



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

ENERGY STAR® Products Partner Meeting

September 11, 2019

Abigail Daken, U.S. EPA
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Introductions



Abigail Daken

EPA
*ENERGY STAR HVAC Product
Manager*



Essie Snell

E Source
Senior Manager



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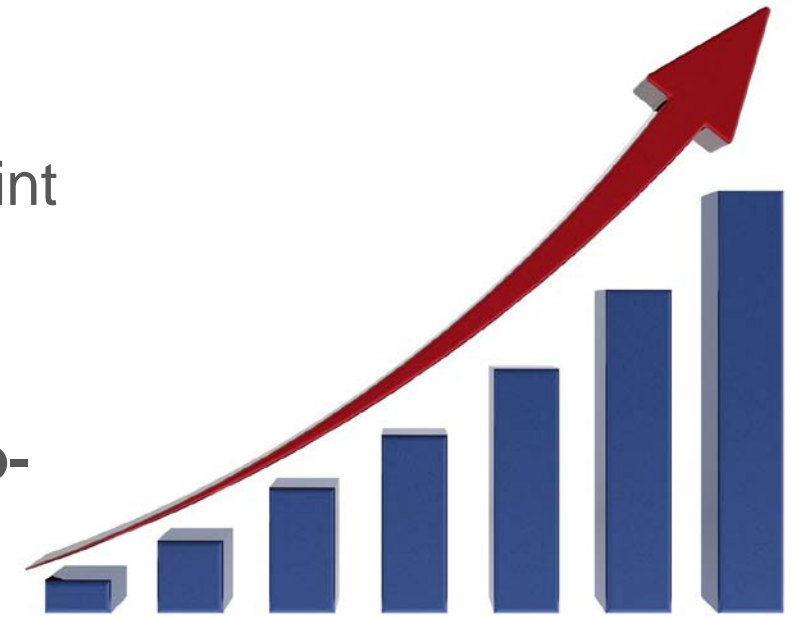
EPA's ENERGY STAR Smart Home Strategy: Bring Energy Savings Along for the Ride

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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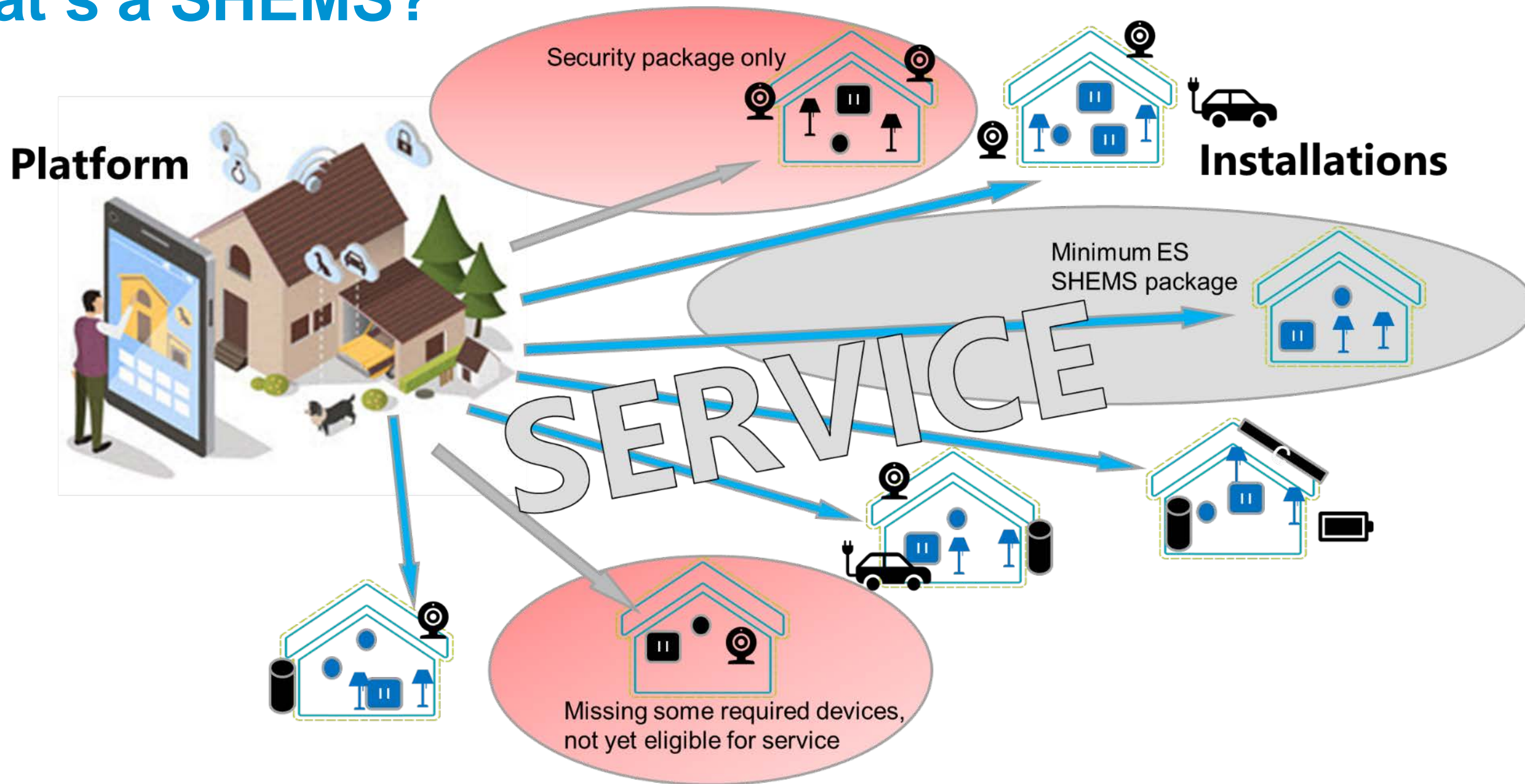


Why ENERGY STAR?

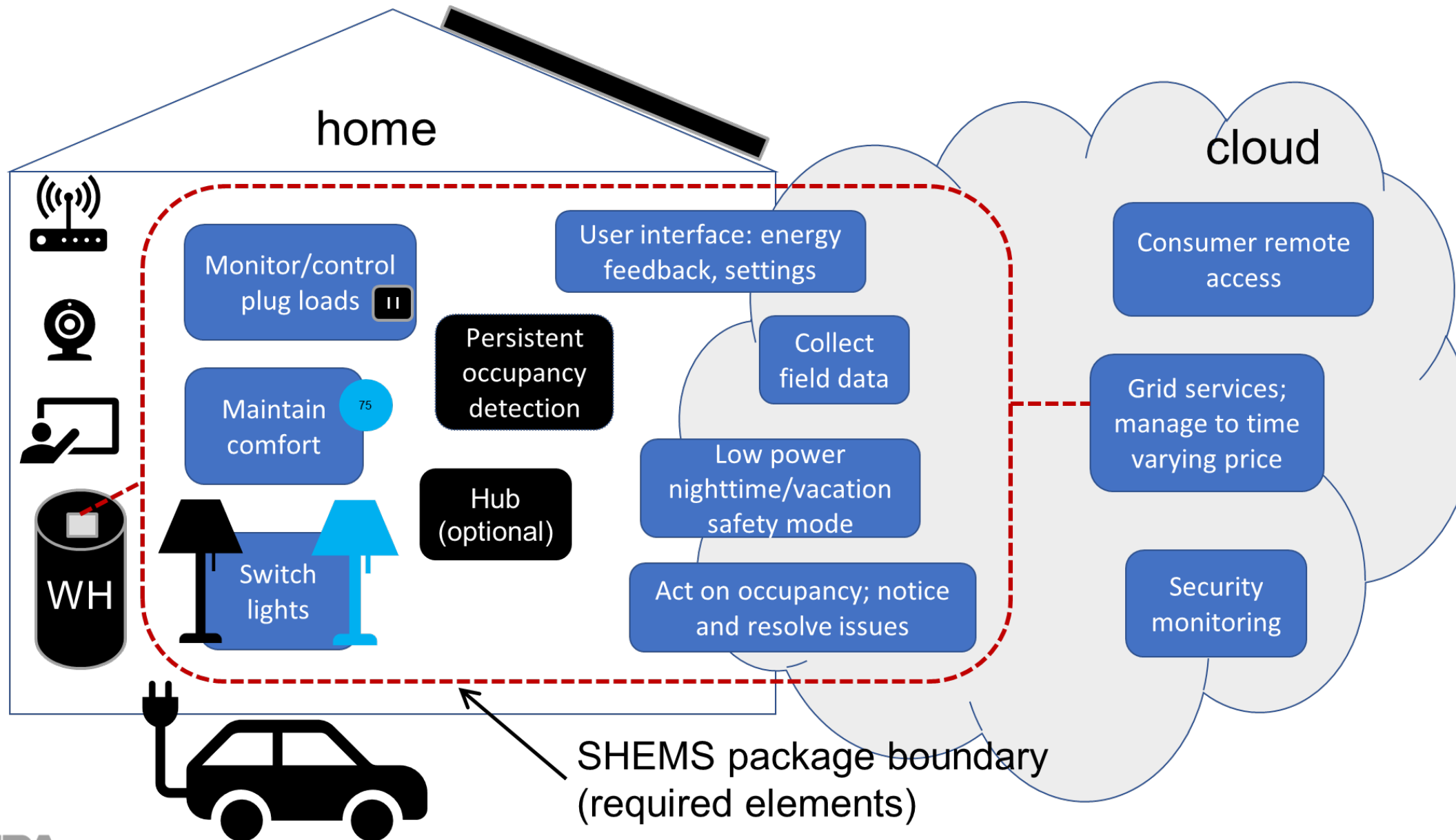


- Consumers and utilities are interested in this space, as shown with smart thermostat adoption
- ENERGY STAR is a known and trusted label, backed by impartial, publicly available specifications and test methods
- Part of the ENERGY STAR brand promise is to make difficult decisions about energy savings 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



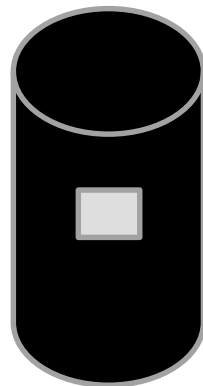
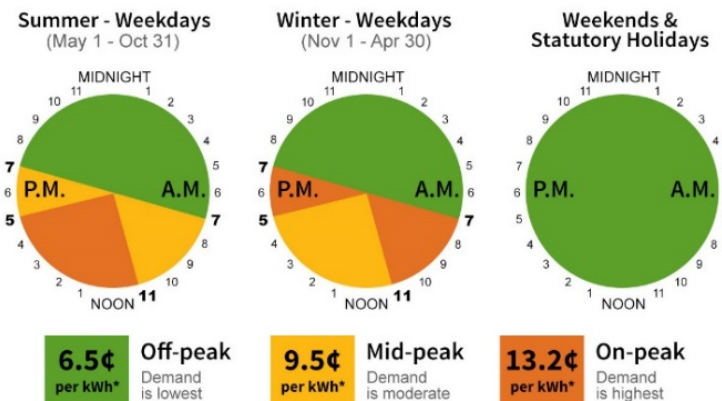
$$\begin{aligned} &\text{Hardware} \\ &+ \\ &\text{Occupancy Info} \\ &+ \\ &\text{Automated Services} \\ &= \\ &\text{Energy Savings} \end{aligned}$$

4. Eligibility Criteria: Five Elements

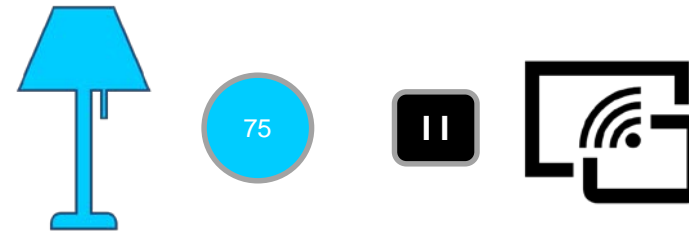
4.1 Required Base Services



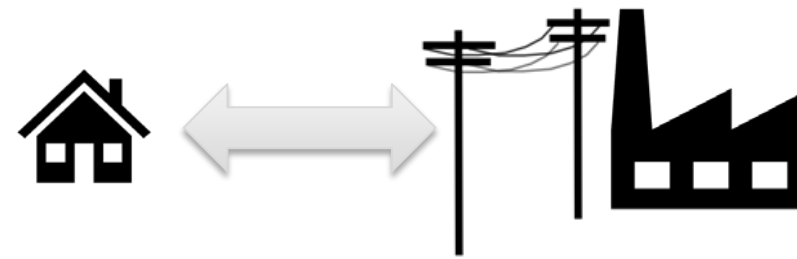
4.2 Additional Platform Capabilities



4.3 Required Devices



4.4 Grid Services

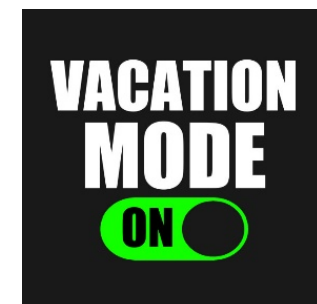
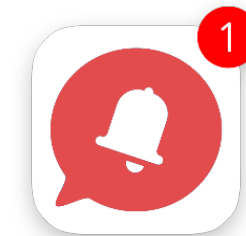


4.5 Field Data Reporting



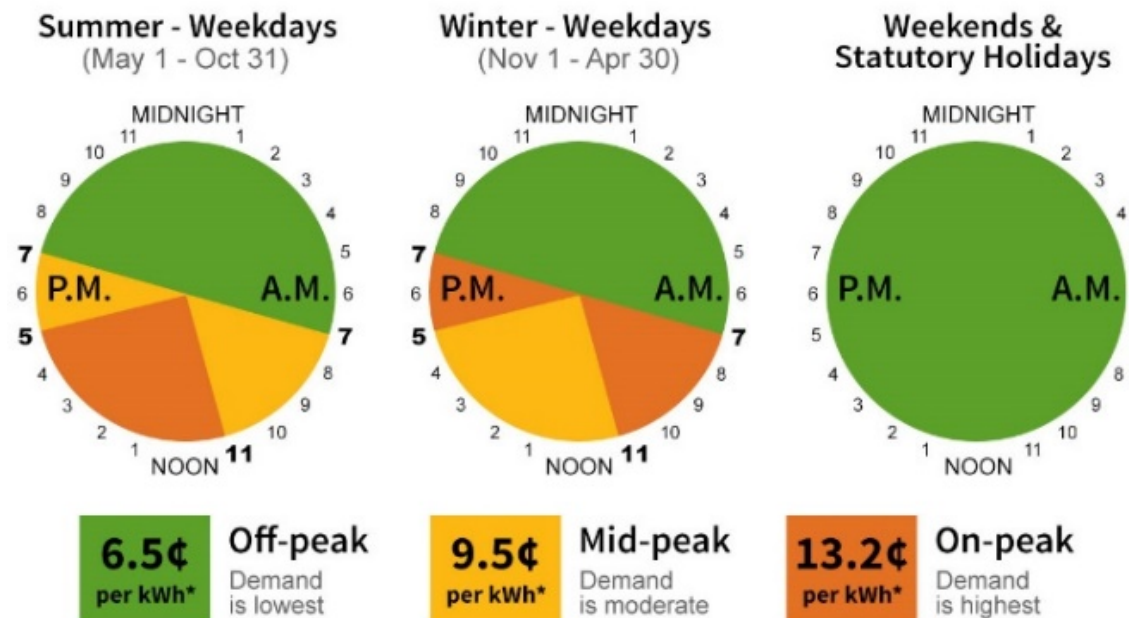
4.1 Required Base Services

- 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

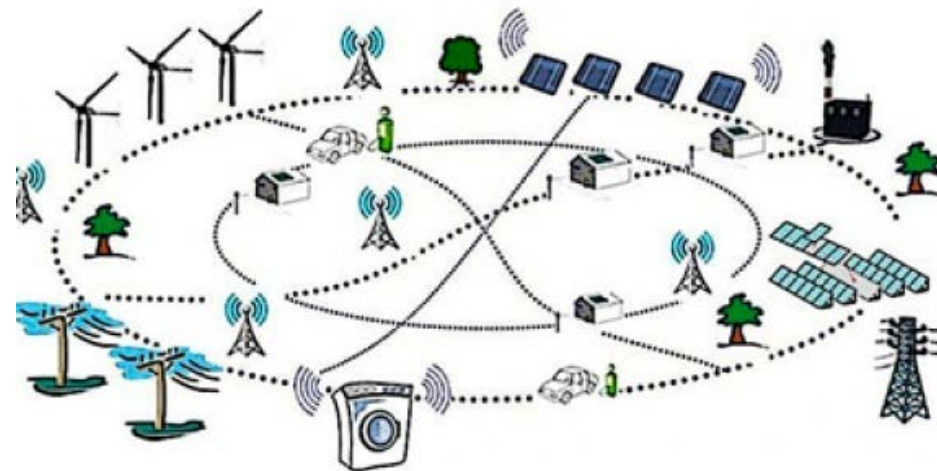
limits for standby/idle power even for devices without a separate ENERGY STAR specification

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



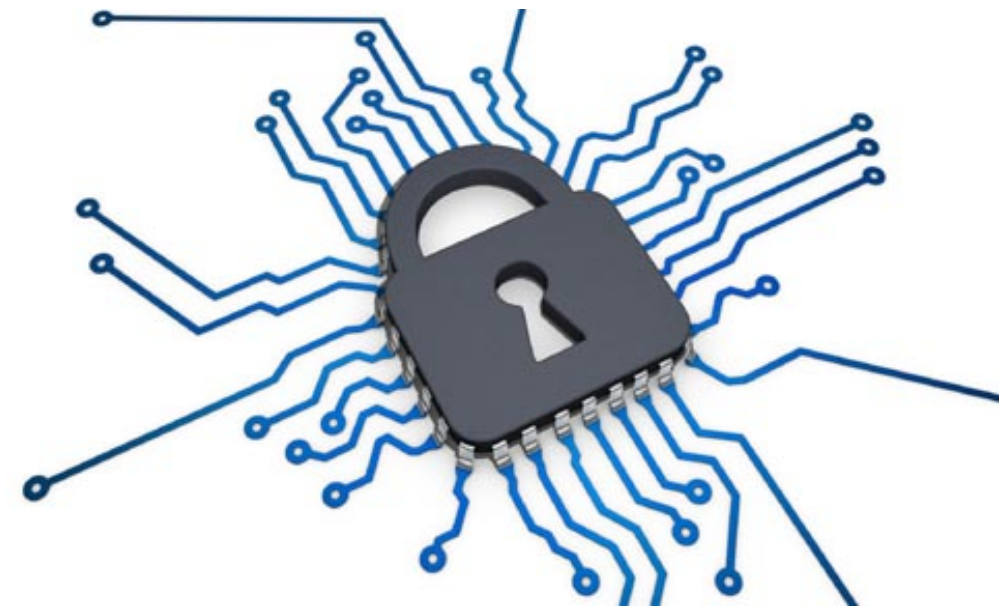


Data Elements are organized into three sections

- **Program Performance (Required)**
 - Minimal set of data elements needed to verify that installations comply with the basic 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.

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



Smart Home Energy Management Systems (SHEMS)

Building Toward a Future Vision

Essie Snell

Senior Manager, Customer
Energy Solutions

E Source

2019 ENERGY STAR Partner Meeting



E Source



Why now?

**61% of people in the US and Canada
think smart homes are a good
investment.**

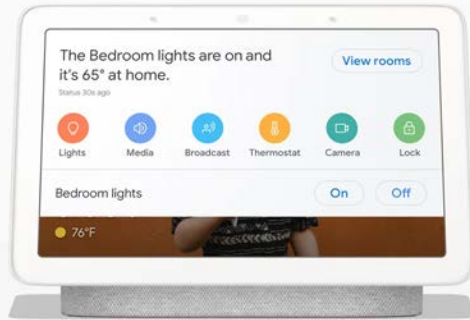
63% of people in the US say they are somewhat or very familiar with home energy management systems.

Smart home tech is finally taking off, and competition is ramping up



XFINITY® HOME
SECURITY · CONTROL · ENERGY

Your home, connected with Google.



Simplify your everyday

Amazon has teamed up with builders and developers nationwide to offer move-in ready smart residences equipped with the latest smart home products activated and supported by Amazon Experts. [Discover apartments and houses in smart communities near you below.](#)

Explore available homes for sale in smart communities

Click on your state below to get started

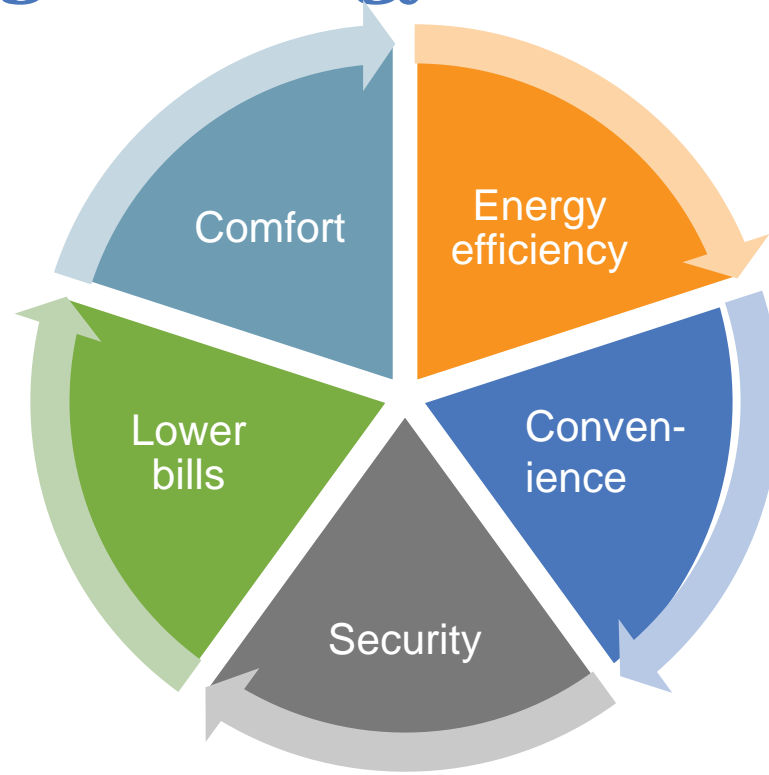


Discover apartments in smart communities near you

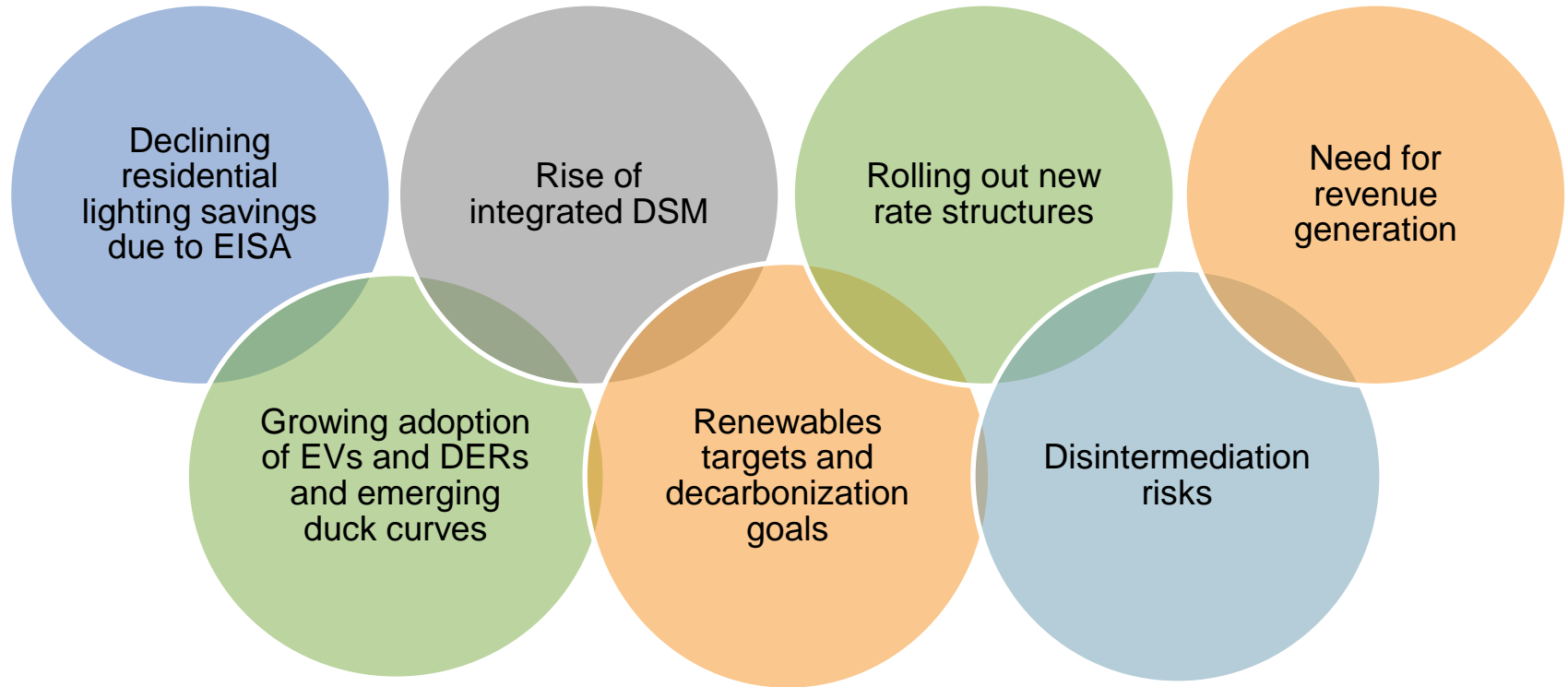


Sources: ADT, Xfinity, Amazon, Google

ENERGY STAR can encourage vendors to keep focusing on energy



Utilities are facing unique challenges



The background is a solid blue color with a network of white lines connecting various smart home and technology icons. The icons include a washing machine, a refrigerator, a chair, a lightbulb, a speaker, a cloud with a sun, a musical note, a person silhouette, a magnifying glass, a TV, a film strip, a thermometer, a Wi-Fi signal, a padlock, and a camera. In the center, there is a faint white outline of a house.

How do we quantify energy benefits?

Current M&V isn't well-suited to evaluating smart home devices

Control-based measures that rely largely on automation and behavior change are challenging to evaluate



ENERGY STAR can help support, centralize, and standardize evaluation efforts

What energy savings can an ENERGY STAR–qualified SHEMS actually deliver?



Some results from previous studies of smart home device savings

Device	Energy-saving strategies	Energy-savings potential
Smart thermostat	Schedule-setting, occupancy-sensing, geofencing, maintenance notifications, HVAC system adjustments, automation using weather data or input from home security components, education, behavioral prompts	5%–19% of HVAC energy consumption
Smart plug	Schedule-setting, occupancy-sensing, geofencing	8%–21% of connected load
Smart appliance	Education around energy use	3%–6% of appliance energy consumption
Smart lightbulb	Dimming, schedule-setting, geofencing	~30% savings over a non-connected lightbulb
Energy-use information	Education, some behavioral prompts	4%–15% of whole-home energy consumption






What about vampire loads?





What are utilities doing?

Five common utility approaches to smart home initiatives

-  Focus only on specific smart home technologies
-  Install and study smart home technologies in new-construction projects
-  Create a custom smart home system
-  Partner with third-party smart home vendors for programs
-  Use existing third-party platforms

DTE Energy's app

- Able to claim deemed behavioral savings of 1.6% per app download
- Currently piloting Powerley's newest app

Get the Whole Picture

The DTE Insight app and Energy Bridge take the guesswork out of home energy use. The app syncs with your home's smart meter to show you what's going on inside your home – what's using the most energy and how efficiently your appliances are running. You decide if you want to conserve in the moment, or not. You can also set energy targets, get tips on how to save money, and more.



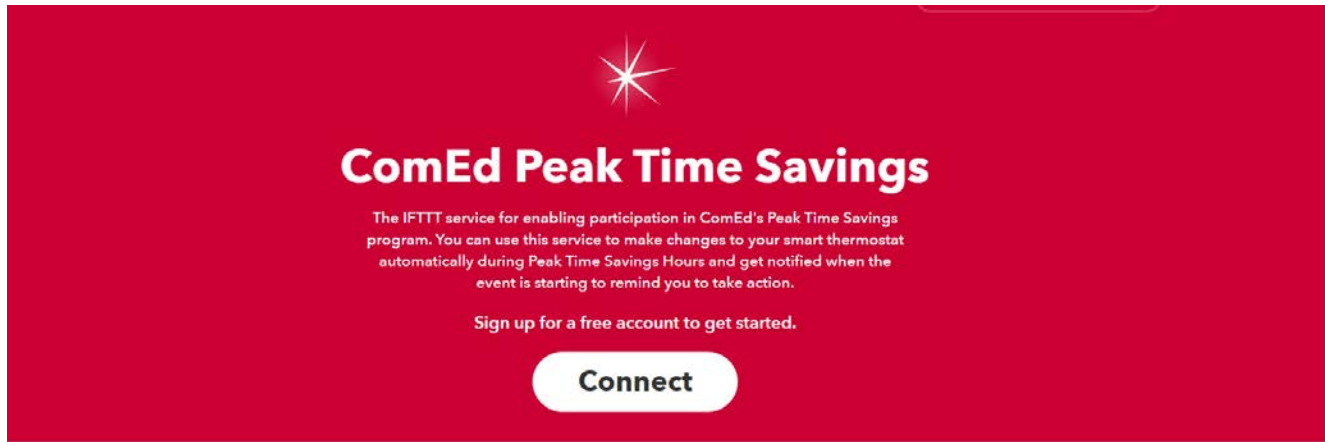
A Powerful Combo

Some things work better together. When you use the Insight app and bridge together you know exactly how much energy you're using and when. You see your energy usage in real time so you can make on-the-spot decisions.

In addition to a fresh new look and improved navigation, you'll enjoy these enhanced features:

Source: DTE Energy

ComEd's IFTTT pilot

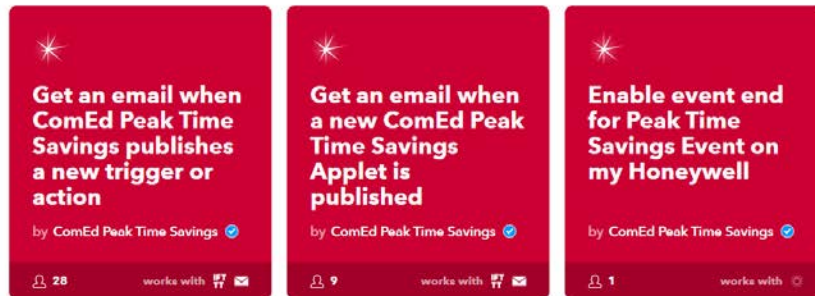


ComEd Peak Time Savings

The IFTTT service for enabling participation in ComEd's Peak Time Savings program. You can use this service to make changes to your smart thermostat automatically during Peak Time Savings Hours and get notified when the event is starting to remind you to take action.

Sign up for a free account to get started.

Connect



Get an email when ComEd Peak Time Savings publishes a new trigger or action
by ComEd Peak Time Savings

Get an email when a new ComEd Peak Time Savings Applet is published
by ComEd Peak Time Savings

Enable event end for Peak Time Savings Event on my Honeywell
by ComEd Peak Time Savings

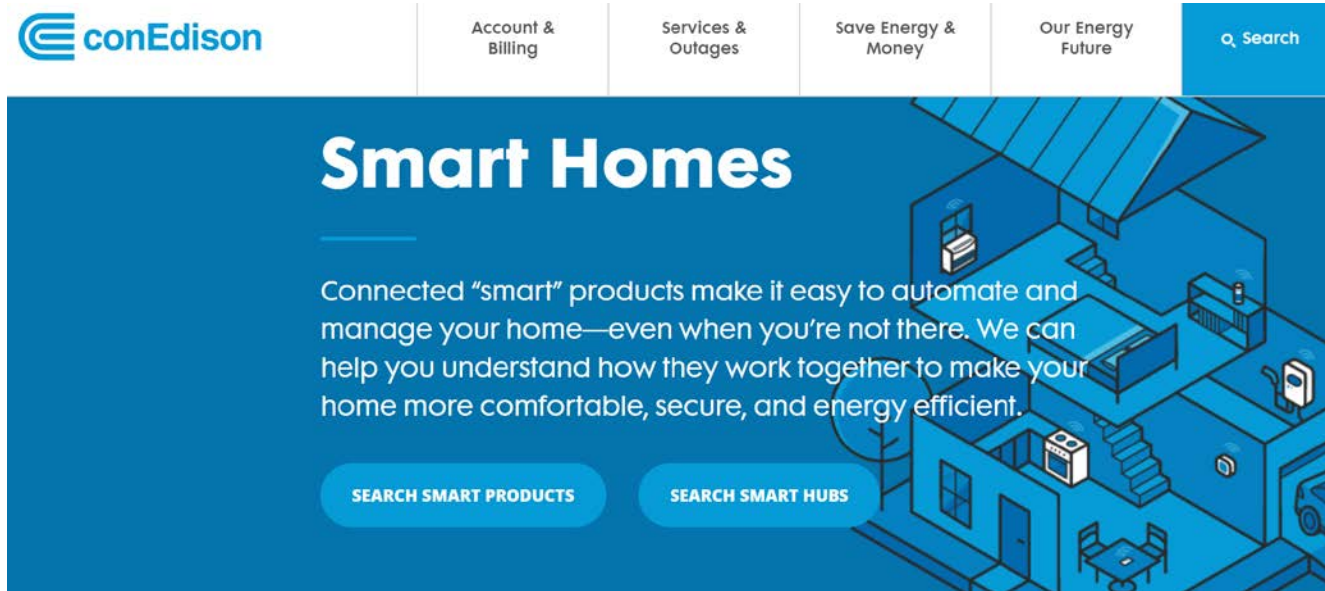
28 works with 17

9 works with 17

1 works with 0

Source: ComEd

Con Edison's online resources and new smart home rate structure



www.coned.com/smarthome

Source: Con Edison

Southern Company's Smart Neighborhood initiatives

Building cutting-edge communities

- Both single family homes and apartments
- Smart home devices
- Distributed energy resources
- Multiple partners (ORNL, Vivint, local homebuilders)
- Responsive microgrids



Source: Alabama Power

More utilities are creating marketplaces to sell smart devices



FirstEnergy's Smartmart

SMART HOME

Keep your home running smarter, more comfortable and more energy-efficient. Our products and plans put you in control.



ELECTRIC VEHICLE CHARGER LEASE

Our Electric Vehicle Charger Lease brings you the power of a Level 2 EV charger without the huge up-front ex...

[MORE DETAILS >](#)



CONNECTED HOME PLAN

Our Connected Home Plan gives you the comfort, convenience and control you need from a smart thermostat. Wit...

[MORE DETAILS >](#)



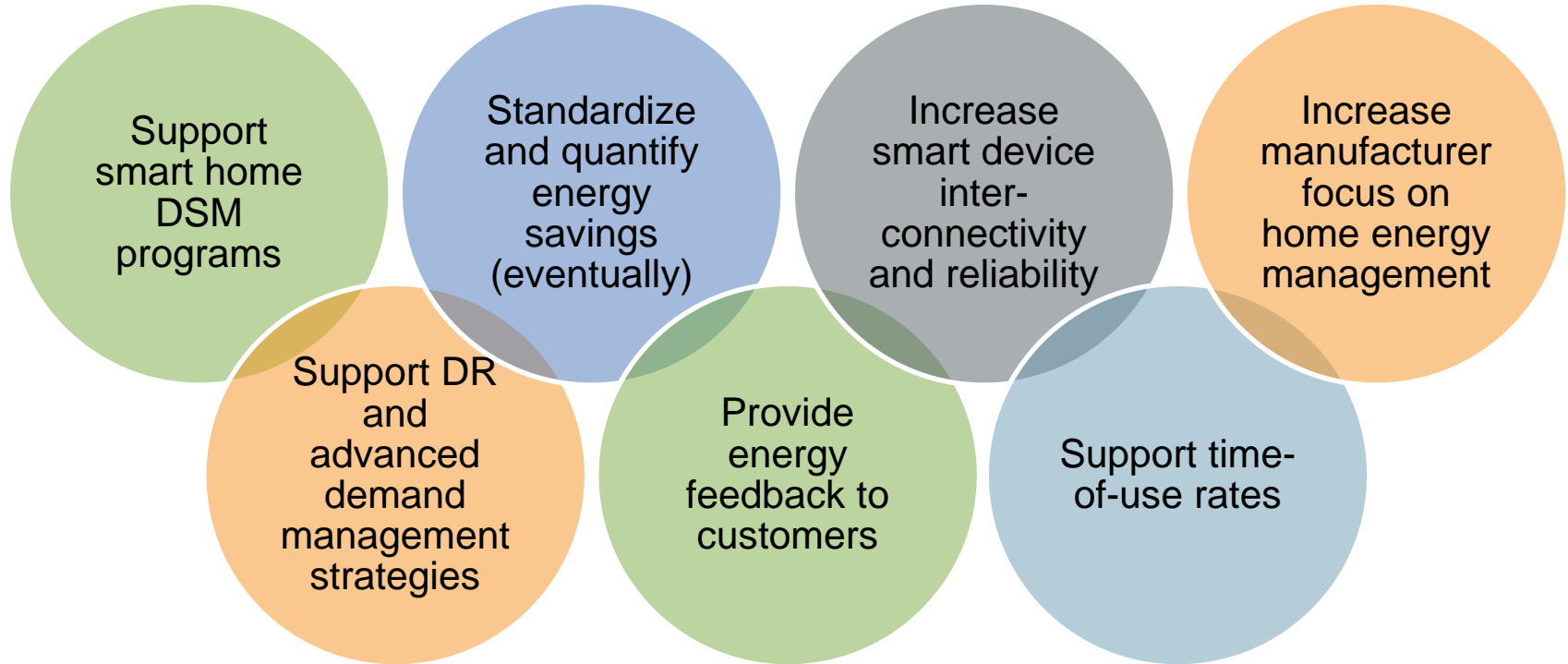
SENGLED PULSE PAIR STARTER KIT

A dimmable LED light with the high quality audio of a JBL Bluetooth speaker. Simply twist Pulse into any sta...

[MORE DETAILS >](#)

Source: FirstEnergy

The new SHERMS specification can help utilities meet a variety of goals



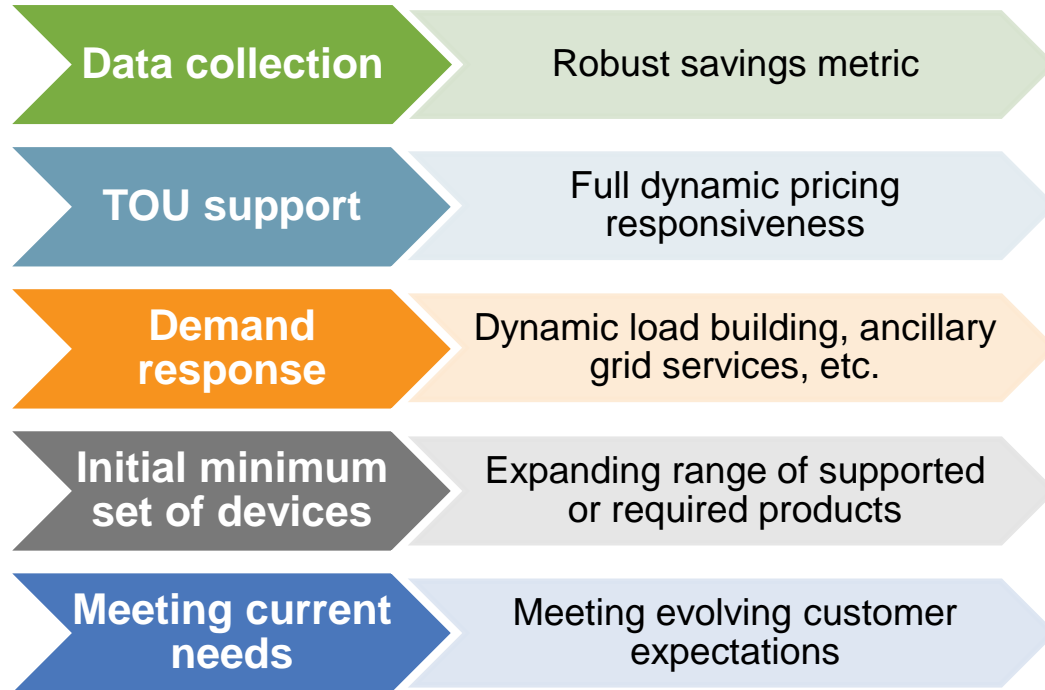


What's next?

Gather clear data on energy benefits so utilities can promote SHEMS



Expect the ENERGY STAR specification for SHEMS to evolve over time



Keep up with the broader smart home market



Sources: Amazon and Google

Thank you! Questions?



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Troy Huntley

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Johnson Controls

ENERGY STAR SHEMS Program

September 2019



Smart Home Energy Management Solutions Provider

Comprehensive ecosystem of partners/support

- *Established network of dealer partners nationwide.*
- *Alarm.com: Connectivity and monitoring*
- *Smart home vendors: Add on products*
- *Consultants*
- *Network of single-family and multi-family builders*
- *ENERGY STAR*



Smart Home Energy Management

Geo fencing: How it works (Phone Bluetooth)

Leave Home

- *Automatically turn off smart lights, adjusts thermostat, locks doors and shuts garage door.*
- *Can attach 119 nodes to system.*

Future of the Smart Home

Energy Management

- *Demand response event & Time of use will be incorporated as features*
- *Data, AI and predictive analytics will be incorporated.*

Every major electrical device will be connected, managed and monitored. HVAC, appliances, and utility meters.

- *Automatically identify equipment faults*
- *Adapt to changing weather conditions*

More outside services available to connected home.

- *E.g., Remote Senior home care*
- *Utility home services will expand*



Qolsys : Challenges

Interoperability with all major home energy uses

- *Working relationships between service providers, innovators, device manufacturers, and utilities*

Automation: Solution has to be easy to use

Thank You

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