ENERGY STAR Smart Home Energy Management Systems (SHEMS): Draft 2 Stakeholder Meeting

June 24, 2019

Outline

- Welcome
- Development process
- Specification changes
- Field Method changes
- Questions
- Partner Commitments
- Package Description Information for ENERGY STAR Product Finder
- Questions
- Adjourn

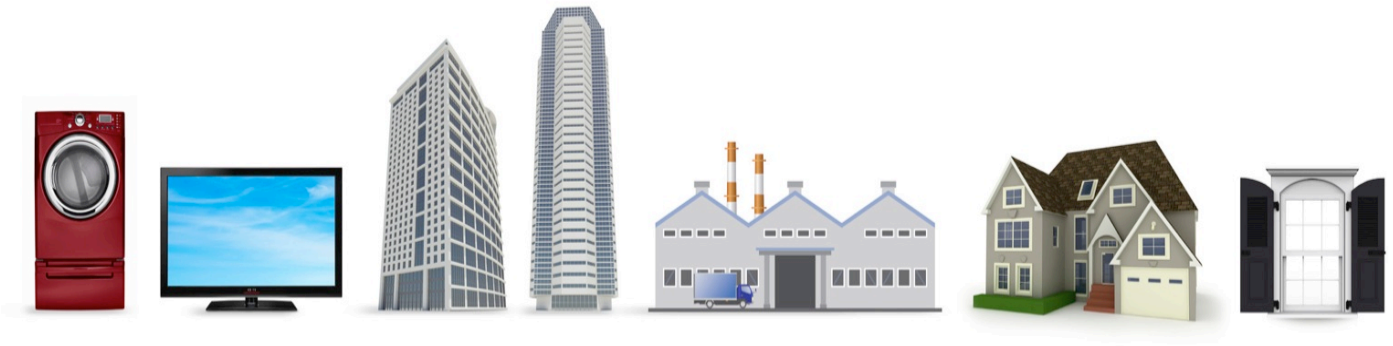
Introducing ourselves

- Co-leads
  - **Taylor Jantz-Sell** – ENERGY STAR lighting lead for 10+ years. Coordinating ENERGY STAR products smart home strategy and new initiatives like SHEMS.
  - **Abigail Daken** – ENERGY STAR technical lead for connected product criteria, smart thermostats, and many other product categories. Focus areas include HVAC, water heating and connected.

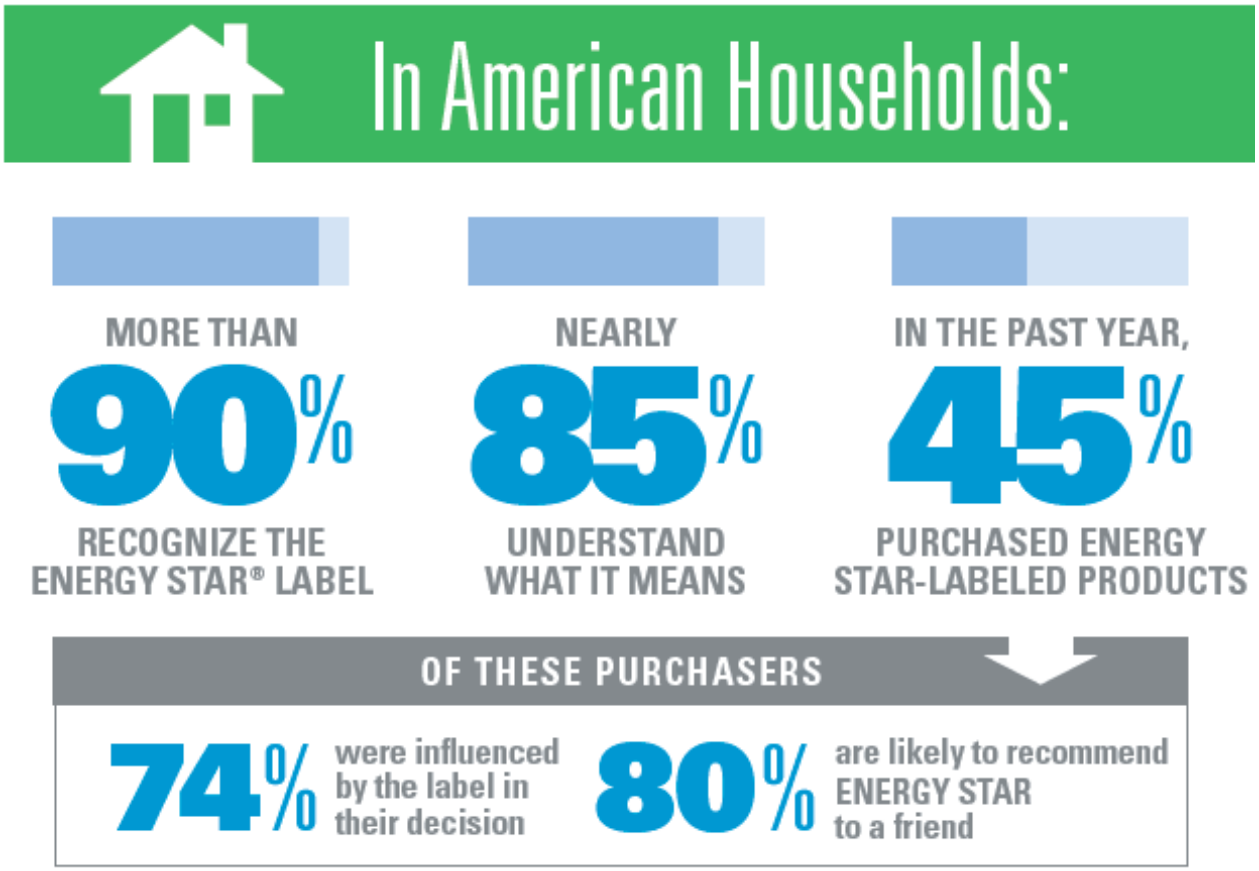
The ENERGY STAR Brand

EPA's ENERGY STAR identifies the most energy-efficient products, buildings, plants, and new homes – all based on the latest government-backed standards.

Today, every ENERGY STAR label is verified by a rigorous third-party certification process.

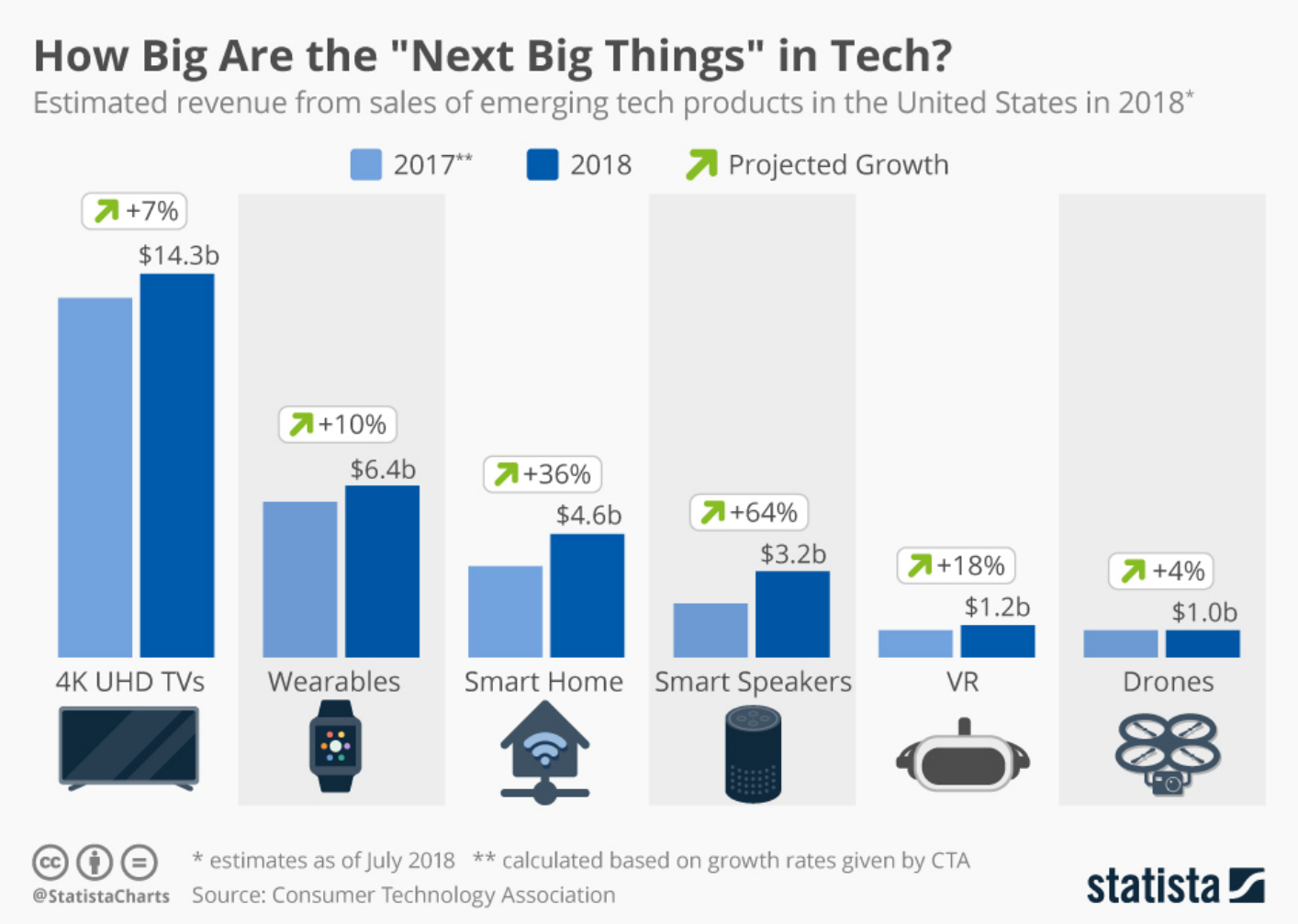


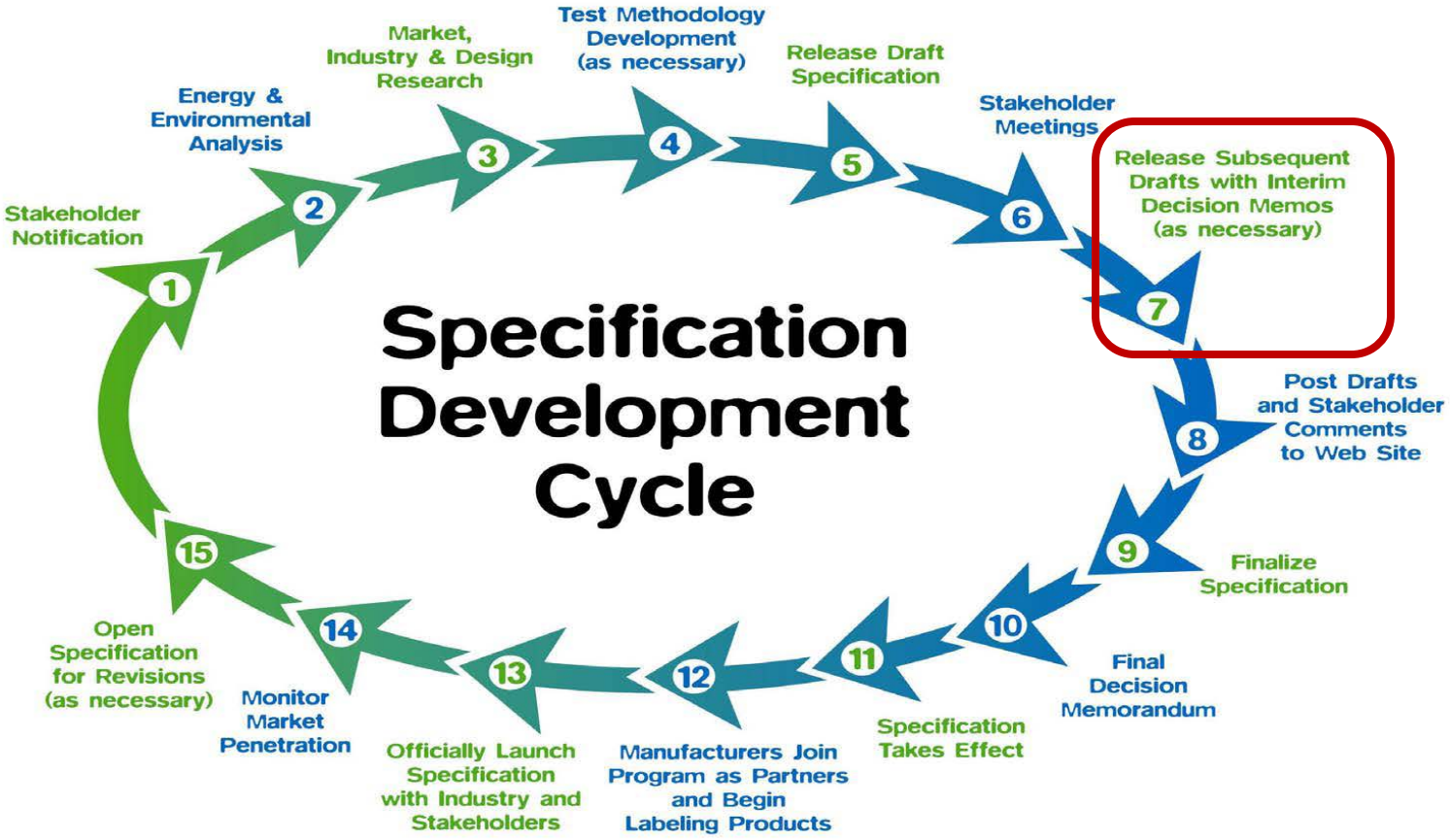
Brand Preference and Loyalty



U.S. EPA 2017

Estimated growth of smart home tech




Specification Development Cycle
1 Stakeholder Notification
2 Energy & Environmental Analysis
3 Market, Industry & Design Research
4 Test Methodology Development (as necessary)
5 Release Draft Specification
6 Stakeholder Meetings
7 Release Subsequent Drafts with Interim Decision Memos (as necessary)
8 Post Drafts and Stakeholder Comments to Web Site
9 Finalize Specification
10 Final Decision Memorandum
11 Specification Takes Effect
12 Manufacturers Join Program as Partners and Begin Labeling Products
13 Officially Launch Specification with Industry and Stakeholders
14 Monitor Market Penetration
15 Open Specification for Revisions (as necessary)

Drivers for Draft 2

- Requests to clarify expectations for branding, marketing, and sale of SHEMS packages (**Partner Commitments**)
- Suggestions for revisions to **Definitions** and **Eligibility Criteria**
- Recommendation to add items to **Future Criteria Revisions** to signal our intent for future modifications
- Comments regarding data for public use and metric development:
  - Made two important but previously optional data fields mandatory and added two new data fields to the **Method to Determine Field Performance**
  - **SHEMS Package Information** which will be collected at the time of certification and posted to the list of certified products

Specification Overview

1. Introduction
2. Definitions
3. Scope
4. Eligibility Requirements
5. Test Requirements
6. Effective Date
7. Future Revisions

1.Introduction- some content moved to partner commitments

1 INTRODUCTION

The intent for this specification is to recognize smart home system packages designed to actively recognize and act on opportunities to save energy and help end users manage their energy in a way that saves them money and makes their lives easier. This includes but is not limited to 1) providing reliable occupancy detection linked to savings strategies that shut off or power down equipment when no one is home, 2) limiting standby power of connected devices, and 3) providing feedback to users about the energy impact of their settings.

The ENERGY STAR SHEMS specification is tailored to current market circumstances in terms of the smart home devices it addresses. As the market and technology continue to evolve, it is expected this program will grow to provide a national framework for complete home energy management services that work seamlessly with the grid. The intent is for the ENERGY STAR certified SHEMS package to be customizable and scalable to function with multiple device options, including devices beyond the minimum requirements in this specification.

The middle paragraph in Draft 1 addressing how partners would not offer competing SHEMS packages was folded into the partner commitments.

2. Definitions – Clarified SHEMS Package

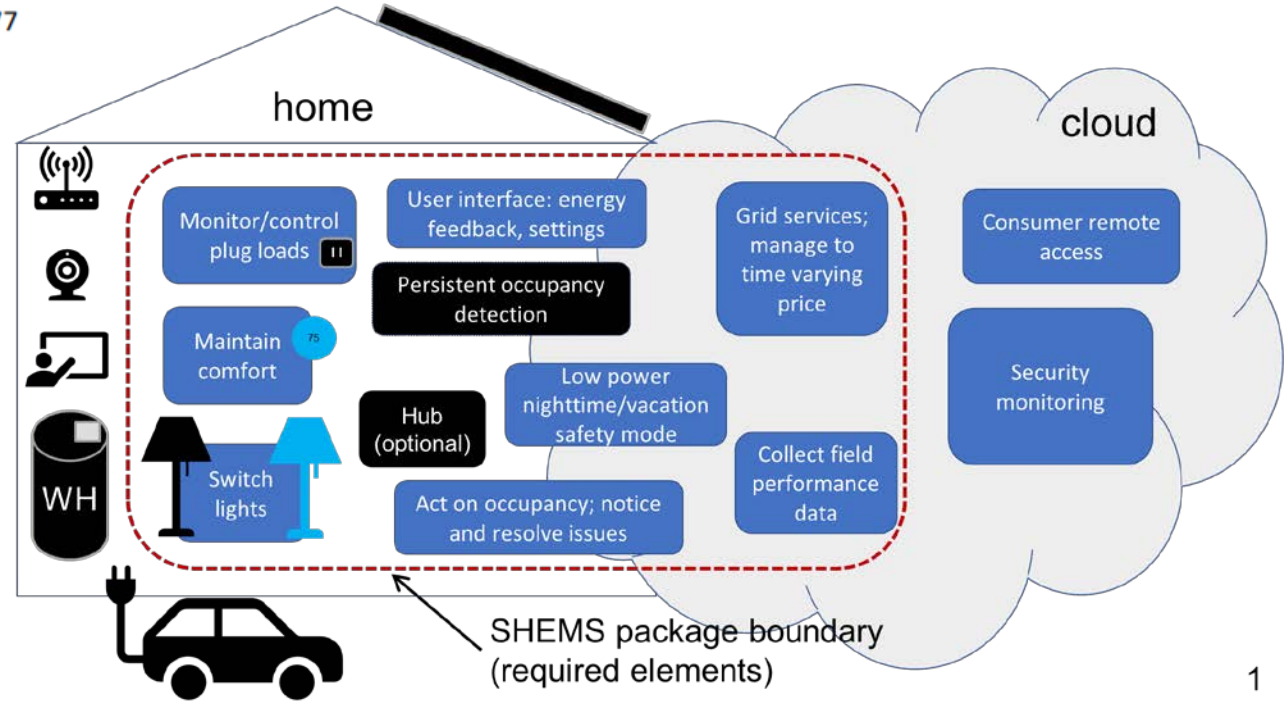
- **Smart Home Energy Management System (SHEMS) Package:** the combination of a service and devices that are designed to work together to deliver occupancy-based optimization of energy use and that meets all of the device and service requirements outlined in the Eligibility Criteria. A SHEMS package:
  - Must be marketed as a complete offering but individual devices may be sold separately.
  - May include devices with energy saving or grid services potential beyond what is required for ENERGY STAR certification (particularly those identified below as Optional Encouraged Devices).
  - May be a subset of a larger home automation platform that provides other services.

3. Scope

No changes to scope; improved diagram

Figure 2: Illustration of SHEMS Package

Minimum device and function requirements are shown inside the red dotted boundary, including at least one ENERGY STAR certified thermostat and two lighting devices, one of which shall be ENERGY STAR certified. Refer to section 4 for detailed information. Persistent occupancy sensing may be a stand-alone additional device or integrated into another required device.



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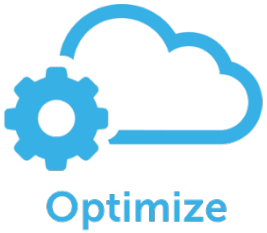
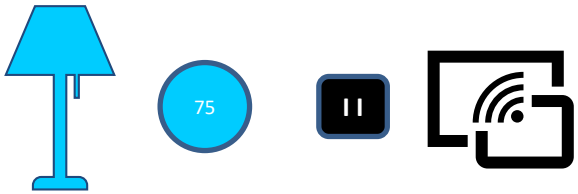
4. Eligibility Criteria: Five Elements

4.1 Required Base Services

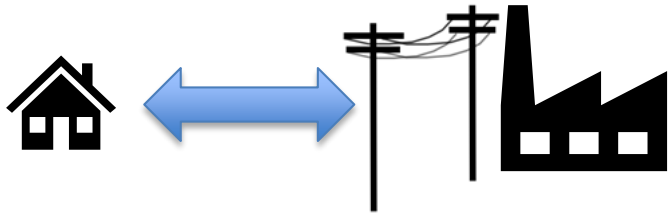


4.2 Additional Platform Capabilities

4.3 Required Devices



4.4 Grid Services



4.5 Field Data Reporting

4.1 Required Base Services – Minor Clarifications

Occupancy-based control:

- All three energy-saving device control triggers (hard, soft, and suggested) shall be enabled by default but may be user-configurable
- ENERGY STAR SHEMS shall send commands to devices connected to the SHEMS package, including but not limited to:
  - Reduce lighting load levels in nighttime/vacation safety mode
  - Turn off any smart strips or plugs
  - Turn off or change modes of other connected devices

4.1 Required Base Services – Minor Clarifications

Energy Data Reporting: ENERGY STAR SHEMS shall allow the end user access to energy consumption or average power data* for all connected devices across minimum time intervals no greater than one day.

*may be estimated based on device settings.

Draft 2 Version 1.0 Specification: Pages 6-7

4.2 Additional Required Platform Capabilities

Ability to connect to and optimize a water heater or water heater controller:

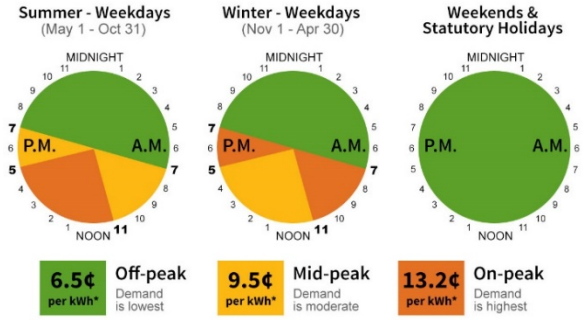
- Feedback received from service providers and utility and energy efficiency partners.
- Water heater control would increase the likelihood of utility incentive programs.
- The new CTA-2045 standard provides a scalable process for water heater integration.
- EPA has given service providers the option to meet this requirement through compatibility with a water heater controller to provide flexibility in offering this high-priority capability.
- EPA maintained this as required in Draft 2.

4.2 Additional Required Platform Capabilities

Time of Use Pricing:

- Service providers requested that this capability be optional.
- According to the U.S. Energy Information Administration, 4.7 million residential utility customers are currently enrolled in TOU rates, and a significant percentage of the CA IOUs' 22.5 million customers will enroll by default by 2020.
- EPA expects TOU-enrolled households will constitute a significant number of SHEMS early adopters and has maintained the requirement to support TOU optimization accordingly.
- EPA has clarified that TOU rates may be entered through user input; utility integration is not required.
- Services, APIs and products available in the market to assist

Draft 2 Version 1.0 Specification: Page 7



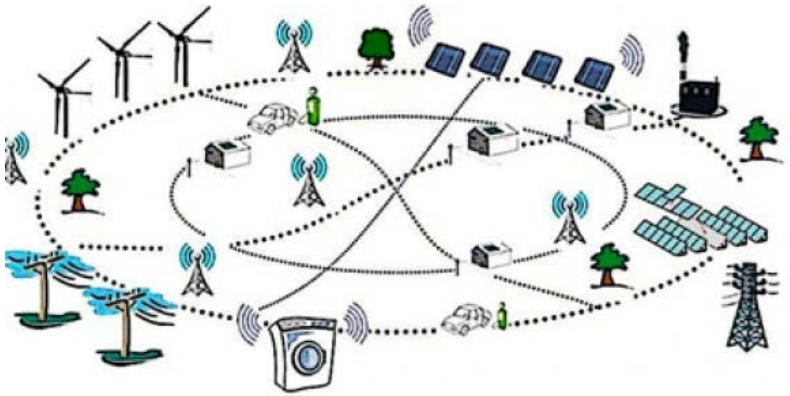
4.3 Connected Device Requirements: Miscellaneous Edits

- Slight revisions to Table 1 to clarify test methods
- Optional Encouraged Devices:
  - Ranked by priority
  - Added "Other (as developed) ENERGY STAR certified products"
- Added for reference, list of current standby power requirements in applicable ENERGY STAR specifications

Device	Power Limit (Idle or standby as applicable)
Plug load device	1.0 watt
Smart lighting control	0.5 watt
SHEMS-specific Hub	Reported to EPA
Connected thermostat	3.0 watts
Lamp	0.5 watt
Luminaire	0.5 – 1.0 watt

4.4 Grid Service Criteria – Minor Revisions

- Specified capability to implement a demand response event to at least one device
- Specified user override duration 72 hours
- Listed specific information which will need to be reported during the certification process (4.4 C) Capabilities Reporting)
  - Which DR protocols are supported?
  - Is DR reliant on service provider's cloud?



Draft 2 Version 1.0 Specification: Page 11

5. Test Requirements (& Certification Elements)

- ✓ Package validation: "Assure that the application associated with the package delivers the required service capabilities with a representative package containing the required minimum devices"
- ✓ Standby/idle power tests
  - Devices for which there is no ENERGY STAR specification:
    - Configure connected functionality and confirm functionality
    - Standard IEC test method for standby power
  - Hub testing (if applicable):
    - Confirm compatibility with required devices and basic functionality
    - Measure network idle power
- ✓ Data Reporting Template with 6 months of field data

7. Future Criteria Revisions: Added New Items

- Possible integration with Home Performance eXtensible Markup Language (HPXML)
- Intent to monitor technology development and reduce standby power limits as appropriate
- Potential to standardize the frequency and accuracy of device-level energy data reporting

Draft 2 Version 1.0 Specification: Pages 14-15

Draft 2 Specification: Questions

SHEMS Method to Demonstrate Field Performance

- ✓ Defines the population for analysis, data reporting periods, and statistical methods for reporting the required data elements.
- ✓ Identifies required and optional data elements.
- ✓ Shows SHEMS are delivering required devices & services
- ✓ Provides EPA data to judge program impact
- ✓ Aids in the development of a simple, comprehensive metric for savings

Reminder: Why Field Data?

- Unlike typical ENERGY STAR products, SHEMS save energy by affecting how people use *other* products
- Only data from real users shows effect of complex behavioral interactions with tech
- Use statistical data
  - Even out household-to-household variation
  - Reveal the effectiveness of the SHEMS

Method to Determine Field Performance: Minor Changes

- Population for Analysis:
  - ≥ 50 installations meeting SHEMS package requirements
  - ≥ 30 installations must have data for at least 90% of the days in the 6-month reporting period
  - Population may be a pre-market test group for the purposes of initial certification

Data Elements are organized into three sections

- **Program Performance (Required)**
  - Minimal set of data elements needed to verify that installations comply with the basic SHEMS service and device requirements.
- **Savings Metric Development (Optional)**
  - Additional elements which EPA believes will allow for the development of a metric and would greatly appreciate receiving.
- **SHEMS Market Evolution (Optional)**
  - Additional elements that indicate the level of integration of SHEMS with the grid and other smart home devices, which are of keen interest to many SHEMS stakeholders.

Data Elements: Minor Changes

- **Program Performance (Required)**
  - Previously optional:
    - Installations in each of 5 climate zones
    - Average weekly away hours per installation for each month in the reporting period
  - New elements:
    - Installations with insufficient data
    - Average lighting load in vacation/night time safety mode
- **Savings Metric Development (Optional): No Changes**
- **SHEMS Market Evolution (Optional):**
  - Previously required: Whole installation standby power

Method to Determine Field Performance: Questions

Partner Commitments

- Standard terms for ENERGY STAR partnership that address proper use of the ENERGY STAR mark and certain additional reporting requirements
- Mostly consistent across different ENERGY STAR product specifications; slight variations for product-specific requirements

SHEMS Partner Commitments: Key Points

- ENERGY STAR partner must be a SHEMS service provider
- Marketing requirements:
  - Identify that the minimum required devices are necessary to providing a SHEMS package (devices may be sold separately from the service)
  - All package offerings marketed as energy management packages must meet the ENERGY STAR requirements
  - The SHEMS package must be marketed distinctly from other packages (e.g. security, entertainment)

SHEMS Partner Commitments: Key Points

Where to display the ENERGY STAR mark:

- ✓ In the service's user interface
- ✓ In the partner's literature and internet site

Where NOT to display the ENERGY STAR mark:

- ❑ Physically applied to packaging (unless all devices in the package are separately ENERGY STAR certified)
- ❑ Physically applied to any device unless the device is separately ENERGY STAR certified (e.g. connected thermostat, light bulb)

SHEMS Partner Commitments: Questions

Preview of SHEMS Package Information

- Information about certified products is made available to the public in the ENERGY STAR Product Finder
- Used by consumer to find products, and by utilities to identify products to incent
- The draft list identifies information EPA believes will be important to consumers and utilities
- Feedback requested to develop complete picklists to ensure data quality

Package Information: Communication Standards, Protocols, and Enabling Hardware

- What devices are needed for connectivity sufficient to enable ENERGY STAR services?
- How does the system connect outside the home?
- What standards does the system meet for:
  - Consumer privacy?*
  - Cyber security?*
  - Communication among devices within the home?

*Suggestions for relevant standards?

Package Information: Required and Encouraged Devices

- Lists of ENERGY STAR certified thermostat and lighting products
- Brand names and model numbers of plug load control/measurement, lighting load control, and compatible connected water heater control devices
- Type of plug load control/measurement offering*
- Type of lighting load control device*
- Compatibility with encouraged device types

*Suggestions for relevant types?

Package Information: User & Grid Services

User Services

- Does the service provide a default schedule?
- How can users interact with the system to control connected devices?*

Grid Services

- How does the system integrate TOU pricing?
- Demand response capabilities summary
- How does DR capability depend on service/device combinations?

*Suggestions for relevant methods?

Package Information: Questions

Next Steps*

The specification, method, and data template will be developed together

- Draft 2 comment period closes July 11
- Comments on Package Information due July 20
- Final Draft – July/August
- Final – August/September
- Smarthomesystems@energystar.gov
- www.energystar.gov/SHEMS

*Future dates are projections and subject to change

Final Questions?