

August 1, 2018

Dear Ms. Jantz-Sell & Ms. Daken,

On behalf of ecobee, we are pleased to comment on the Smart Home Energy Management Systems (SHEMS) Discussion Guide, and our company looks forward to continuing to participate as a stakeholder and contributor in this ENERGY STAR® specification initiative.

We offer the comments below from the perspective of ecobee's accelerated growth and evolution over the past decade (see Appendix A). ecobee has transitioned from being a smart thermostat company to being recognized as an innovator and leader in the smart home and building automation field. Considering this, we caution the U.S. Environmental Protection Agency (EPA) against developing a specification for integrating home energy management equipment, devices and services that will be overly prescriptive. We are a proponent of leveraging and applying the ENERGY STAR Connected Thermostat certification, a recognized national and uniform approach, to evaluating smart thermostat savings. However, going forward, we recommend EPA teams assess the feasibility and prospects of a SHEMS specification with our following recommendations in mind:

1. *Any SHEMS specification must account for the accelerated pace of innovation that is taking place within the home automation sector:* Given the varied and ancillary purposes of home accessory and energy management services, we encourage the EPA to structure the specification such that new technologies, equipment and services (including software upgrades) can be readily incorporated. In this case, it is best for the EPA to take an approach that does not define what devices should be controlled beyond home devices that “are the most promising targets for energy savings based on occupancy,” as your team recommends.¹ Specifically, we recommend a minimum subset of installations that should be included in our answer to “Scope” section question #1. Ultimately, any ENERGY STAR specification for home energy management systems should not deter customers from investing in products and services that enable energy efficiency in their homes.
2. *Consider only defining a minimum kW savings value for packages:* We recommend that the EPA define the specific goal (for example, energy savings / reduction) it believes smart home energy management platforms should achieve and leave the implementation and integration details to vendors and service providers. This can take the form of the EPA establishing a minimum energy savings goal for a package. Given the combination of services and devices that may be included in a qualifying package, we view the SHEMS stakeholdering initiative as a forum to explore and discuss how this can be achieved. This exploration can include the data and information that may be required.

¹ EPA, June 2018, “ENERGY STAR® Smart Home Energy Management Systems Discussion Guide June 2018,” p. 1.

3. *Remain flexible in defining and categorizing device power consumption considering the growing range of capabilities within individual devices:* As we highlight, companies are increasingly offering home energy management devices that serve multiple purposes in response to consumer demand and preferences. For early home energy management products, it was appropriate to use an idle state power consumption measure. However, consumers are placing greater value on devices that can perform different functions and processes at once. As this allows for an improved user and home connectivity experience, we suggest that considering power consumption from the perspective of a “standby power level” would be more suitable than defining an average or maximum.

We offer the recommendations above from the standpoint of ecobee’s contribution to and development of the SHEMS market. Based on our achievements to date, we respectfully suggest that ecobee has been instrumental in increasing North American consumer adoption and acceptance of such platforms and systems. Our company has shown foresight in developing products and services that enable energy savings through combining unique software algorithms with occupancy and temperature room sensing capability throughout the home. This has served to broaden consumers’ perception of how home automation accessories, devices and services can seamlessly connect within the home. Over the years, we complemented this approach to product design and development by integrating with a number of home automation and energy management services. This includes integration with applications such as Apple HomeKit and Samsung SmartThings, and incorporating the Amazon Alexa in the Switch+ and ecobee4 thermostat.

Overall, we appreciate and support the EPA’s objective to recognize and promote energy management features that optimize energy savings without inconveniencing consumers or sacrificing their comfort. To that end, we are looking forward to collaborating with the EPA on defining what a SHEMS specification may look like, and finding out more about how it may impact consumers.

Sincerely

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Comments of ecobee on the ENERGY STAR Smart Home Energy Management Systems Discussion Guide

Scope

1. Which products or product capabilities should be included in the basic package?

- One ENERGY STAR certified smart thermostat
- A lighting requirement. Specifically, ENERGY STAR light bulbs and certified light fixtures, and/or lighting controls

We also support inclusion of the following capabilities and requirements:

- Occupancy detection capability
- A set of algorithms that modify the operation of the devices in the package to save energy based on occupancy information
- The ability to collect information about the optimization of devices within the home based on occupancy
- A set of installation instructions and recommendations to promote maximum energy savings

Please note that, while we support the inclusion of the requirement highlighted below, we ask that, through this forum, the EPA provide stakeholders with more information about what type of information its teams may require or request regarding it:

- The ability to collect information about the optimization of devices within the home based on occupancy

2. What devices and/or capabilities should be included to address miscellaneous energy loads (MELs)?

As noted, we recommend that the EPA avoid prescribing additional devices for control beyond what we have recommended above. As the discussion guide indicates, integration services and software may have the ability to manage devices and equipment in the home beyond MELs such as water heaters. However, it is worth noting that managing water heaters is generally more cost-effective than controlling plug loads. For this reason and others, selecting device types should be at the discretion of the product and service vendor.

3. Which products or capabilities should be expressly included in scope or encouraged beyond the basic package?

As noted, we recommend that the EPA avoid prescribing additional devices for control beyond what we have recommended in our answer to Scope question #1.

4. *Are there any specific products or product capabilities that should be expressly **excluded** from scope?*

Yes. In light of our recommendations on page 1 and answer to “Scope” section question #1, we suggest the scope exclude the following:

- The ability to connect to a hot water heater controller or directly to a hot water heater, if such a device is present in the home
- Devices and/or capabilities that address energy used by MELs, potentially including smart plugs, power strips

Qualification Criteria

1. *Are there hallmarks of optimization strategies for short term, long term, and partially occupied spaces that have been used or piloted that could provide a general framework for this specification?*

We do not have a response to this question at this time.

2. *What strategies are effective to address MELs, using the devices and/or capabilities you mentioned in response to the Scope Feedback Request section, question 2?*

Considering our answers and recommendations above, we do not have a response to this question at this time but may provide additional input on this subject in the future.

3. *What is the range of power use of smart switches when they are supplying power independent of what is plugged in?*

Our experience to date with ecobee’s smart light switch, the Switch+, is that its power consumption is minimal, ~2 watts, in an idle state as we define it. It is important to note, however, that smart devices today may perform certain processing functions in an idle state and therefore, any specification should aim to account for this processing and multi-function capability. Considering this, the EPA should be flexible in defining this range since single purpose devices are now evolving into multifunctional systems. In these cases, the energy used by them should not be viewed through a narrow lens (i.e. of simply being lighting switches or controls) but reflect their multifunctional value to consumers.

4. *What is the range of power use of smart plugs when they are not supplying power?*

We do not have a response to this question at this time.

5. *Are other measures needed to address this concern?*

For devices such as smart thermostats and smart light switches, the technologies’ independent power consumption should not be a concern because their energy use is minimal relative to the energy savings achieved by the device. However, considering that

single devices are increasingly serving multiple functions and purposes, we believe that the standby power level would be more appropriate than defining an average or maximum.

It is also important to note that, at ecobee, we make every effort to minimize our devices' individual power use. This includes ensuring that our smart thermostats and light switches align with various industry and government standards, specifications and codes. This includes the power consumption standards the EPA established for Connected Thermostats (CTs) in the associated ENERGY STAR specification.²

6. *What other data and statistical measures would be helpful to analyze savings potentials realized by the population?*

Considering the number software integration methods offered and available (that would control devices and services to derive savings), we ask the EPA to consider setting a minimum savings value for an installation package. In this case, we are willing to work with your team on what would be required from a device and service standpoint.

Potential Evaluation Methodology

1. *Is it practical to report data from the entire population (defined in the Populations to be Analyzed section)? Alternately, EPA could define a procedure to produce a random sample and require analysis of that.*

We recommend the latter and suggest the EPA define a procedure to produce a random sample and subject it to analyses.

2. *Is there a way to characterize energy savings from optimized unoccupied hours in terms of how deep the energy savings are (e.g., short term away optimization versus long term vacation modes, periods with pets at home, etc.)?*

Generally, we can only speak to the software configurations of ecobee products and services. Yes. In our case, there are rules of thumb that we use for calculation. For example, it has been reported that thermostats can reduce natural gas consumption by approximately 1% for each degree Fahrenheit offset during an eight-hour setback.³ These are crude approximations and become much less appropriate with increases in the number of devices in the home. To provide guidance to your team on this question, we would need more clarity on what the EPA is seeking and a recommendation from your team on its preferred baseline behavior for each element of the system.

² ENERGY STAR Program Requirements for Connected Thermostats Version 1.0, December 2016, https://www.energystar.gov/sites/default/files/ENERGY%20STAR%20Program%20Requirements%20for%20Connected%20Thermostats%20ersion%201.0_0.pdf

³ Nelson, L., and MacArthur, J. 1978. "Energy savings through thermostat setbacks," ASHRAE Transactions 83 (1): 319-333

3. *There are a wide range of ways to determine occupancy, some which require user interaction (e.g., geo-fencing, arming an alarm panel) and some which do not. Do data show a difference in frequency of use, depth of energy savings, or total time optimized based on the type of occupancy detection?*

Yes. We have methods for identifying the level of energy savings generated by the different services that are enabled through occupancy detection in certain ecobee smart devices. This can be generally determined by evaluating how frequently different service types are activated such as the “away” and vacation mode, and assessing how often the Smart Home/Away feature is enabled (i.e. automatic efficiency set back).

4. *How would EPA determine, based on a description of product capability, whether a particular system can respond to occupancy?*

We suggest that the EPA provide a definition and requirement. Partners, manufacturers and service providers can then certify that they meet the requirement.

Appendix A

Summary of ecobee's product evolution over the past decade:

- In 2007, ecobee invented the world's first smart Wi-Fi thermostat;
- In September 2014, ecobee introduced the ecobee3, the first smart thermostat to ship with a remote, occupancy sensor, enabling customers, through occupancy and temperature detection, to balance, manage and optimize the heating and cooling in up to 32 rooms in a home. The ecobee3 also established the design and software foundation that has been applied to ecobee's more recent residential thermostats released to date;
- In April 2017, ecobee became the second company to achieve the ENERGY STAR certification for its newest generation of residential thermostats within the program's CT product category. Today, ecobee has certified five residential thermostats as a family of ENERGY STAR products;
- In May 2017, ecobee launched the ecobee4, its fourth-generation residential smart thermostat with Amazon Alexa voice service and far-field voice recognition built into it. The ecobee4 was the first in a suite of ecobee products that are intended to reflect ecobee's vision to invest in far-field voice, and product strategies that enable homes to listen, learn, anticipate and respond. For example, a number of utilities and Retail Energy Providers are beginning to offer energy-based Alexa skills to their consumers, providing ecobee customers with the ability to ask Alexa about their energy use and manage it;
- In March 2018, ecobee released its smart light switch, the ecobee Switch+, delivering on its vision to invisibly integrate voice assistance in every room of the home. In addition to having Amazon Alexa voice service built into each ecobee Switch+, the light switches are equipped with ecobee's occupancy and temperature detection technology.

It is also worth noting that, in 2014, ecobee instituted a comprehensive HVAC contractor installer training program. Our company also provides extensive installation materials and resources to end use consumers via resources included within the product packaging and online on ecobee's website. Over the past five years, we have also invested heavily in HVAC contractor and distributor training.