



## **ENERGY STAR Connected Communications and Reporting**

Katharine Kaplan, ENERGY STAR Product Development and Program Administration Manager

# ENERGY STAR Connected Capabilities

The following capabilities are used to define the requirements for Connected Products in ENERGY STAR product specifications.

- **Energy Consumption Reporting** – products must be capable of reporting interval energy consumption data to consumer authorized entities
- **Operational Status Reporting** – products must be capable of providing their functional status to consumer authorized entities
- **Remote Management** – products must be capable of receiving and responding to consumer authorized remote requests
- **Demand Response** – products must be capable of receiving, interpreting, and acting upon grid signals by automatically adjusting/shifting/deferring their electrical load
- **Open Communications** – connected capabilities must use open standards based communications (except for cases of remote management). An API must be available to interested parties.

# ENERGY STAR Connected Functionality

	Connected Thermostats*	Refrigerators & Freezers	Clothes Washers	Clothes Dryers	Room A/C	Dish-washers	EVSE*	Light Fixtures	Pool Pumps
Energy Consumption Reporting		✓	✓	✓	✓	✓		✓	✓
Operational Status Reporting		✓	✓	✓	✓	✓		✓	✓
Remote Management		✓	✓	✓	✓	✓		✓	✓
Demand Response	✓	✓	✓	✓	✓	✓	✓		✓
Open Access	✓	✓	✓	✓	✓	✓	✓	✓	✓
DR override by Consumers	✓	✓	✓	✓	✓	✓	✓		✓
Connected Capability not Optional	✓								

\*Product Specifications still in Draft form

# *Uptake:* ENERGY STAR Certified Appliances with Connected Functionality

- 28 refrigerators / freezers
- 4 clothes washers
- 2 clothes dryers
- 240 light fixtures
- 4 room air conditioners



# Room Air Conditioners

## Communications Requirements

- Products make use of Open Standards – Communication with entities outside the Connected RAC System that enables connected functionality must use, for all communication layers, standards that are:
  - Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,<sup>1</sup> and/or
  - Included in the NIST Smart Grid framework Tables 4.1 and 4.2, and/or adopted by the American National Standards Institute (ANSI) or another well-established international standards organization

# Room Air Conditioners

## Communications Requirements (continued)

Communications Hardware Architecture – Communication with entities outside the Connected RAC System that enables connected functionality shall be enabled by:

- a) Built-in communication technology
- b) Manufacturer-specific external communication module(s) and/or device(s)
- c) Open standards-based communication port on the appliance combined with open standards based communications module
- Open standards-based communication port(s) on the appliance in addition to a, b or c, above
- If option b or c is used, the communication module/device(s) must be easy for a consumer to install and shipped with the appliance, provided to the consumer at the time of sale, or provided to the consumer in a reasonable amount of time after the sale.

# Room Air Conditioners

## Energy Consumption Reporting

- To enable simple, actionable energy use feedback to consumers and authorized 3rd parties
- The product shall be capable of transmitting energy consumption data to energy management systems and other consumer authorized devices/services
- This data shall be representative of the product's interval energy consumption
  - Recommended: reported in watt-hours for intervals of 15 minutes or less
  - Data may also be reported in alternate units and intervals as specified in the product manufacturer's interface specification or API

# What We've Learned – CEA 2045

- Initially thought it would be attractive to white goods manufacturers
- Not so, was dormant for several years, though we do have explicit allowance for it in several specifications
- Now gaining traction for some products: pool pumps, water heaters, EVSE
- Notably, all of these are considered richer targets for grid services



# What We've Learned – Barriers to Adoption

- Adoption of has been slow. Chicken and egg problem. Little demand so little availability
- Difficult to develop tests for DR functionality because manufacturers do not have prototypes to share
- Fractured utility landscape remains a barrier, though there is some coalescing

# What We've Learned – Communications and Connected Thermostats

- All CTs participating use WiFi to service providers cloud architecture
  - Correlates to connectivity driven by consumer amenity
  - It's the fastest way to achieve consumer amenity
  - Consumers not generally concerned that connection is “captured” by service provider
- Wide variety of business models around DR
  - Some services sell device-level access to utilities
  - Some act as DR aggregators
  - Virtually everything in between
- Additional services would be enabled by more direct (e.g., device-addressable) and faster (not WiFi through cloud) access; little market so far



Thank you!

Katharine Kaplan

[Kaplan.Katharine@epa.gov](mailto:Kaplan.Katharine@epa.gov)

202.343.9120

[www.energystar.gov](http://www.energystar.gov)