements updated to reflect that
- Software is ready to use, and ICF can provide technical support if needed



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Estimated Timeline

Nov 30, 2015	Released draft 2 Specification, draft 1 method to demonstrate field savings, request for data
Dec 4, 2015	Discussion of request for data
Dec 10, 2015	Draft 2 webinar (including draft 1 field savings method); finalize elements of data request
Dec 23, 2015	Comment deadline for specification and method to demonstrate field savings
Jan 8, 2016	Data to be considered in specification setting due
Jan 2016	Draft 3 specification (with proposed levels), Draft final method to demonstrate field savings
Feb 2016	Draft 3 webinar; finalize field savings method
April 2016	Draft final specification
May 2016	Finalize specification; program begins



Discussion



Contact Information

Abigail Daken
EPA ENERGY STAR Program
202-343-9375
daken.abigail@epa.gov

Doug Frazee
ICF International
443-333-9267
dfrazee@icfi.com