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May 11, 2012

Abigail Daken
Environmental Protection Agency
1725 Eye Street NW, Suite 1000
Washington, DC 20006

Dear Ms. Daken:

The Consortium for Energy Efficiency (CEE) respectfully submits the following comments in response to Draft 3 of Version 1.0 of the ENERGY STAR Climate Controls specification, released by the Environmental Protection Agency (EPA) on April 9, 2012.

CEE is the binational organization of energy efficiency program administrators and a staunch supporter of the ENERGY STAR Program. CEE members are responsible for ratepayer-funded efficiency programs in 45 US states and eight Canadian provinces. In 2011, CEE members directed $7.8 billion of energy efficiency program budgets in the two countries. These comments are offered in support of the local activities CEE members carry out to actively leverage the ENERGY STAR brand. CEE consensus comments are offered in the spirit of strengthening ENERGY STAR so it may continue to serve as our national marketing platform for energy efficiency.

CEE highly values the role ENERGY STAR plays in differentiating energy efficient products and services that the CEE membership supports locally throughout the US and Canada. We appreciate the opportunity to provide these comments.

Responsiveness to Previous CEE Comments

CEE would like thank EPA for addressing several issues in Draft 3 consistent with past CEE comments. We continue to support a cautious approach when it comes to requiring humidity controls and establishing a single national standard to signal time-of-use price tiers using LED lights. CEE also appreciates the additional time and rigor EPA is dedicating to development of this important specification, and the underlying test procedure for assessing high-usability products.

Foster a Competitive, Innovative Marketplace

CEE recommends that the non-proprietary principle embodied in the tenets of ENERGY STAR extend to associated communications protocols and frameworks specified to enable "connected" functionality. If a specification cannot be established in this manner, for example if a "communicating climate control" requires a particular adjunct device that is proprietary, then it would not be qualified to achieve the ENERGY STAR label. As is the case with most products, application of 3rd party climate controls could void the HVAC system warranty and would not support complex control functions, therefore we believe only the communication aspect must be uniform. For ENERGY STAR to obtain widespread support, we recommend that labeled products be adaptable to a variety of power distributor communication systems through a standardized portal connection.

Several CEE members view a *standard modular communication interface* as an important step to enable connectedness to residential loads by providing a means for residential products to work with any load management system through user installable plug-in communication modules. We would like for the climate control specification to be written in a manner that allows for both hub and non-hub architectures to be utilized for load management. This may help to mitigate the risk of labeled products precluding existing utility systems from interfacing with the climate control. Ideally, the communications module would be able to be provided by anyone and not just the supplier of the climate control.

Complement Established State Codes that Address Communicating Programmable Thermostats

We support EPA's stated intent to craft a specification that is complementary to established state codes.

Clarify the Basis for Limiting Power Consumption of a Communicating Thermostat:

Some committee members are actively testing communicating thermostats that would integrate with their advanced metering infrastructure, some of which may not meet the power consumptions limits proposed in Draft 3. CEE requests that prior to limiting the average watt draw of a communicating thermostat, EPA share with stakeholders an assessment of which products, technologies, and capabilities would be affected (e.g. communication technologies, or

screen brightness, which may affect usability). Further, we would like to better understand what the expected energy savings of this requirement would be. To the extent the ENERGY STAR label for climate controls is likely to encompass some in-home energy management devices, what is the impact of the proposed energy consumption limit? Ideally, a data set or scatter plot that shows the energy consumption of currently-available climate controls would be made available to stakeholders.

Continue to Investigate and Document Anticipated Energy Savings of Labeled Products

Documenting the energy savings of a communicating programmable thermostat remains a difficult challenge—and important need—for efficiency programs hoping to partner with ENERGY STAR on Climate Controls. Current research by at least one CEE member (Fraunhofer)[1] may be helpful to EPA's stated objective of ensuring labeled products yield significant energy savings in the field. We continue to believe EPA is making great progress in developing a performance-based "ease of use" path to demonstrate compliance with ENERGY STAR requirements. While these laboratory usability tests will go a long way in predicting the product's success among consumers, we don't know precisely what role usability plays in delivering verifiable energy savings. Will it reliably lead to occupants choosing to use energy-saving settings? This is an open question that is currently being investigated in a field deployment of high- and low-usability programmable thermostats by Fraunhofer.

Evaluate the Implications for Demand Response and Load Management Programs

Some CEE members have concerns the ENERGY STAR specification requirements for "connected" products could either explicitly require, or inadvertently lead to requiring, a Home Area Network (HAN) to enable demand response and/or load management. If true, this will affect several existing programs administered by CEE members, and could increase the cost of implementing residential demand response and load management programs. In a worst case scenario, demand response programs may actively avoid ENERGY STAR-labeled thermostats. CEE requests that EPA assess and share the expected implications (good and bad) for existing demand response and load management programs. We further recommend that any incremental cost associated with achieving "connected" be included within the calculation of incremental cost so the Program can continue to represent cost-effective energy savings.

[1] See the attachment for a description of this ongoing research.

CEE would once again like to thank the EPA for the opportunity to comment on Draft 3 of the ENERGY STAR specification for Climate Controls. Please contact CEE Senior Program Manager John Taylor at 617-532-0944 with any questions about these comments.

Sincerely,

Ed Wisniewski
Executive Director

Fraunhofer USA

FRAUNHOFER CENTER FOR SUSTAINABLE ENERGY SYSTEMS (CSE)

DEMONSTRATING REAL-WORLD EFFECTIVENESS FOR HOME ENERGY MANAGEMENT (HEM) TECHNOLOGIES

Scientific Third-Party Validation of Energy Savings, Household Acceptance

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At the Fraunhofer Center for Sustainable Energy Systems, we help answer these and other questions with Home Energy Management (HEM) product field performance validation—delivering an independent assessment of your product's performance in a real-world setting.

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About Fraunhofer CSE

The Fraunhofer Center for Sustainable Energy Systems (CSE) is a non-profit applied R&D laboratory that serves clients from across the solar photovoltaics, building technology, and materials fields. Our mission is to foster economic development through the commercialization of clean energy technologies for the benefit of society. We work with a variety of customers, ranging from Fortune 500 companies and national labs to university spin-outs and start-ups.

Our Approach

- Experimental design, recruitment of households, installation of product and non-intrusive in-home sensors and data acquisition systems in the building
- Behavioral analysis of households: currently practiced energy behaviors, readiness for energy saving, and feasibility analysis of new energy behaviors
- Development of tailored persuasive communication strategies: behavioral feedback and recommendations/tips
- In-depth qualitative insights from personal interviews and focus group research

The result is a real-world analysis that benchmarks the performance of your product to validate the features that set it apart from the competition and to provide ideas for further improvements.

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Front Page *A programmable thermostat in use.*

Above *A member of the CSE Human Factors Research team installs a thermostat at a project deployment site.*

Right *Examples of high- and low-usability thermostats used in the CSE field survey.*

PROJECT EXAMPLE: FIELD EVALUATION OF PROGRAMMABLE THERMOSTATS

The Opportunity

Increase sales and market share of your product by qualifying for Energy Star label. For programmable thermostats this means fulfilling high usability requirements.

The Challenge

No field tests have directly evaluated energy savings achieved in actual households due to increased usability of programmable thermostats. Scientific evaluation can be used to support your product's effectiveness for energy saving.

The Approach

- Identify multifamily building for a field study with a large number of households (N = 90)
- Work with building management to ensure seamless recruitment of households and random assignment of households into high- and low-usability groups
- Install thermostats and non-intrusive sensors to monitor temperatures and HVAC activity
- Conduct surveys to evaluate how household members use their thermostats and to compare reported use patterns to the observed data-driven patterns

The Approach

- Apply data analysis algorithms to evaluate user interaction with the thermostats based on temperate and HVAC state data and detect naturally occurring temperature fluctuations from changes of temperature setpoints
- Use autoregression analysis techniques to detect whether thermostat settings were changed permanently or overridden manually on a day-to-day basis
- Analyze survey, energy consumption and user-thermostat interaction data to derive occupant behavior and energy consumption patterns associated with high- and low-usability thermostats
- Evaluate how usability of programmable thermostats affects energy savings and comfort levels achieved in a realistic field test

The Outcome

- Rigorous scientific assessment of the occupant behavior as a factor in product effectiveness
- Validation of energy saving claims
- Real-world data to guide policy and design of programmable thermostats
- Data-driven insights for product enhancement opportunities