



Smart Home Energy Management Systems (SHEMS) 1 of 2: Building Towards a Future Vision

ENERGY STAR® Products Partner Meeting

September 11, 2019

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Introductions



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Troy Huntley

Johnson Controls
National Sales Manager, Utilities



Agenda

- The ENERGY STAR Smart Home Energy Management Systems (SHEMS) Specification – What's in Version 1 and future vision

Abigail Daken - U.S. EPA ENERGY STAR

- Utility Interest in Smart Homes and Where ENERGY STAR SHEMS Fit In

Essie Snell – E Source

- The Future of Smart Home Technologies

Troy Huntley– Johnson Controls

- Questions and Discussion



SHEMS Version 1

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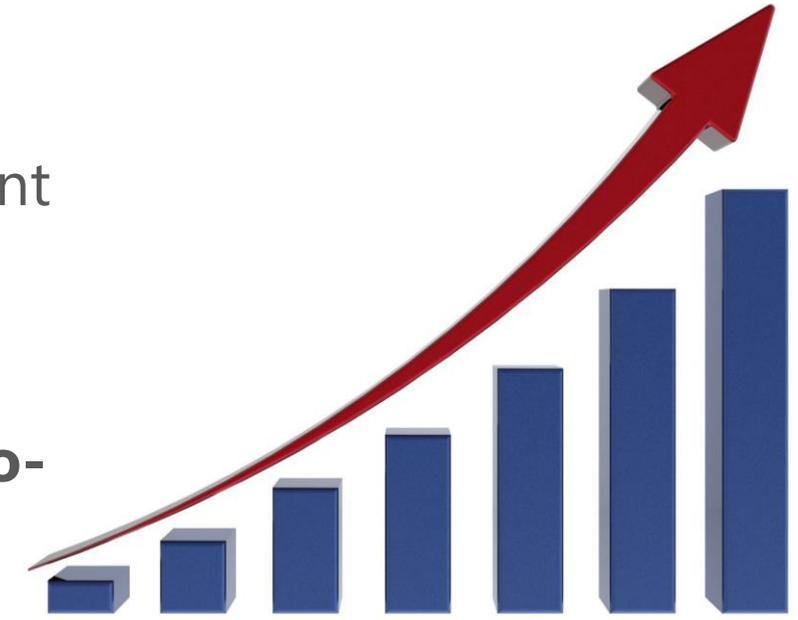
EPA's ENERGY STAR Smart Home Strategy: Bring Energy Savings Along for the Ride

As the market for "smart" products and systems grows, EPA aims to help drive and optimize energy savings through their use.

- Guide energy characteristics of smart products and systems
- Explore system models and ways to work with Service Providers
- Leverage the ENERGY STAR brand and position to advance energy efficient behaviors and practices into the connected and smart home market

Why Smart Home Energy Management Systems and Why Now?

- Device **shipments growing**: 22 million (2016) to 96 million (2026)
- **Service providers are easing barriers** for adoption, proving a central point for end users and a relationship that allows for ongoing evaluation and improvement.
- Connectivity among a system of products represents an opportunity for **co-optimized savings** and **enhanced customer experience**.
- **Occupancy information is low hanging fruit** for energy savings in these systems
- **Additional opportunities exist** for sharing information and energy management through connected and coordinated systems (e.g., demand response, load shifting, distributed energy resources balancing solar PV, battery storage, EV charging, etc.)



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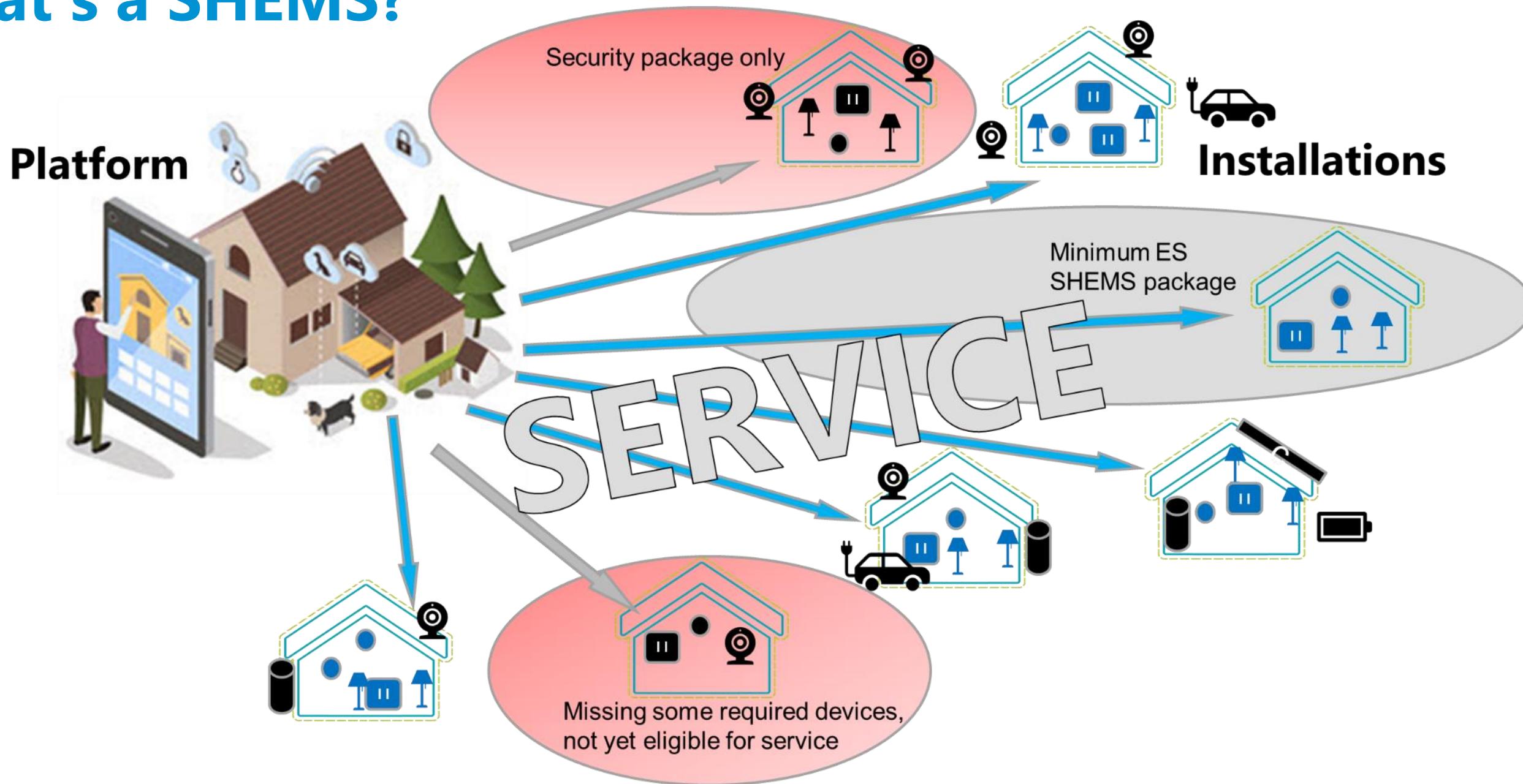


Why ENERGY STAR?

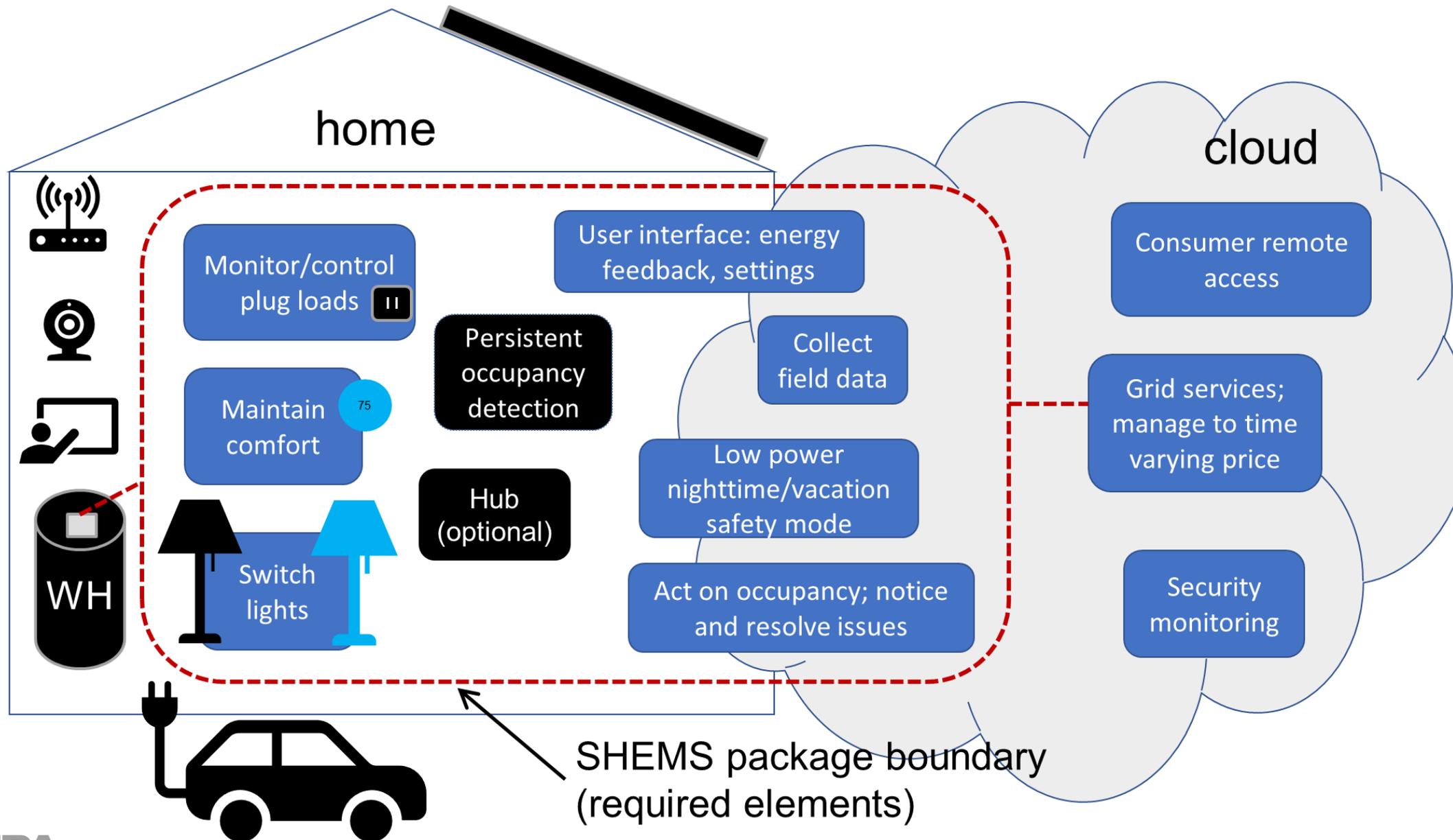


- Consumers and utilities are interested in this space, as shown with smart thermostat adoption
- ENERGY STAR is a known and trusted label, backed by impartial, publicly available specifications and test methods
- Part of the ENERGY STAR brand promise is to make difficult decisions about energy savings simple, as with automated SHERMS energy savings
- Offering a uniform national platform allows for smoother, more coordinated, deployment of incentive programs
- ENERGY STAR SHERMS 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



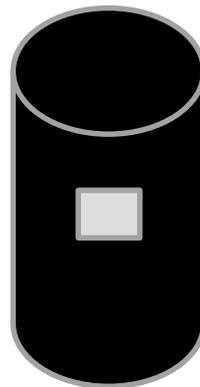
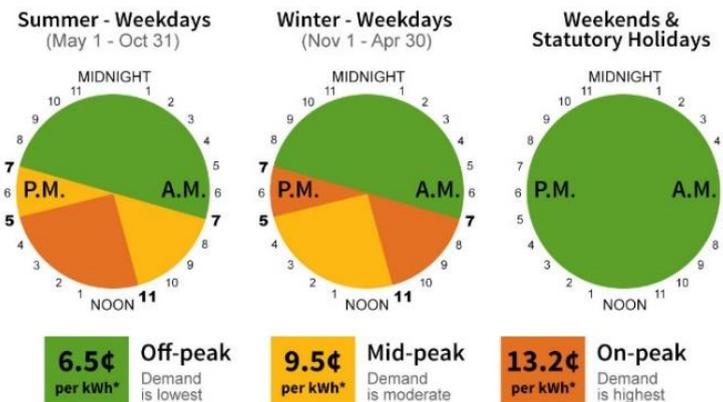
$$\begin{aligned} &\text{Hardware} \\ &+ \\ &\text{Occupancy Info} \\ &+ \\ &\text{Automated Services} \\ &= \\ &\text{Energy Savings} \end{aligned}$$

4. Eligibility Criteria: Five Elements

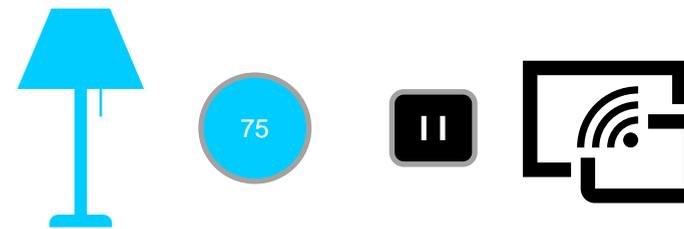
4.1 Required Base Services



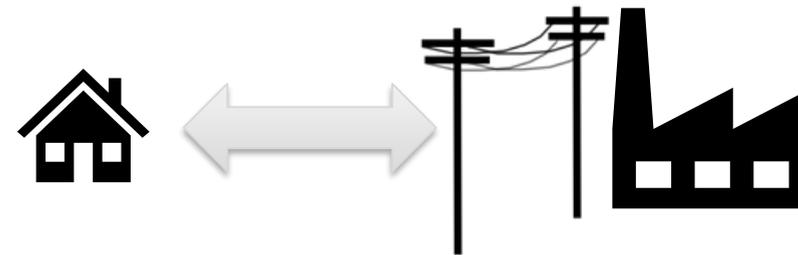
4.2 Additional Platform Capabilities



4.3 Required Devices



4.4 Grid Services



4.5 Field Data Reporting



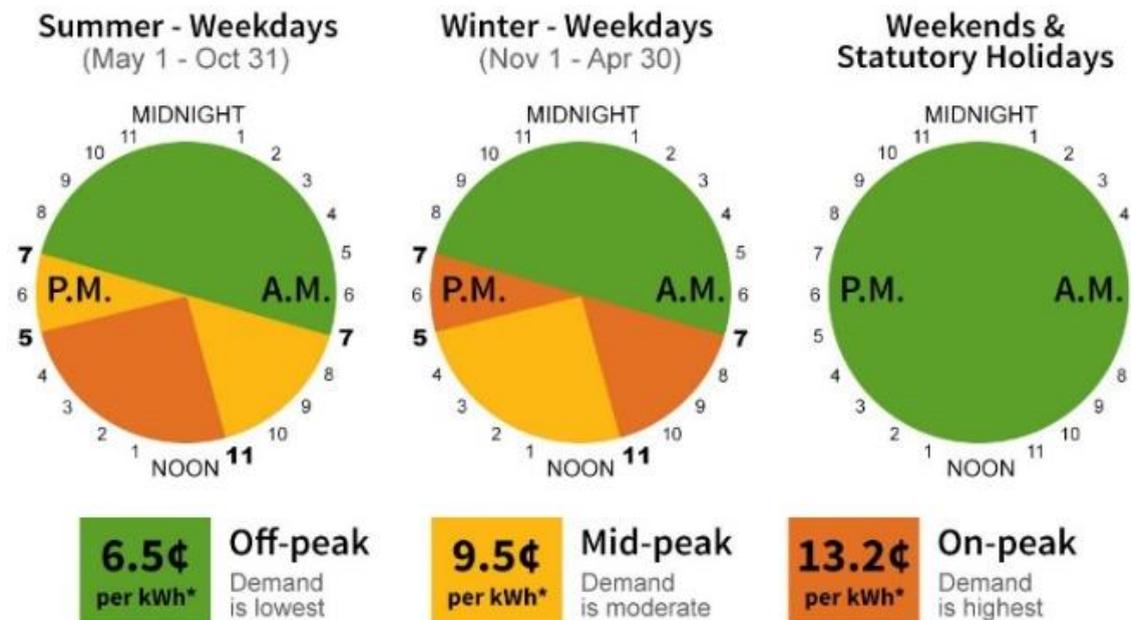
4.1 Required Base Services

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



4.2 Additional Required Platform Capabilities

- Ability to connect to a smart WH or WH controller
- Ability to optimize system for time of use electricity prices



4.3 Connected Device Requirements

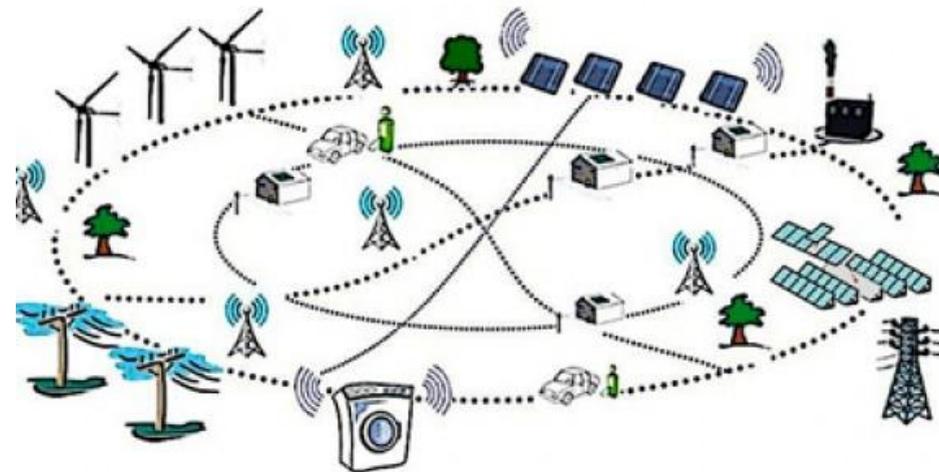
limits for standby/idle power even for devices without a separate ENERGY STAR specification

Thermostat (1)	Lighting and Lighting Control Devices (1 ENERGY STAR + 1 other)	Plug Load Device (1)
<p>Note: Products shown as examples; EPA not highlighting any brands</p>		

- List of encouraged devices: DERs, ENERGY STAR connected appliances, etc.

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 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
- Every 6 months, covering a 6 month period
- According to the SHEMS Method to Demonstrate Field Performance
- Using the provided Data Template



What does EPA certify?

- Is the Service Provider's Platform certified?
 - No – runs many other packages (e.g. security)
- Is an Individual Installation certified?
 - Not all homes that purchase the SHERMS package will set it up in accordance with the SHERMS specification
 - Installations that include all elements of the basic SHERMS are considered part of the population for field data analysis
- Are Individual Devices certified?
 - Only insofar as they have their own, separate ENERGY STAR specification, e.g. connected light bulbs and smart thermostats

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





Data Elements are organized into three sections

- **Program Performance (Required)**
 - Minimal set of data elements needed to verify that installations comply with the basic SHERMS 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.
- **SHERMS Market Evolution (Optional)**
 - Additional elements that indicate the level of integration of SHERMS with the grid and other smart home devices, which are of keen interest to many SHERMS stakeholders.

A Quick Note on Security

EPA understands there can be security risks associated with smart products and systems. Recognizing that this is not our area of expertise, we do not intend to take the lead on developing security standards in the smart home market. To the extent that sound security standards arise, EPA may point to them in ENERGY STAR specifications as appropriate.



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Version 1 is Just a Beginning

- EPA was motivated to release the SHERMS 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 SHERMS:
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

Considerations for Future Revisions

- Development of an energy savings metric for SHERMS, and levels of performance for it
- Encourage interoperability and security by relying on any industry standards or best practices that develop for
 - Energy reporting, aggregation, and user communication
 - IoT security and privacy
 - DR response and communication protocols
 - Smart home set up and description
 - Occupancy detection and automatic action
- Additional devices and services with substantial energy efficiency benefits
- And more...

Roadmap from here

- First certifications expected Q2 2020: as far as we know, most Smart Home Service Providers will need to update their offerings and collect data
- Next step: energy savings metric
 - By Q1 2021, hope to have enough data to begin analysis and metric development
- Revision to Version 2 begins as metric nears completion, hopefully in 2021; likely effective 2022 or 2023
 - Other changes in Version 2 will depend on market developments

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

