



# ENERGY STAR® Certified Smart Home Energy Management Systems

## Energy Efficiency Program Sponsor Frequently Asked Questions

### What prompted EPA to get involved in smart home systems?

Devices marketed as “smart” are proliferating in the United States with revenue from the sale of smart home products growing thirty-six percent between 2017 and 2018.<sup>1</sup> Based on consumer interest in the novelty and convenience features of these devices, this trend is expected to continue. Left unchecked, the energy consumption of these devices could add significantly to the already growing category of “miscellaneous” energy use in U.S. homes, begging the question, “Is it smart, if it’s not energy efficient?”

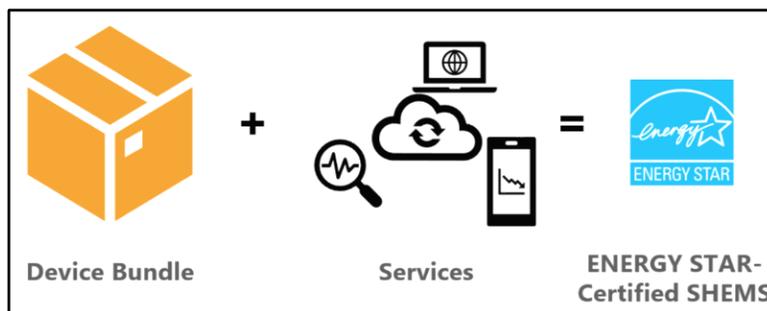
EPA and participating ENERGY STAR stakeholders saw an opportunity to mitigate growing consumption and bring a focus on energy savings opportunities to the smart home market through development of ENERGY STAR certification criteria. The strategy: leverage the powerful ENERGY STAR brand and partnership to guide smart home systems toward readily achievable energy savings in the near term, while working toward the future of a smart home ecosystem capable of acting as a single touchpoint for consumers and utilities to manage energy consumption. Working closely with stakeholders, EPA identified energy savings enabled by occupancy detection, standby power, interoperability, and user amenity as focal areas for the initial specification.

### How does EPA define Smart Home Energy Management System?

As defined by EPA in the [Version 1.0 Program Requirements](#), *Smart Home Energy Management System(s)* (SHEMS) refers to a package of smart home devices connected to a central service that enables user amenity and energy savings through scheduling, remote device control by the user, and automated device control based on occupancy detection.

### What are key criteria for ENERGY STAR-certified SHEMS?

To be certified as an ENERGY STAR SHEMS, the package must meet minimum device requirements and service capabilities.



<sup>1</sup> Estimates as of July 2018 based on growth rates provided by the Consumer Technology Association.

### **Device criteria**

An ENERGY STAR SHEMS package includes the following devices which cannot exceed the maximum standby power requirements specified in the table below.

Device Category (Minimum number)	Device Requirements	Maximum Allowable Standby Power Consumption	Device Compatibility
Connected Thermostat (1)	<a href="#">ENERGY STAR Certified Thermostat</a> Must be automated based on occupancy detection.	3.0 watts	All devices in the SHEMS must be configured to meet interoperability requirements including automated device detection (see interoperability section for additional details)
Connected Lighting (2)	At least one ENERGY STAR Certified <a href="#">Connected Bulb</a> or <a href="#">Fixture</a> ; second device may be a smart light switch. Must be automated based on occupancy detection. Must be capable of reporting energy consumption and responding to vacation and safety modes.	0.5 – 1.5 watts for ENERGY STAR lighting; 0.5 watts for smart light switches	
Connected Plug Load Device (1)	Includes smart plugs, smart power strips, and home energy monitors; must be capable of reporting power or energy consumption. Smart plugs and outlets must be automated based on occupancy detection.	1.0 watt	
Occupancy Sensor (1)	Permanently located in the home. Service provider must recommend installation in high traffic area. May be incorporated in one of the other devices (e.g. connected thermostat with an integrated sensor).	N/A	
Optional Devices	Some systems may use a Hub to provide connectivity to other devices. Other optional devices, such as ENERGY STAR certified appliances with connected functionality, are encouraged.	Standby consumption must be reported for the Hub.	

### **Required interface and service capabilities:**

All ENERGY STAR-certified SHEMS must include an interface that provides user control of required and optional devices from outside the home; receipt and response to occupancy data; and information on the energy consumption of SHEMS-connected devices; and that enables energy saving device control actions by:

- Facilitating user-established rules and schedules or event-triggered actions (e.g., arming alarm panel triggers 'away' setting)
- Suggesting energy saving actions to the user based on device usage patterns, room occupancy, or home occupancy
- Automatically controlling smart home devices based on device usage patterns, room occupancy, or home occupancy. (There also must be user opt out options for this feature.)

In addition, the SHEMS platform must be *capable* of the following:

- Automatically detecting devices through the SHEMS app/user interface
- Providing a vacation or nighttime safety mode that automates lighting when activated and consumes no more than 0.03kWh/day.
- Connecting to and controlling a water heater (i.e., water heater controller or ENERGY STAR-certified water heater).
- Enabling signal receipt and response to a demand response (DR) event. For instance, this could include enabling a DR request to shed load through an ENERGY STAR connected thermostat or to adjust water heater operation in response to an OpenADR request. (DR functionality is not activated unless the customer has agreed to participate in a demand response program or initiative.)
- Controlling devices based on time-of-use energy prices provided by the customer or via integration with a utility program.

Additional details about these criteria can be in the [ENERGY STAR Product Specification for Smart Home Energy Management Systems](#).

### **Which methods for detecting occupancy are allowable?**

EPA leaves the method for achieving occupancy detection to the service provider. Occupancy sensor requirements include that there be at least one occupancy sensor permanently located in the home, and that the service provider recommend this sensor be located in a high-traffic area. EPA expects many platforms will use additional strategies such as geo-fencing.

### **How is EPA encouraging interoperability?**

Through the ENERGY STAR SHEMS criteria, EPA is encouraging interoperability via the following:

- Encouraging and reporting the use of open standards (e.g., Wi-Fi, SEP, Bluetooth)
- Mandating that required devices be automatically detected and that consumers can set them up through the SHEMS app (i.e., customer user interface).

- Encouraging additional compatible devices such as solar inverters, connected electric vehicle chargers, and connected appliances.
- Requiring that for devices to be considered compatible, they must share energy consumption and occupancy information with the SHEMS.

## How do ENERGY STAR criteria for SHEMS differ from other ENERGY STAR product categories?

Most ENERGY STAR product criteria (other than smart thermostats) are based on engineering estimates and demonstrated performance based on laboratory testing. In these cases, the product criteria apply to the hardware and the ENERGY STAR partner is a manufacturer. In contrast, ENERGY STAR-certified SHEMS are a combination of hardware and service. The service provider is the ENERGY STAR partner since the service is a primary component of the product offered to users and is central to delivering savings and amenities. The service provider also has access to data about how the product is used in the home, which is necessary to understanding delivered energy savings.

## What is the test method for certifying ENERGY STAR SHEMS?

As a requirement of certification, EPA collects statistical data from service providers summarizing system installation information and in-field performance. The [method to demonstrate field performance](#) defines a population of installations for analysis and includes required and optional data. Prior to ENERGY STAR certification, data from a full 6 months of operation with a sufficient number of active installations must be submitted to and approved by an EPA-recognized Certification Body. Additional requirements for 6-month periodic data submissions are outlined in the [ENERGY STAR Program Requirements for SHEMS](#).

Required data include (but are not limited to) the following:

- Number of devices by type per installation (for required devices).
- Number of installations per climate zone
- Average on time per light
- Average “away” time by away type—scheduled, suggested, automatic based on occupancy—per week per installation
- Average normalized weekly away hours per installation for each month in a reporting period.

Optional data are requested to further inform SHEMS metric development and facilitate understanding of the evolving SHEMS market. The reporting template, available on the [SHEMS for Partners](#) web page, provides fields for gathering required and optional data elements. Appendix A of the field performance method provides a detailed description of the data elements in the reporting template.

## Are there customer data privacy concerns?

Access to customer data remains solely in control of the SHEMS service provider. EPA's process is intentionally anonymous. Data analysis and aggregation is done by service providers to protect privacy and proprietary information. Certification bodies and EPA contractors receive aggregated statistical data only. EPA will only receive data that has been anonymized.

Customers should be encouraged to consult their SHEMS service provider about data security and privacy but can be assured that the federal government does not receive personally identifiable information or individual usage data from anyone that uses an ENERGY STAR-certified SHEMS. Service providers are required to report any data privacy and cybersecurity standards they adhere to when certifying new products. EPA will make this information available as part of the certified product list, which will be available via [energystar.gov](http://energystar.gov).

Energy efficiency programs that have direct data sharing agreements with SHEMS providers should consult with their legal and corporate communications departments to determine the best way to communicate data privacy issues with their customers

## How do energy efficiency programs anticipate using the SHEMS specification?

Utilities and other interested energy efficiency program sponsors are likely to first introduce ENERGY STAR-certified SHEMS on a pilot program basis and/or evolve existing pilots to align with ENERGY STAR criteria. EPA recommends that energy efficiency program sponsors encourage service providers to submit optional data in SHEMS pilots.

## What is the effective date of the specification? When will there be enough available product to transition existing pilot programs to ENERGY STAR? How can I find out which service providers are likely to certify product?

The Version 1.0 specification was finalized and took effect on September 3, 2019. EPA is actively working with service providers to support their SHEMS offerings. EPA anticipates the first certified SHEMS by mid-2020.

EPA is currently gathering information on utilities that would be interested in being connected with service providers and other market actors involved with the development and marketing of ENERGY STAR certified SHEMS. [Click here](#) if you would like to participate.

## How much energy does an ENERGY STAR certified SHEMS save?

Energy efficiency program sponsors are encouraged to consult their existing technical resource manuals (TRMs), as relevant, to determine device-level savings estimates appropriate to their service territory and required consideration of potential interactive effects among devices as applicable. TRM values for specific jurisdictions are commonly available for ENERGY STAR-certified thermostats and lighting. (For programs that evaluate energy savings from ENERGY STAR-certified smart thermostats using regression-based billing analysis, it is unlikely that the additional devices *required* in the SHEMS package would deliver statistically detectable additional energy savings.)

At this juncture, it is unclear how much energy the management system will save *beyond* the energy savings from required and optional devices. EPA anticipates additional system savings from the automatic control of devices while the home is unoccupied. EPA strongly encourages energy efficiency program sponsors working in this area to support development of a future SHEMS energy savings metric by requesting inclusion of optional data in any pilots they undertake. (See “What is the test method for certifying ENERGY STAR SHEMS?” above).

## **Are there certain customer types of home/equipment characteristics that are likely to yield greater or lesser energy savings?**

EPA expects that occupancy-based automation will be the largest driver of energy savings. Therefore, homes with periods of low occupancy will see the greatest savings, whereas homes that are occupied constantly will save less energy. In addition, since at least one ENERGY STAR-certified thermostat is required, savings will likely vary by climate and age and type of HVAC equipment.

## **Are ENERGY STAR-certified SHEMS suitable for demand response programs?**

Yes. ENERGY STAR SHEMS must be able to work with utility demand response programs by implementing a demand response signal to at least one device in the package, but there are no specific required responses. In addition, the functions need not be in use for ENERGY STAR certification. Providers are encouraged to use open standards to meet this criterion (e.g., by offering an OpenADR virtual end node).

## **How can ENERGY STAR-certified SHEMS be used to help customers transition to time-based rates?**

Depending on user preference and rate structure, there are several capability requirements in the ENERGY STAR SHEMS criteria that can help customers to respond to time-based rates. The most direct option is to allow device control based on time-of-use energy prices provided by the customer or via integration with a utility program. Additionally, the scheduling feature of an ENERGY STAR-certified SHEMS could be used by the customer to prioritize energy consumption based on rate schedules and other user-defined considerations. In addition, the interface enabling user control of devices from outside the home may facilitate customer participation in periodic peak-time reward events.

## **How does EPA anticipate changing the specification in the future?**

EPA anticipates using data gathered from service providers to develop a savings metric that can be used as a basis for assessing the energy saving performance of SHEMS. With robust field data, EPA can envision a future specification with fewer prescriptive requirements that relies on an energy savings metric to identify top performing SHEMS. In addition, data on market evolution may indicate opportunities for more comprehensive grid services and/or enhanced interoperability requirements.