

ENERGY STAR® Smart Home Energy Management Systems (SHEMs) Discussion Guide

Intel's comments on EPA's feedback request - July 27, 2018

EPA seeks feedback on the approach to **scope**:

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

Capability to detect occupancy either through sensors, geo-fencing or some other method (e.g. security set to AWAY, or calendar set to VACATION, etc.) is a minimum. Device to control HVAC is next most important, followed by electric water heaters, pool pumps, lighting, electric stove/range, and other miscellaneous electrical loads (MELs).

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

Capabilities to address vampire loads are important, but MELs beyond the above can quickly lead to diminishing returns because of their small loads. Electric Vehicles (EV) aren't often thought of in this category, but can be controlled as just another MEL by a sophisticated SHEMS.

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

More important than cataloging MELs would be the basic ability to discern 'load flexibility' of the devices, even when dwellings are occupied. HVAC pre-cooling or cycling is one example of algorithmic optimization. Another is learning the times an EV is really being used and for how long to determine its flexibility to charge when and how much, per times that might be more optimal for energy provision.

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

Intel is in early stages of evaluation.

EPA seeks feedback on the approach to **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?

As mentioned above, many service providers have used algorithms to control thermostats that optimize energy savings and keep occupants comfortable at the same time. Both service providers and utilities have documented these savings.

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?

Learning the behavior of devices reveals behavior of the occupants and detects patterns that can be deployed for optimization, and over-ridden by the occupant at any time. In another example, if someone uses a device consistently during the day, but rarely at night, different device readiness settings can be deployed during those times.

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

Intel is in early stages of evaluation.

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

Intel is in early stages of evaluation.

5) Are other measures needed to address this concern?

EPA should consider DOE/NREL's "Uniform Methods EM&V Protocols". As it relates to SHERMS, there is a protocol for smart thermostats, maybe other technologies and services relevant here. What there is should be used by EPA if possible and others could be developed in collaboration between EPA, DOE and the private sector.

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

Intel is in early stages of evaluation.

EPA seeks feedback on the approach to **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.

Given the range of device categories and the variety of devices within them, data from an entire population may yield muted results. Sampling customers of service providers with similar categories of devices would seem to yield better results per service provider and the algorithms or occupancy detection methodology they deploy.

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.)?

It would seem that a comparison of the dwelling's energy usage as a whole during those different periods above is possible, and may already be deployed by some service providers. Focus should be on the holistic 24/7/365 optimization of the household use cases, as some may be better off in occupied vs. unoccupied time frames, and those time frames may shift from day to day.

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?

Intel is in early stages of evaluation.

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

Intel is in early stages of evaluation.