



ENERGY STAR[®] **in a Connected World**

Abigail Daken

National Summit on Smart Grid and Climate Change
Washington, DC **October 14, 2015**

For more than 20 years, EPA's ENERGY STAR program has identified the most energy efficient **products, buildings, plants, and new homes** – all based on the latest government-backed standards and now a rigorous third-party certification process.



ENERGY STAR. The simple choice for energy efficiency.



Every single day,
consumers choose
ENERGY STAR
products more than

800,000 times



The Internet of Things (IoT)

- IoT is the network of "things" embedded with electronics, software, sensors, and connectivity to enable objects to exchange data with other connected devices.
- Today, the IoT has **15 billion** connected devices.
- By 2020, it is forecasted the IoT will have **50 billion** connected devices.



The Internet of Everything (IoE)

- The industry is quickly revolutionizing into the Internet of Everything (IoE).
- IoE is a platform that includes the networked connection of “things”, but also includes the links between people, process, and data, ie. home energy management system.

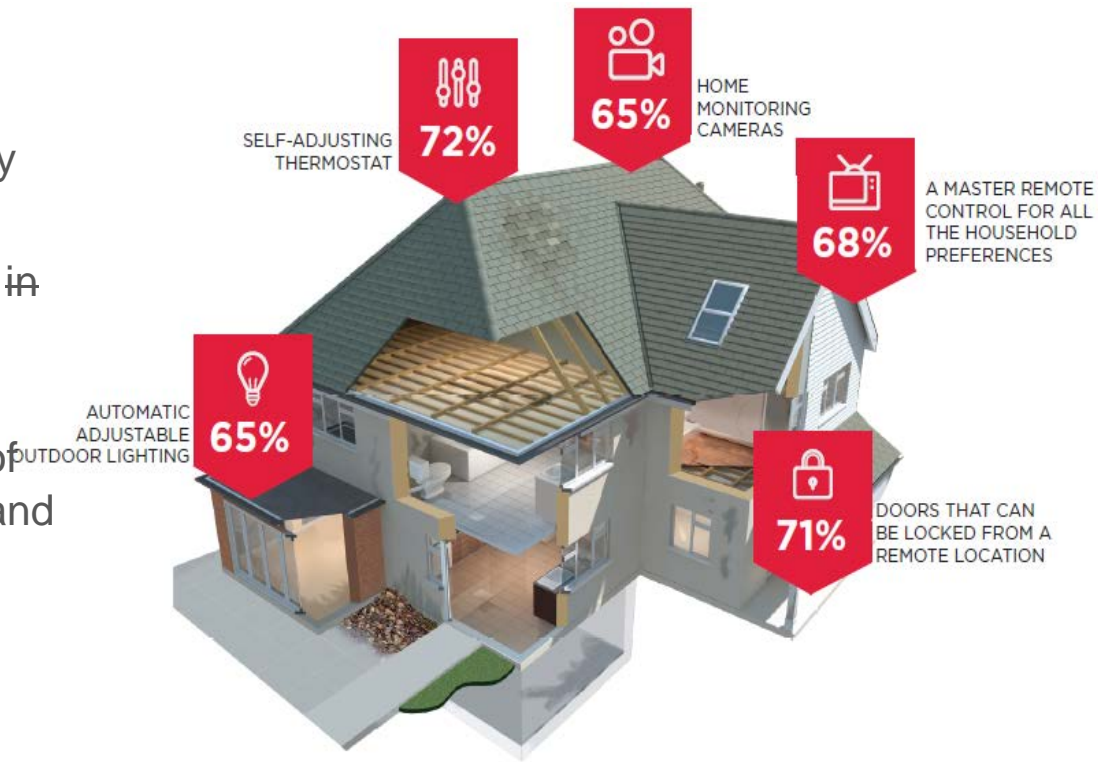


Energy Efficiency is Emerging as a Key Driver in Connected Homes

- Some of the most desired smart devices are: thermostats, door locks, lighting, monitoring cameras, and a master remote for all household control.

- Motivations:

- 70% are excited about cost savings from energy efficiency
- Nearly 50% list helping the environment as a key feature in of a smart home
- Nearly 50% are motivated by the potential in convenience of programming home settings and maintenance





Connected in ENERGY STAR Specifications

- **Many products have optional criteria. For these, connected functionality is a feature, like through-the-door ice or a wool wash cycle.**
 - **Appliances** – Refrigerators/Freezers, Clothes Washers, Clothes Dryers, Room Air Conditioners and Dishwashers; criteria include demand response.
 - **Pool Pumps** – Criteria include demand response.
 - **Lighting** – Criteria do not include demand response.
- **One upcoming product has required connected functionality:**
 - **Connected Thermostats (in development)** – Connected functionality provides a unique opportunity to measure savings as actually achieved in the field. Grid responsiveness requirements included to take advantage of the opportunity available from heating and cooling equipment.



ENERGY STAR and Thermostats

- By 2009, it was clear that in most cases, presence of a control that *could* enable savings (i.e. programmable thermostat) was not sufficient to *achieve* savings.
- 2012 and on: thermostat market was becoming something new, and the vanguard of this trend was WiFi thermostats
- Connected thermostats have many additional avenues for savings
 - More sophisticated algorithms, updated over time
 - Learning, automated control, presence detection
 - Remote control
 - Expanded capacity for user interactions
- Few commonalities in how savings are achieved or in business models (e.g. service vs. hardware, retail vs. installer or utility program)
- Commonalities are claims to savings and connectivity
- Connectivity also provides information about actual use, rather than just how devices could be used

ENERGY STAR CTs – A new approach

- EPA specifications have always relied on laboratory measurements of energy use
- In the emerging Internet of Things, EPA recognized that CT savings could be modeled using only:
 - publically available weather data, and
 - data reported by the CT itself
- In effect, CT products are able to self-report energy savings





Metric for periodic reporting

- Provides assurance of sufficient consumer savings
- Is fair to all connected thermostat providers
- Uses only connected thermostat data plus outdoor weather history
- Preserves consumer privacy
- Protects proprietary information
- Practical to calculate



Program Outline

- Recognition for CTs that save energy in the field
- To earn the ENERGY STAR:
 - “CT device” must meet criteria that enables savings
 - Partner must periodically report aggregate consumer savings for each CT product
 - “CT product” includes the CT device and a service component
- Service Provider is the ENERGY STAR partner



How to measure savings in the field?

- Compare actual run time to modeled run time with an artificial baseline of constant comfort temperature
- Use a large representative sample of the service provider's customers, reflecting the diversity of climate and demographics in their customer base
- Protect consumer privacy by reporting only aggregated metric data to EPA
- Report aggregated data periodically to ensure that as software updates occur, savings remain
- Estimate savings nationally (or in a region) by comparing achieved metric score to metric score for a typical thermostat schedule

Advantages of ENERGY STAR Connected Criteria



- ENERGY STAR criteria provide consistent definitions and approaches, a consistent set of starter functionality, and an emphasis on open standards.
- ENERGY STAR is a trusted resource that can help consumers find these connected products.
- ENERGY STAR products with connected functionality provide consumer benefits including insight into energy use, convenience in diagnosing service needs, and control via remote management.



Contact Information

Abigail Daken
EPA ENERGY STAR Program
202-343-9375
daken.abigail@epa.gov

Doug Frazee
ICF International
443-333-9267
dfrazee@icfi.com



Connected in ENERGY STAR Specifications

Specification	Connected Criteria	Demand Response Test Method
Refrigerator/Freezer	Optional - Final	Final
Clothes Dryers	Optional - Final	In Development
Clothes Washers	Optional - Final	In Development
Room AC	Optional - Final	In Development
Dishwashers	Optional - Final	In Development
Pool Pumps	Optional - Final	Final
Lighting (Lamps and Luminaires)	Optional - In Development	N/A
Connected Thermostats	Required - In Development	In Development
Electric Vehicle Supply Equipment	Required - In Development	TBD