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Smart Home Energy Management Systems

Past, Present, and Future

October 18, 2019

Session Survey Instructions

At the end of each session, you will be given 5 minutes to complete the session survey.

- Complete the survey using the mobile app or paper versions
- Provide the paper surveys to the room moderator or to the BetterBuiltNW table
- We appreciate your feedback

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Complete the Session Survey

- Smart Home Energy Management Systems: Past, Present, and Future
- Emily Kemper

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Agenda

- The Smart Home Market and overall product categories
- Smart Home Products and Services
- Challenges and Benefits in incorporating smart home products in programs
- The path forward for contractors and builders

Smart Home Market and Product Categories



Connected Technology Market

Consumers want smart home products

- 26 million households now own at least one smart home device
- The Smart Home Market is expected to reach \$55
 billion by 2022
- 84% of Americans expect to be able to control something in their homes via smart devices in a year
- **25% of Americans** currently control some home function with a smart phone or tablet
- 10% have installed an advanced thermostat
- 82% of those with smart home technology report that they're satisfied with it



Smart Home Energy Management and the promise of more savings



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Smart home products relative to savings opportunity

	Types of Smart Home	Products in SHEMS (Smart Home Energy Management Systems)
Functionality	Category	Short Definition
	Smart Home Platform	Software platform that enables multiple different hardware devices to operate as a home automation system
	Smart Thermostat	HVAC Wi-Fi enabled control utilizing remote or rule-based mechanisms
	Smart Plug	Single communicating piece of hardware that controls or provides feedback about connected energy consuming devices
Control-based	Smart Switch	Wi-Fi enabled wall switch that controls or provides feedback about connected energy consuming devices
	Smart Appliance	Communicating appliance which can be controlled remotely via various interfaces
	Smart Hub and Smart Switch	Dual function wall mounted smart switch that also enables and manages interaction between existing smart hardware within a single home
	Smart Lighting	Lighting bulbs, controls, and fixtures that have automated control functionality
, , , , , , , , , , , , , , , , , , ,	Smart Hub	Device that enables and manages interaction between existing smart hardware within a single home
	Energy Portal	Online dashboard that is consumer or program administrator facing
Information-based	Data Analytics Platform	Cloud based analytics platform that analyzes large volumes of data collected from existing smart hardware
	In-Home Display	Physical display that collects data from existing hardware and provides real time feedback and/or prompts
/	Load Monitor	Single non communicating piece of hardware that displays energy consumption data of the connected appliance or devices
	Web Service Platform	Cloud-based platform that focuses on more than just energy

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More Savings

Less Savings

What Products can save energy?

- These product categories are "ready for prime time" and <u>most likely</u> to save energy →
- However, the only category which has shown energy savings through evaluations thus far is smart thermostats
- Our best opportunity for incorporating smart technologies in homes seamlessly is through new construction approaches
 - Primarily because the incremental cost is lowest in new home builds



ENERGY STAR SHEMS

- On September 3, the EPA released the ENERGY STAR SHEMS Version 1.0 Program Requirements
 - It is a "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 is a package of devices and services



ENERGY STAR SHEMS



Smart Home Products and Services

What is a smart thermostat? What is a Wifi thermostat?

		Characteristics
		Retains basic thermostat capability, regardless of link status
		Can collect temperatures, HVAC run-times and HVAC performance information
	Programmable	from field systems
	thermostats	Temperature stability
		Programmable for schedules and setbacks
		Wi-Fi-enabled
Wi-F	i thermostats	Online dashboard and/or mobile app connected to the user account
Now for a		Intuitive user interface (UI) that may include touchscreen or buttons
deep dive		Proximity sensing allows a user to accept and act upon external data (like the location of a smart phone).
thermostats	Occupancy sensing directly thermostat).	Occupancy sensing directly detects and acts upon internal sensors (inside the the the the the the the the the th
Smart therm	ostats	"Learning," optimization, or adaptive control; algorithms that learn user behavior or track usage to improve performance
		Basic demand response capabilities: allows remote connection with utilities, who, with authorization, can adjust thermostat settings during peak demand periods (optional).

Brief history of thermostats



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Types of Smart Home Products in SHEMS (Smart Home Energy Management Systems)

Short Definition

Smart thermostats are part of the Control-based functionality category, which means they have more potential to save energy

Functionality

Category

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ENERGY STAR Certified Smart Thermostats

Minimum criteria + performance data = certification

ENERGY STAR Program Requirements for Connected Thermostats Version 1.0

Heating & Cooling control features include:

- Additional home temperature sensor
- Additional occupancy sensor
- External temperature detection
- Geofencing
- Humidity sensing
- Occupancy sensor on device

Smart Thermostats – Major Vendors











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Smart & WiFi Thermostats – Other Vendors



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Smart controls for unitary HVAC (DHPs, room ACs)



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Smart Plugs / Outlets & Advanced Power Strips



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Smart Water Heater Controls



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Home Energy Monitoring and Management Systems







CURB

Curb

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Other Smart Home Offerings & Platforms

Smart & WiFi Thermostats: Some companies offer HVAC optimization via a software platform that can control WiFi-connected thermostats in large volumes

Examples: EnergyHub

Smart Home Platforms: a few companies are attempting "single app" solutions to control multiple devices

Examples: Powerley, Kirio, Alarm.com

Honorable mention: Bidgely, which provides insights on energy consumption, but doesn't enable control

***EnergyHub**



powerley

kiriō

Challenges and Benefits to Smart Home Products

Challenges: Smart Home Bundles, up until recently, have been difficult to incentivize in energy programs

Many utilities can't figure out the benefit to their businesses

Interoperability issues have made it challenging to develop a "turnkey" consumer experience

Up until recently, the lack of nationally recognized standards for products meant no basis for energy savings

No clear leader in energy management platforms

Ultimately, we need to remember the customer

Create a "turnkey" customer experience...

...because, if consumers aren't happy, we hear about it first



Opportunities: We have started to get past many of our biggest barriers in the past 6-12 months. What can we do in the future?

Connect the Smart Grid to the smart home, to leverage utility investments in AMI More companies are releasing ecosystems of products, as the tech companies "battle" for consumer attention

Focus on the customer experience: make it simple to add new products that they want

Use the new ENERGY STAR SHEMS Specification to address energy savings, so we can finally offer incentives

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Benefits to Customers







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The Path Forward for Contractors and Builders

What would an ideal smart home solution look like now?

 Now we have the ENERGY STAR SHEMS Program requirements, this bundle of products makes a lot of sense



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Smart home packages offerings are different for new construction vs. existing home retrofits or renovations

Residential New Construction

- Incremental cost is smaller
- Products can be low-voltage wired into the house as its built, as opposed to plug loads added later
- System can be "harmonized" in a smart home "ecosystem" from day 1



Existing home "smart retrofits" are a bit more challenging

Existing Home Retrofits and Renovations

- Incremental cost is larger, due to installation costs
- Products are usually added as plug loads
- System often relies on hubs or 3rd party platforms (aka smart speakers) for harmony, if it exists



What does the future look like?

The Home IS the smart energy management system



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Our Path Forward

Smart Home products are here to stay, so we should make them work for us and for homeowners

Thank you!

Emily Kemper, AIA Director, Residential Solutions

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