Working Toward Smart Efficiency

An Overview of the ENERGY STAR SHEMS Specification for Energy Efficiency Program Sponsors

November 13, 2019

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Welcome! We will begin shortly

- **Login or Audio Troubles**
  - Please type questions in the chat window for help
  - If you cannot hear the audio through the computer, you can listen in by calling:
    - US/Canada Toll Number: +1-415-655-0002
    - Access code: 293 153 002

- **Questions**
  - There will be a Q&A session at the end of the presentation
  - Submit questions to the organizer and panelists via chat to “All Panelists”

- **Presentation Slides & Recording**
  - Presentation slides will be sent to all participants

- **Notes**
  - To improve audio quality, all attendees are muted upon entry

Introductions

Abigail Daken

EPA
ENERGY STAR HVAC Product Manager

- ENERGY STAR technical lead for connected product criteria, smart thermostats, and many other product categories. Focus areas include HVAC, water heating and connected.
- SHEMS Co-lead with Taylor Jantz-Sell, who is currently out on maternity leave, returning January 2020.

Agenda

- Program Overview
  - Why ENERGY STAR?
  - ENERGY STAR SHEMS Definitions, Requirements, Test Method
  - Who is the ENERGY STAR Partner?
  - How might SHEMS be sold and installed?
  - How can EEPS participate?
- Questions and Discussion

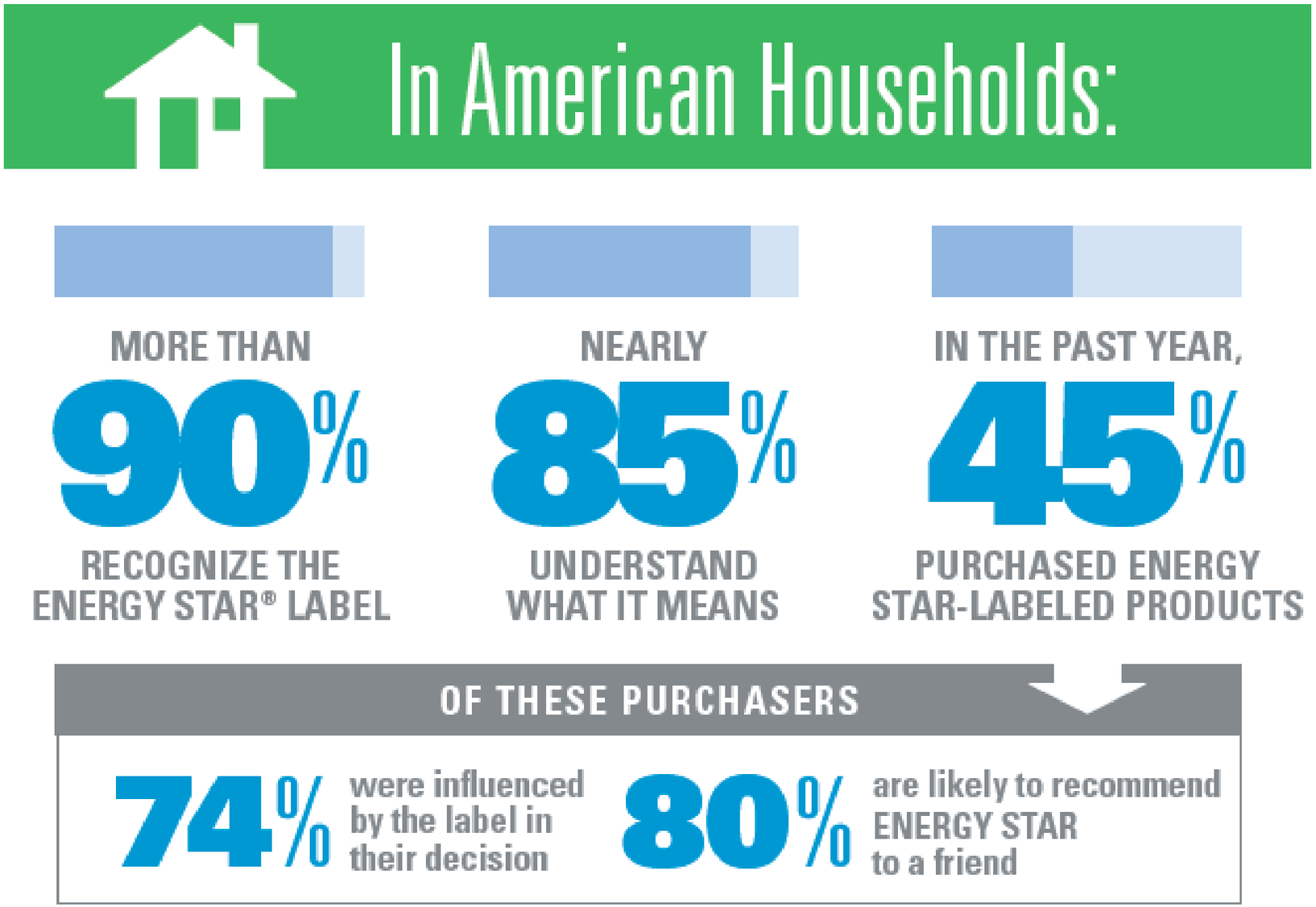
Our goal today is to answer questions – please stop us and ask!

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

Diverse drivers & energy implications

What connectivity provides	Driver of market adoption	Energy Implication and/or Opportunity	Examples
Large loads, load flexibility doesn't impact consumer	Grid services	Enable cleaner grid	Pool pumps, water heaters
Large loads, load flexibility has consumer impact	Grid services	Enable cleaner grid; protect consumer interest	EVSE, HVAC
Convenience and quality of maintenance	Blended: consumer, brand owner, grid	Better maintenance saves energy	White goods, HVAC
Safety and security	Consumer interest	Added load; occupancy info?	Door locks, window sensors
Additional functionality	Consumer interest	Added load	Color changing lights, VADAs

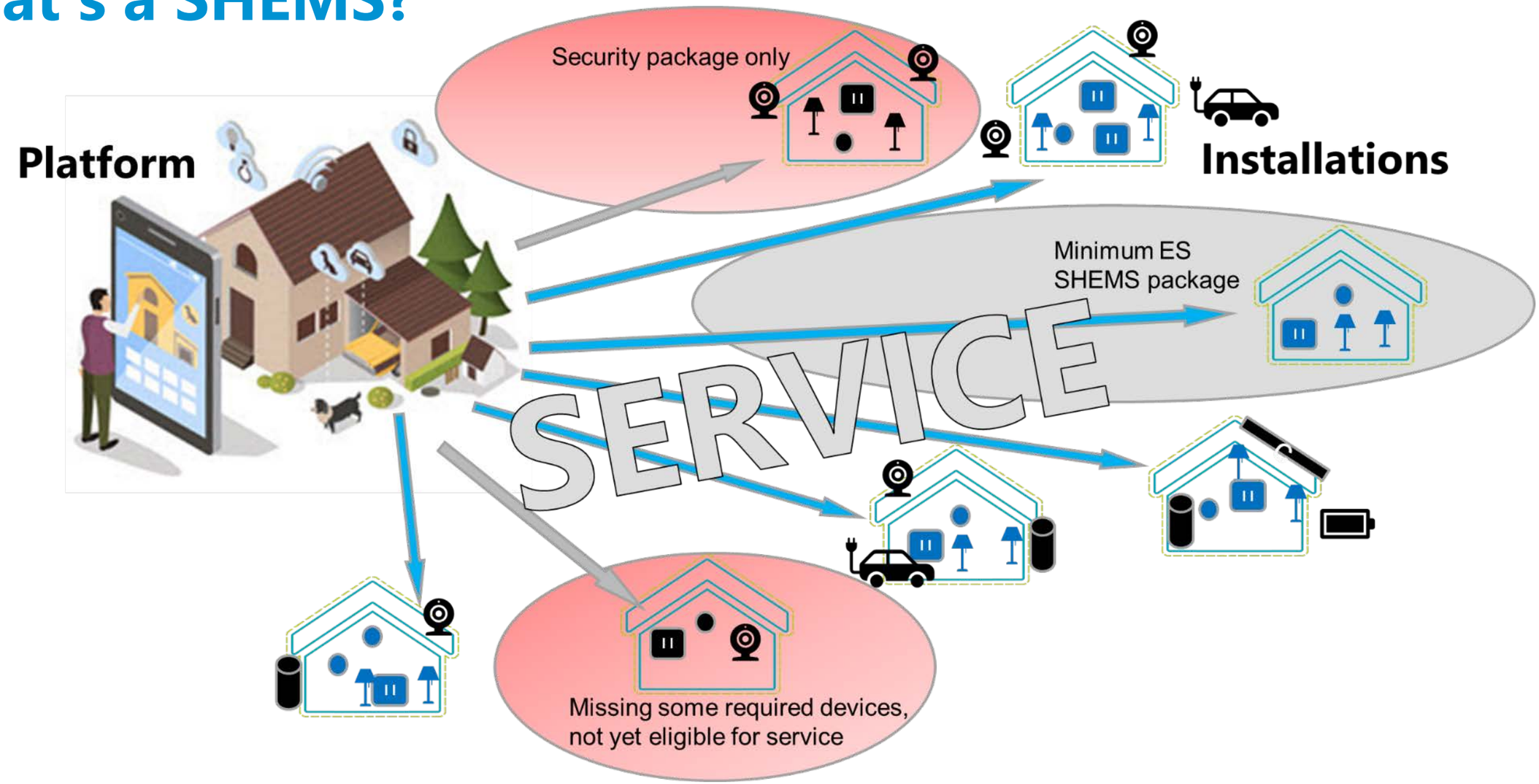
Consumers want connected for…

- **Control**: immediate and perceptible impact on consumer experience (heating/cooling systems).
- **Convenience**: potential to avoid inconvenience or large cost (wireless switches, predictive appliance failure).
- **Safety**: makes people feel safer (connected cameras, door locks).
- **Fun**: additional functionality which is fun (smart speakers, color changing bulbs)

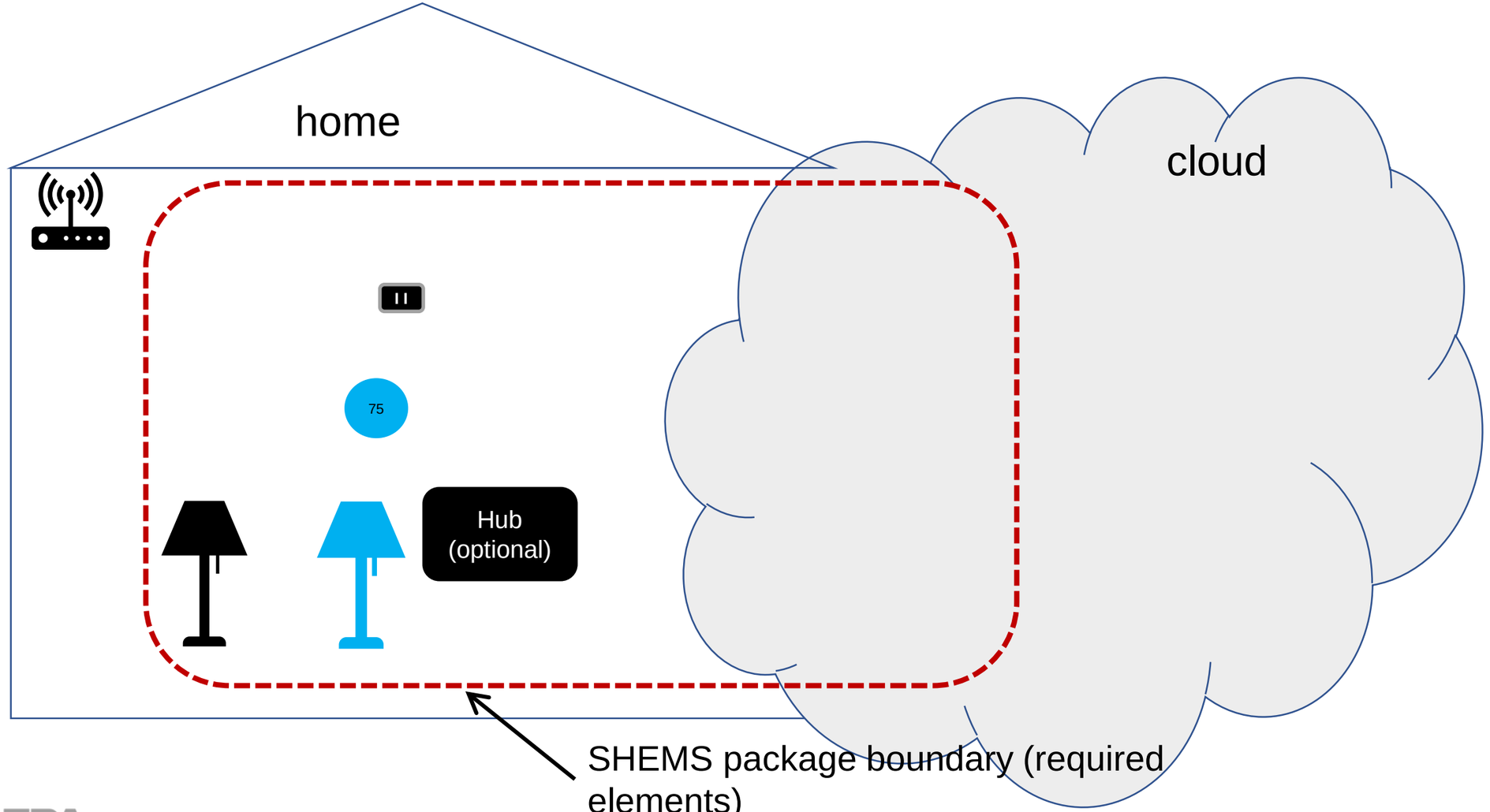
Why ENERGY STAR?

- **Consumers and utilities are interested in the smart home**, as shown with smart thermostat adoption
- **ENERGY STAR is a known and trusted label**, backed by impartial, publicly available specifications and test methods, and a powerful branding tool
- Part of the ENERGY STAR brand promise is to **make difficult decisions about energy savings simple**, as with automated SHEMS energy savings
- Offering a **uniform national platform** allows for smoother, more coordinated, deployment of incentive programs
- ENERGY STAR SHEMS can be a win for the companies that offer them, for the consumers that want them, and for the environment

What's a SHEMS?



A SHEMS is a Package of Devices and Services



Hardware

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Occupancy Info

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Automated Services

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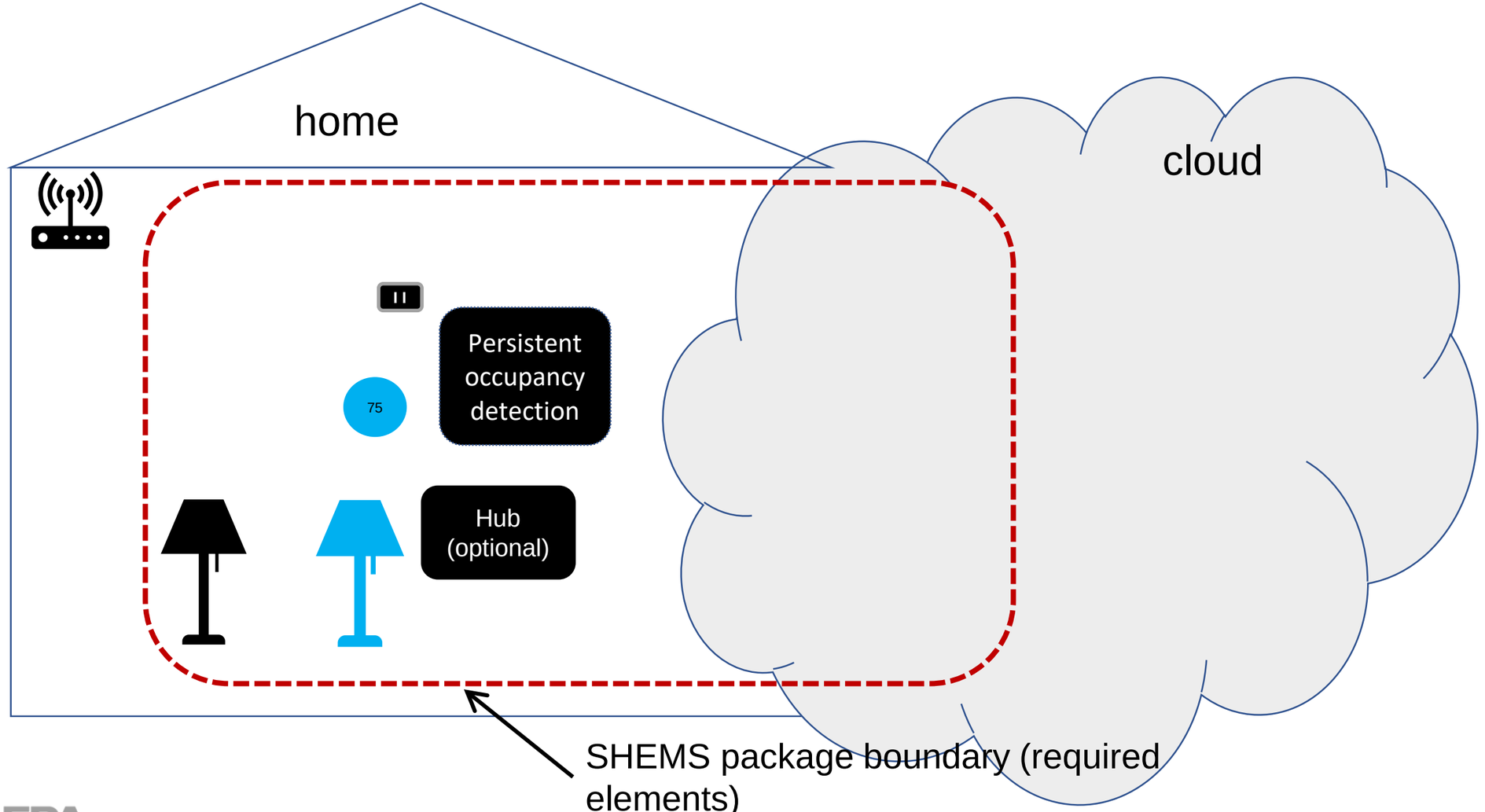
Energy Savings

A SHEMS is a Package of Devices and Services



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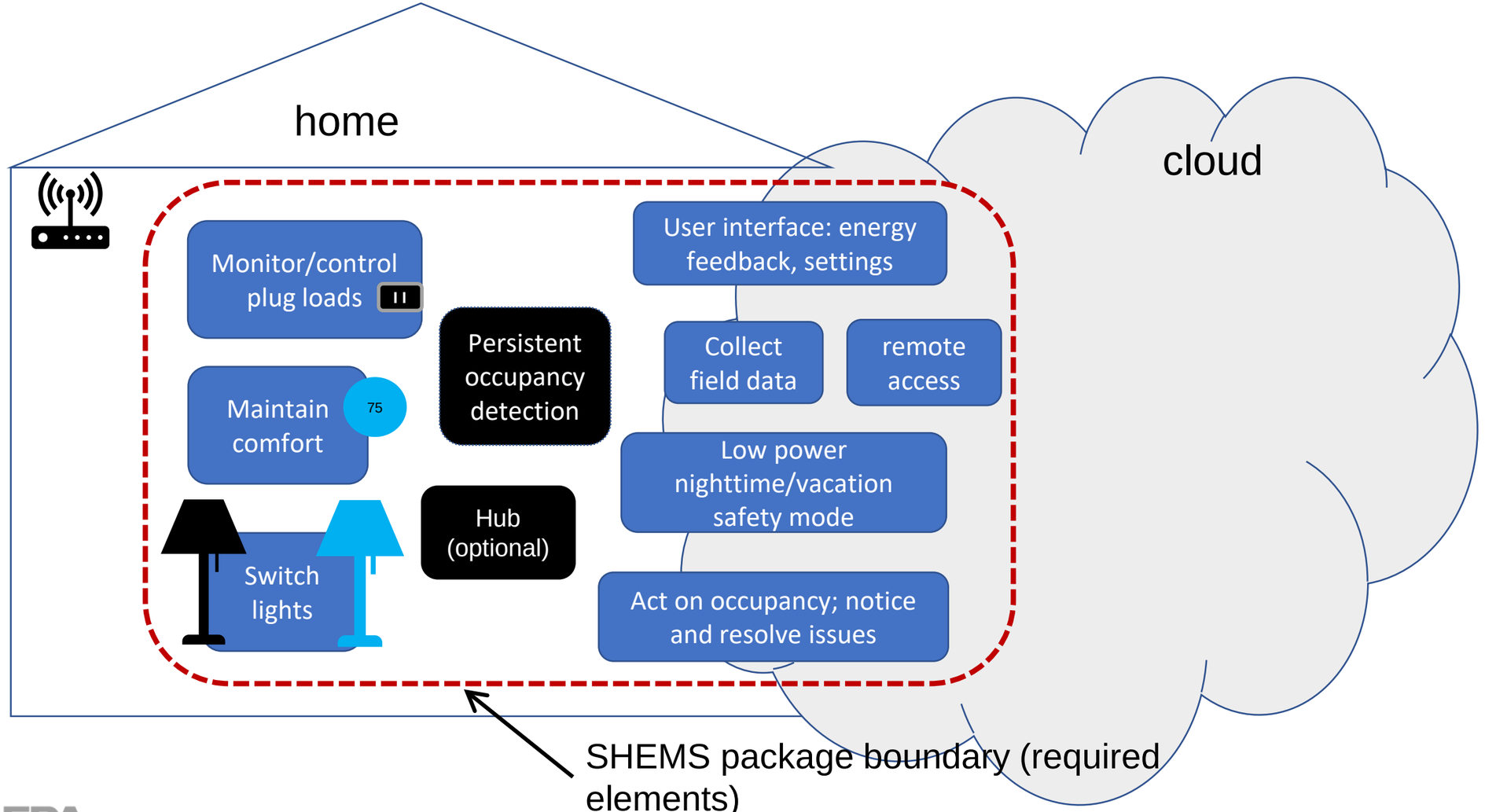

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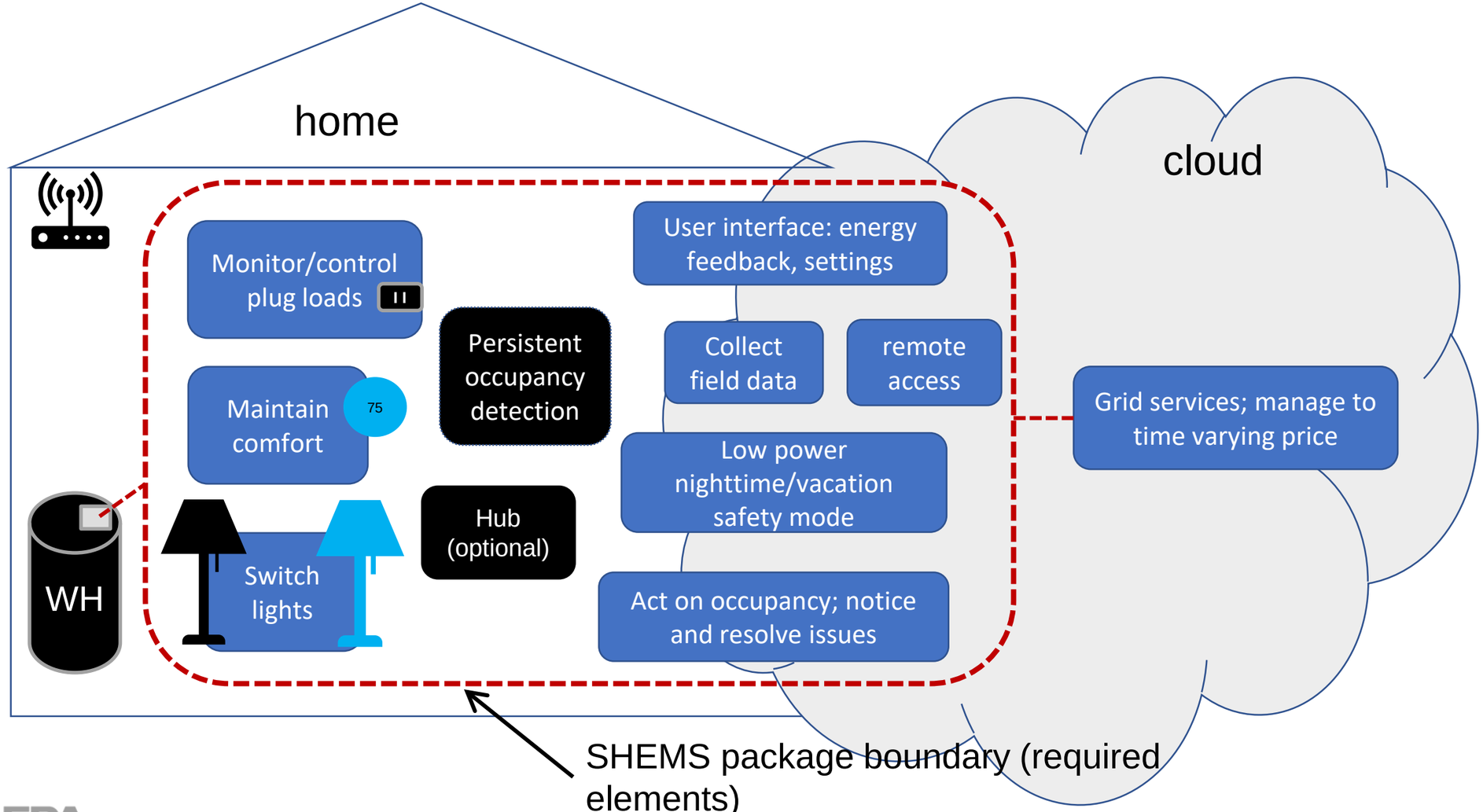

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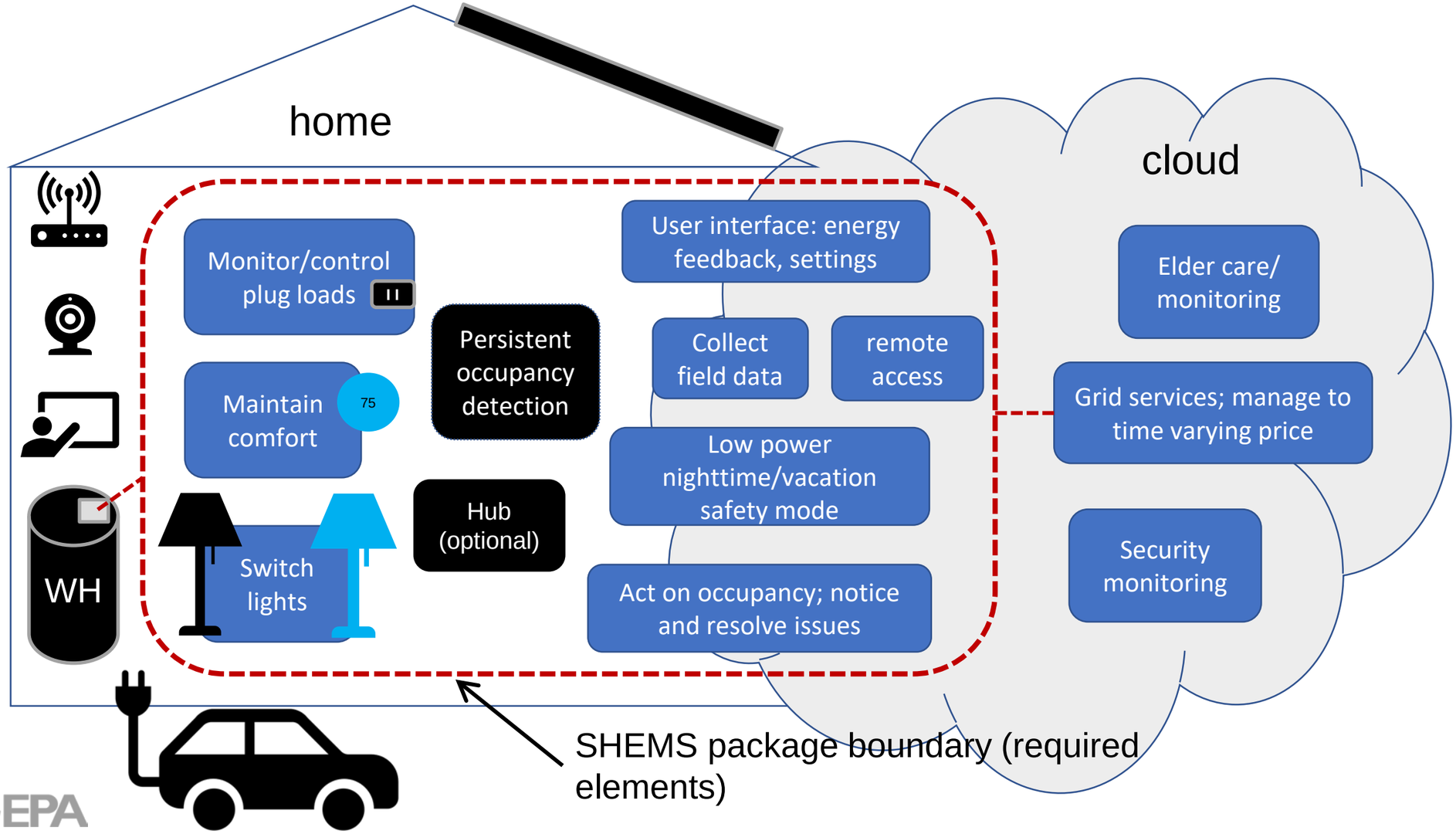

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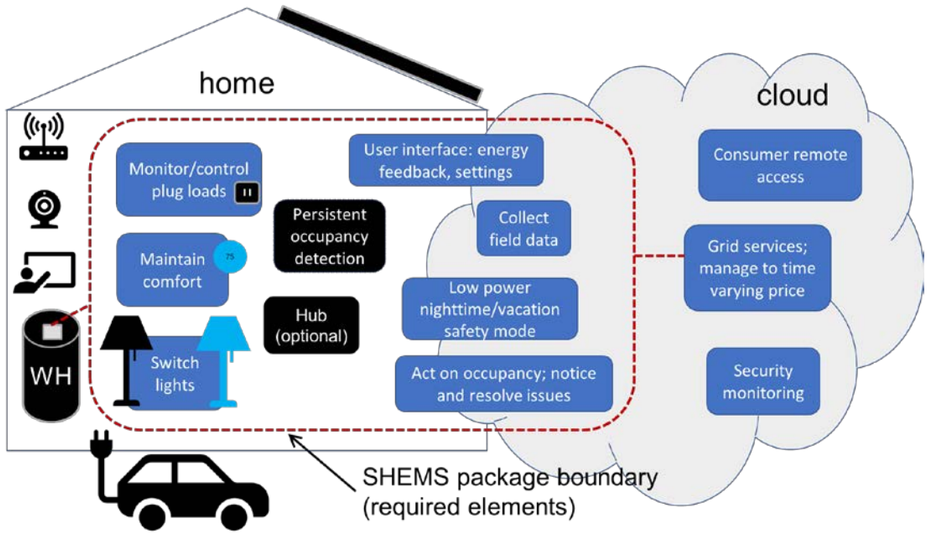

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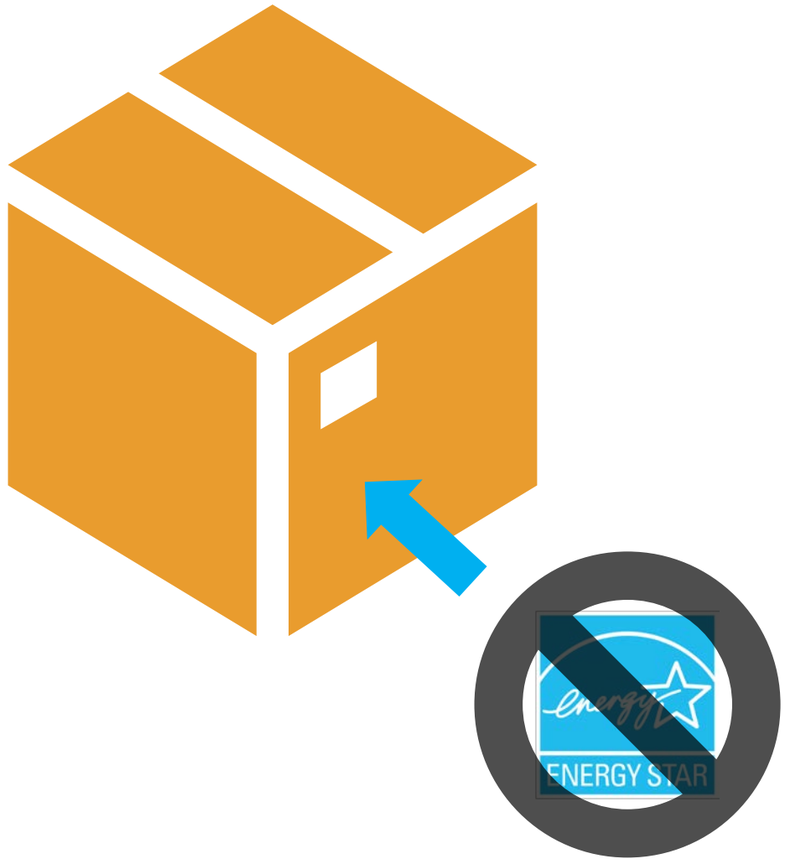

SHEMS Package

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Device Bundle

Services

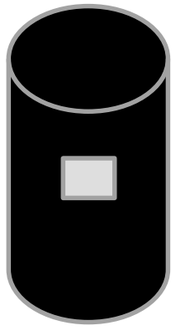
ENERGY STAR Certified Product

What is required of an ENERGY STAR SHEMS?

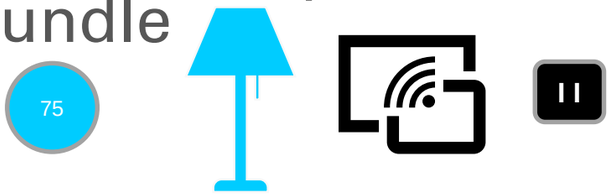
4.1 Required Base Services

Optimize

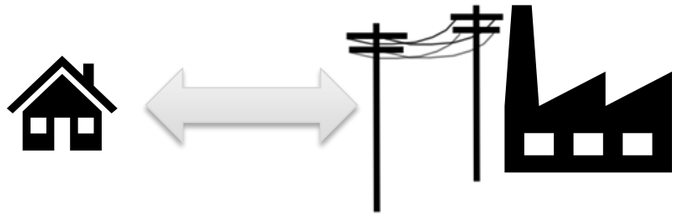
4.2 Additional Platform Capabilities



4.3 Minimum Compatible Device Bundle



4.4 Grid Services



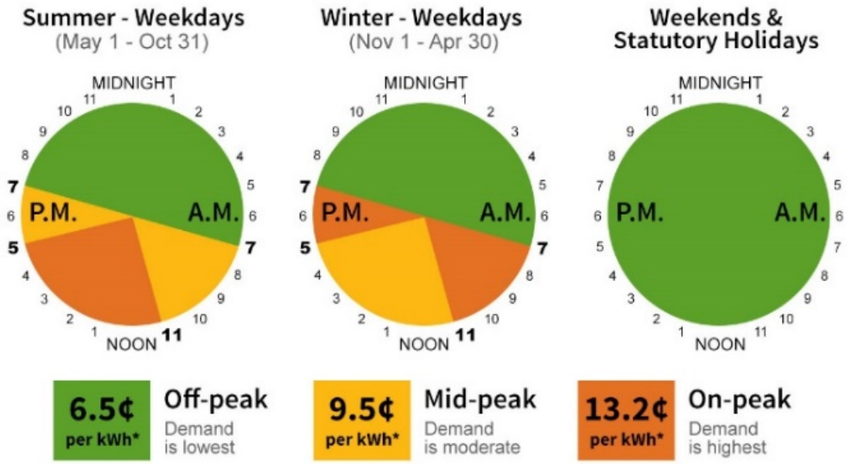
4.5 Field Data Reporting

4.1 Required Base Services

- Occupancy detection
- Occupancy-based optimization
  - Implicit, explicit and suggested triggers
- Energy information for users
- Remote user access
- User customization and notification for system failures
- Vacation or nighttime safety mode
- Device recognition

4.2 Additional Required Platform Capabilities

- Ability to connect to a smart WH or WH controller
  - Connection shall enable occupancy-based control using occupancy information from the SHEMS
  - Connection cannot require the use of a third-party integration service (such as IFTTT)
- Ability to optimize system for time of use electricity prices



4.3 Minimum Compatible Device Bundle

Device	Examples	Capabilities/Requirements
Connected Thermostat (1)		• ENERGY STAR certified
Connected lighting (2)		• Report lighting energy/power • Automated based on occupancy detection • Vacation safety mode
Connected Plug Load Device		• Disaggregate whole-home energy usage to individual circuits OR measure and control a single plug/power strip • Energy data communicated to central service • Plugs/outlets only: automated based on occupancy detection
Hub (optional)		• May be necessary to provide connectivity to other devices

EPA is providing the images above as examples and does not intend to highlight any specific products

4.3 Standby for Required Devices

Device	Standby Power Limit	EPA Savings Estimates
Connected Thermostat (1)	3.0 watts	8% of heating and cooling bills
Connected lighting (2)	Lamp: 0.5 watts Luminaire: 0.5 to 1.5 watts Smart switch: 0.5 watts	Not differentiated from non-connected lighting
Connected Plug Load Device	1.0 watts	-
Hub (optional)	No limit; must be reported	-

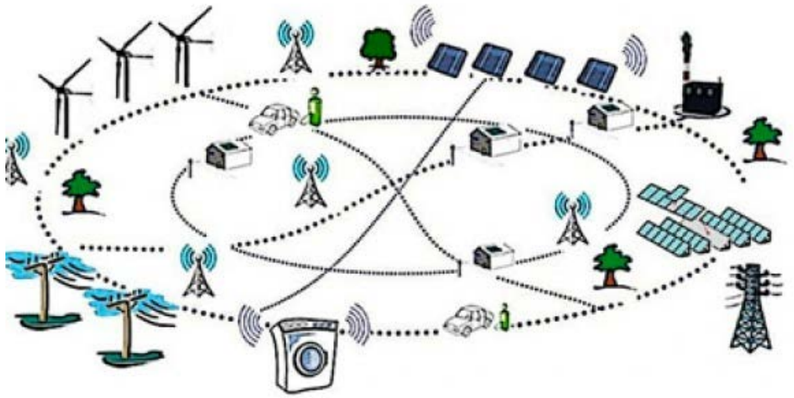
Compatible (primary connectivity): streamlined pairing process and access within user interface *(required devices, encouraged devices*)

Can connect (secondary connectivity): enables direct occupancy-based control without third-party service, but pairing process and user interface may be less streamlined *(water heater controller/connected water heater)*

Not sufficiently connected (tertiary connectivity): device requires enabling a third-party service (such as IFTTT or Works with Apple HomeKit)

4.4 Grid Service Criteria

- Capability to implement a demand response event to at least one device
- User override available; duration 72 hours or less
- DR capabilities reported, must include
  - Which DR protocols are supported
  - Is DR reliant on service provider's cloud



4.5 Field Data Reporting

- Unlike typical ENERGY STAR products, SHEMS save energy by affecting how people use *other* products
- Only statistical data from real users shows effect of complex behavioral interactions with tech, evens out variation
- Partner must submit data every 6 months (covering a 6-month period) according to the SHEMS Method to Demonstrate Field Performance using the provided Data Template
- A subset of the field data may be shown on the ENERGY STAR certified product list, but not all data will be made publicly available

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.

Program Performance (Required)

- For each device type in the basic package (thermostat, lighting, smart plug/power strip), number connected to the platform per installation
- Average scheduled, suggested, and implicitly generated away time per week per installation
- Total installations served by the platform
- Installations with insufficient data
- New installations registered during the reporting period
- Average on time per light fixture
- Installations in each of 5 climate zones
- Average weekly away hours for each month in the reporting period

Savings Metric Development (Optional)

- Percent of controllable lighting devices which are scheduled or automated per installation
- Average power during non-away time
- Average relative reduction in power during away time
- Whole installation standby power
- Installations with insight into whole-home energy use
- Number of thermostats per installation
- Length of time subscribed

SHEMS Market Evolution (Optional)

- Number of installations in each of 50 states
- Percent of installations enrolled in DR programs using SHEMS service
- Percent of DR events opted-out or overridden per installation
- Installations leveraging time of use pricing
- Installations including a connected water heater or water heater controller
- Installations including connected PV
- Installations including connected battery storage
- Installations including a connected EV charger

EPA's Vision

- EPA was motivated to release the SHEMS specification now largely because of where it could take us
- In our working groups over the Fall and Winter, discovered a common vision of the future SHEMS:

  Seamlessly optimize energy use, storage, and production in the home for multiple priorities of cost, environmental impact, and convenience, while providing excellent customer experience.
- EPA sees the Version 1 specification as a stepping stone to bring that future closer

Who can be a partner?

- The Service Provider is the ENERGY STAR Partner
  - ✓ Brands the interface with which the end user interacts
  - ✓ Brand name appears in consumer-facing marketing information
  - ✓ May or may not manage service algorithms
  - ✓ Responsible for ensuring that field data is submitted to EPA
    - –Data may be submitted by service OEM
  - ✓ May or may not brand any of the package devices
  - ✓ Must comply with the ENERGY STAR Partner Commitments
    - –Use the logo in accordance with our Brand Book

How might SHEMS be sold and installed?

Option 1: Professional install

- An installation professional manages device procurement, installation and connection
- May or may not be employed by the SHEMS service provider
- The home may or may not have some devices installed previously
- In new construction, device installation may occur before the home is occupied, SHEMS is complete when occupant enrolls in service

Installation contractor is generally **not** the ENERGY STAR Partner

How might SHEMS be sold and installed?

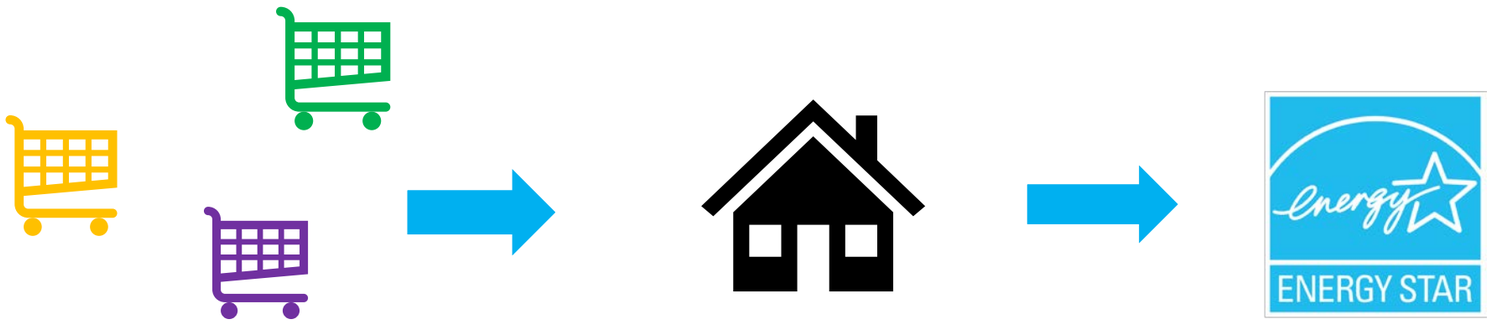
Option 2: Package self-install

- Package of devices is offered through a retailer, service provider's online store, or utility's online marketplace
- Homeowner follows instructions to install and connect devices themselves
- SHEMS is complete when homeowner enrolls for service

How might SHEMS be sold and installed?

Option 3: Piecewise self-install

- The homeowner purchases different devices at different times, not necessarily from a single marketplace
- The homeowner chooses a service provider (and may need to acquire additional equipment such as a hub) to establish the ENERGY STAR SHEMS service



How can energy efficiency program sponsors participate?

- Use ENERGY STAR for smart home pilot programs
  - Require the submission of the optional data
  - Both new and existing homes
  - Create relationships with service providers to generate additional value from energy data and other capabilities
  - Partner with local retailers and trade allies
- Become a service provider
- Include ENERGY STAR SHEMS in online marketplaces

EPA's tips for a successful pilot program

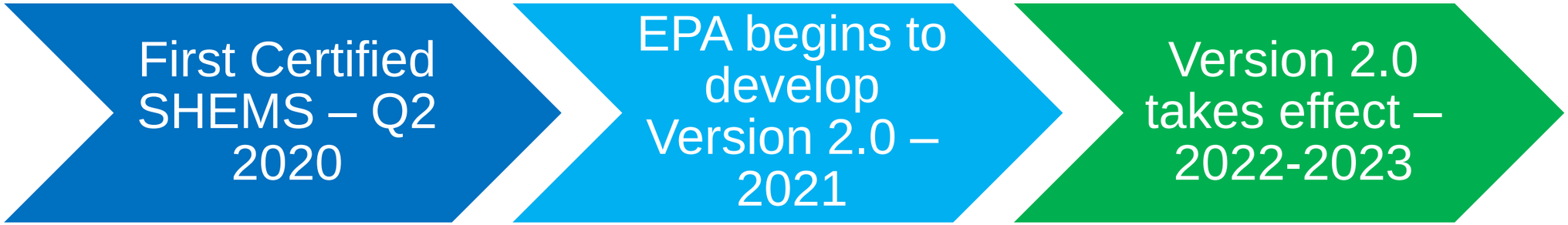
- The ENERGY STAR Qualified Product List (QPL) will contain additional information which may be relevant to pilot programs, such as:
  - a summary of demand response capabilities
  - communications protocols
  - additional compatible devices such as battery storage, solar inverters
- The additional platform capabilities (TOU optimization and water heater control) may provide additional value

EPA Matchmaking Service

- To facilitate getting the program off the ground, EPA will be hosting a matchmaking service to share contact information between mutually interested parties looking to establish business partnerships
  - Follow this link to participate in the service: https://forms.gle/jW7vnVz8QvWMNXoi6

(will be posted after the presentation is over)

Roadmap from here



- Changes in Version 2.0 will be shaped by development of a savings metric and by market progress.
- Timing is contingent on the availability of data (especially the optional sections of the Method to Determine Field Performance) on which to base a savings metric.

Potential Service Providers (active in specification development)

- Google Nest
- Resideo
- Alarm.com
- Zen Ecosystems
- Inspire

Contact Information

Specification Questions:

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Taylor concentrating on her other job, back in the office January 2020

Other webinars in this series

Join the upcoming webinars:

- **December 4, 2019, 1-2pm ET:** Making Sense of the ENERGY STAR SHEMS Program for Home Builders

View recordings of past webinars:

- **October 16, 2019:** Making Sense of the ENERGY STAR SHEMS Program for Service Providers and Device Manufacturers
- **October 30, 2019:** Making Sense of the ENERGY STAR SHEMS Program for Retailers

Questions and Discussion