Consumer
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Via e-mail: SmartHomeSystems@energystar.gov

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Subject: **Smart Home Energy Management Systems & ENERGY STAR**

Dear Abigail and Taylor:

On behalf of the Consumer Technology Association (CTA), we would like to offer initial comments relevant to EPA's exploring the possibility of recognizing smart home energy management systems (SHEMS) that use occupancy information to optimize the energy use of multiple devices. As EPA has explained, its program idea is based on criteria for a package of hardware and services that deliver more integrated, holistic energy savings in the smart home.

CTA welcomes a holistic approach to supporting energy savings opportunities in the home.

ENERGY STAR product specifications for electronics evolved over the years from a focus on standby power to a focus on total power consumption across all operating modes. Likewise, we appreciate EPA's consideration of a holistic approach to smart home energy management systems. As EPA acknowledges, there are several questions about scope, qualification criteria, data reporting, evaluation methodology and other issues that need to be addressed. As we continue to gather thoughts from our members on these considerations, we look forward making further contributions and recommendations.

CTA has contributed standards relevant to home energy management.

CTA is an ANSI (American National Standards Institute)-accredited standards development organization, and in recent years, CTA has produced standards relevant to device and equipment connectivity, data reporting and energy management. Following are brief descriptions of the standards and their role in a device or system.

ANSI/CTA-2047: Consumer Electronic Energy Usage Information (CEEUI)

ANSI/CEA-2047[1] is an American National Standard developed primarily to enable a device to report its estimated energy usage data to energy monitoring and management services and applications. It is also capable of reporting usage data obtained from actual measurements if the device includes the capability. To estimate energy usage, a device uses pre-stored values for the energy used in each of its operational modes such as "on" or "standby." The device simply logs the amount of time it is in each operating mode. Upon receiving a request for its energy usage over a given period of time, the device calculates the usage by multiplying the pre-stored value for each mode with the time it was in each mode and adding them together. This state-based energy usage information, although only an estimate, can be provided in a standard form over a Local Area Network on request from an energy management system or an application running on a smart phone, tablet or PC. Such applications could then, for example, build a history of that device's energy consumption for use by the consumer or third-party service providers. The standard is protocol/network agnostic, thereby enabling any protocol to implement it using its native command and data structures. It also is intentionally "light weight," requiring minimal processing and memory resources, and no additional circuitry from the end device. This approach is not limited to consumer products. It can easily be added to commercial and even industrial products. Network security is supported through the selected transport protocol in addition to network or application layer security. ANSI/CTA-2047 was developed with input from the Smart Grid Interoperability Panel Home-To-Grid Domain Expert Working Group (SGIP H2G DEWG).

ANSI/CTA-2045: Modular Communications Interface (MCI) for Energy Management

While ANSI/CTA-2047 focuses on reporting energy usage, another American National Standard, ANSI/CTA-2045[2], focuses on defining a low-cost interface for consumer products for energy management, demand response, and home automation. The MCI provides a standard interface for energy management signals and messages to reach devices. Such devices may include an energy management hub, an energy management controller, an energy management agent, a residential gateway, an energy services interface, a sensor, a thermostat, an appliance, or other consumer products. Having a common interface enables the consumer to purchase and self-install a low-cost module specific to whatever network interface (Wi-Fi, ZigBee, HomePlug, Z-Wave, LonWorks, etc.) the consumer, or the consumer's utility, may choose. It is based on a joint specification from the USNAP Alliance and the Electric Power Research Institute (EPRI) with input from the SGIP H2G DEWG. Conceptually, an MCI module forms the interface between an end product and any home (or business) network. The end product includes the MCI connector, interface and protocol.

The MCI standard defines the physical and electrical connection as well as a communications protocol that can pass through standard higher-layer protocols including Internet Protocol (IP), OpenADRiii, and SEPiv from the MCI module to the end-device. This enables any product to

[1] https://members.cta.tech/ctaPublicationDetails/?id=e195510c-081c-e811-90cf-0003ff52c08a
[2] https://members.cta.tech/ctaPublicationDetails/?id=3bef3c65-081c-e811-90cf-0003ff52c08a

connect to any type of demand response system (Advanced Meter Reading [AMI], Smart Energy Profile [SEP], OpenADR), over any home or building network. Network security is supported through the selected transport protocol, such as Wi-Fi, ZigBee, HomePlug, Z-Wave, LonWorks, etc., in addition to network or application layer security.

The standard also details the mechanical, electrical, and logical characteristics of a socket interface that allows communication devices (universal communication modules) to be separated from end devices (Smart Grid Devices). Although the potential applications of this technology are wide-ranging, it is intended at a minimum to provide a means by which residential products may be able to work with any load management system through user-installable plug-in communication modules. Communications messaging supported by the MCI standard in turn supports direct load control, Time-of-Use (TOU), Critical Peak Price (CPP), Real-Time Pricing (RTP), peak-time rebates, block rates, and a range of ancillary services. The functions of the removable modules can be tailored by utilities or other load-managing entities to provide support for the unique needs in a given region or service territory, without impacting the end-use devices.

A CTA-commissioned study shows the energy savings potential of smart home products and systems in a residential setting.

In addition to the development of industry standards, CTA also commissioned a first-of-its-kind study published two years ago which quantified the energy savings potential of selected home automation products and systems. In brief, the increasing use of home automation technology through the Internet of Things (IoT) has the potential for substantial energy savings and greenhouse gas emissions reductions.

The study, *The Energy Savings Potential of Home Automation Technology*, found widespread adoption of home automation products such as temperature, circuit and lighting control, if used for energy savings purposes, could collectively avoid up to 100 million tons of CO2 emissions and reduce total residential primary energy consumption by as much as 10 percent –savings that is more than consumer electronics' share of residential primary energy consumption (8.4 percent), according to a separate CTA study.

This study reported the overall U.S. technical energy savings potential from several individual approaches ranges from 0.3 to 1.1 quadrillion BTUs (quads) of primary energy consumption, or from one to five percent of total residential primary energy consumption. The study's findings, which represented the best current estimates of achievable savings, highlighted several areas where home automation could deliver energy savings, including connected thermostats, HVAC zoning, and control of window shades, circuits and lighting.

Actual energy savings depends strongly on how users choose to control their automated household devices and equipment, the study found. Intelligent features, when activated, can enable greater savings. Smart thermostats, for instance, can learn when specific rooms in a home do and do not need conditioning to save energy without sacrificing comfort. Savings could be even higher when automated devices are used together, as with whole-home control.

Sales of many home automation technologies are projected to rise over the next few years, according to CTA's *U.S. Consumer Technology Sales and Forecasts*. Consumer trends have shown that the primary motivator behind purchasing automation products, such as smart blinds, thermostats and light fixtures, has been for convenience, security and/or entertainment. Particularly relevant to EPA's consideration of an ENERGY STAR program approach for SHEMS, the study found that further increasing the marketability of these products to homeowners by promoting their energy savings potential could lead to more energy savings nationwide.

As further background, the study was conducted by the Fraunhofer Center for Sustainable Energy Systems CSE and commissioned by CTA. Fraunhofer CSE identified 17 candidate home automation approaches and selected five to study in depth, based on initial energy savings estimates and feedback from members of CTA's TechHome Division, energy efficiency program administrators and developers. The findings recommended pursuing targeted field studies of sufficient scale to refine these energy savings estimates, especially for approaches whose savings depend more strongly on occupant behavior. The entire study, *The Energy Savings Potential of Home Automation Technology*, is available online[3].

CTA looks forward to providing additional comments and input as EPA continues its exploration and development work on ENERGY STAR and SHEMS.

Sincerely,

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[3] https://www.cta.tech/CTA/media/policyImages/Energy-Savings-from-Five-Home-Automation-Technologies.pdf