Connected Criteria for Large Load Products (Pool Pumps, CAC-ASHP, Water Heaters, EVSE) Discussion Guide

February 2019

Introduction

The U.S. Environmental Protection Agency (EPA) has maintained optional connected criteria in the ENERGY STAR® specifications for several products since 2011, now totaling 11 different types. These criteria have sought to balance the features consumers are interested in, the ability to provide grid services that utilities are interested in, and the additional energy use and energy saving potential associated with connected products.

In the past several years, the landscape of home automation and the need for flexible loads has changed, placing increasing value on flexible and controllable loads and the tools needed to achieve them. Given these developments, EPA is advancing our strategy on connected criteria to serve the evolving market and expanding coverage to linchpin products. This Discussion Guide lays out the context for this evolution and the resulting specification activity for a small set of ENERGY STAR products. It is intended to start a discussion with stakeholders about the strategy and about how to implement it. EPA welcomes stakeholder feedback and has included questions that EPA particularly hopes to explore. Before detailing the specifics of the proposed strategy for connected criteria of a subset of ENERGY STAR products, this Discussion Guide lays out the general landscape of grid evolution.

Background on the Potential for Connected Technologies to Deliver Both Energy Efficiency and Load Flexibility Benefits to the Grid

To date, the role of energy efficiency in the electric system has been primarily to offset the need to build or purchase fossil fuel generation. Energy efficiency is often the least cost system resource and as such, there has been substantial investment by utilities in energy efficiency programming over the past two decades. Approximately $29.3 billion was spent on U.S. electric energy efficiency programming from 2012 through 2016 alone.[1] Depending on the number of years programs have been running, the energy efficiency technologies promoted, and the nature of when the electric system peaks, energy efficiency can offset the need for baseload, intermediate load, and/or peak load generation[2].

Going forward, energy efficiency will remain an important component in the overall electricity supply market, enabling cleaner generation resources to cost-effectively meet demand. By decreasing the scale of renewable generation resources and the related transmission and distribution infrastructure needed, energy efficiency can save customers money directly through lowered bills and indirectly through lowered rates.

[1] Consortium for Energy Efficiency (CEE), *2017 State of the Efficiency Program Industry*, pp. 30-31. March 21, 2018.

[2] American Council for an Energy-Efficient Economy, *Keeping the Lights On: Energy Efficiency and Electric System Reliability*, pp. 5-10, October 2018

Enabled by modern grid investments that improve visibility, management and automation, energy efficient technologies can be bundled with other distributed energy resources (DERs)[3] to provide other important grid benefits. For example, energy efficient investments that flatten energy use at peak times can be geotargeted to specific electric zones or nodes on distribution feeders to relieve grid congestion. Similarly, energy efficient technologies, can be an important part of a DER bundle to help address the intermittency of wind and solar resources[4]--balancing electric system load, frequency, and/or voltage.

To achieve full benefits, a DER bundle typically needs to have some loads that can be controlled automatically to reduce energy consumption, shift it to another time period, or in some cases accept electricity during times of oversupply (for direct use or to store for later use.) Load control has been the purview of utility demand response programs for many years. Electric demand response programs represent a substantial utility-sector investment in the United States--approximately $1 billion per year.[5]

The increased availability of connected features imbedded in ENERGY STAR certified products[6] is enabling energy efficient and demand response-ready (DR-ready) technologies to be installed as a package, blurring the lines between investments that typically have been treated separately within the utility organization.

At the same time, the U.S. electric grid is undergoing rapid change with retirement of predominantly fossil fuel-based power plants, coupled with growth in both utility scale and customer side renewable electric generating capacity.[7] As shown in Figure 1, the growth in utility-scale renewable electricity capacity is predominantly solar and wind, with an estimated 80 gigawatts (GW) of new solar photovoltaic and wind projected to be added between 2018 and 2021.[8]

[3] A distributed energy resource (DER) is a resource sited close to customers that can provide all or some of their immediate electric and power needs and can also be used by the system to either reduce demand (such as energy efficiency) or provide supply to satisfy the energy, capacity, or ancillary service needs of the distribution grid. The resources, if providing electricity or thermal energy, are small in scale, connected to the distribution system, and close to load. (NARUC). Examples of DERS include energy efficiency, demand response, battery storage, behind the meter solar, and combined heat and power.

[4] Wind and solar are often referred to as intermittent resources as their availability can be affected by weather conditions.

[5] CEE, 2017 *State of the Efficiency Program Industry*, pp. 30-31.

[6] Many products that are marketed as smart are not designed with energy efficiency or grid services in mind. There is no industry accepted definition for smart. EPA uses the term “connected” in the specification development processes to describe products designed to communicate to other systems inside and outside the home in order to provide energy use reporting, consumer amenity, and in most cases also load shifting capability.

[7] Source: https://www.eia.gov/todayinenergy/detail.php?id=34452

[8] U.S. Energy Information Administration. Annual Energy Outlook 2018. Accessed from www.eia.gov/aeo

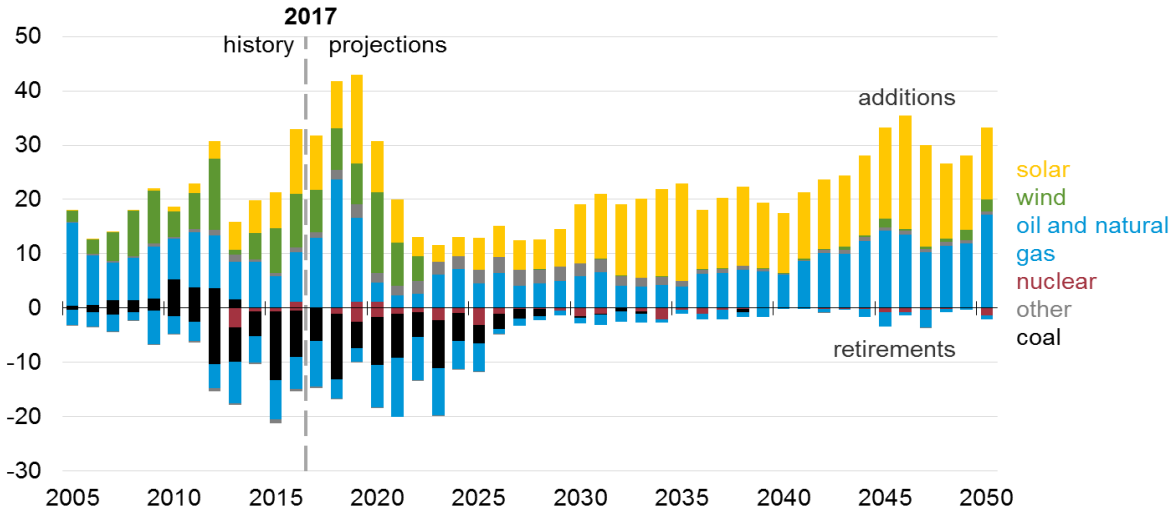

Figure 1 Annual Electricity Generating Capacity Additions and Retirements (gigawatts)
Source: U.S. EIA Annual Energy Outlook 2018

Small-scale solar deployments also continue to grow, delivering an estimated 23,991 GWh of net generation in 2017, more than half from the residential sector (see Figure 2)**.** Among the ten states with the largest net generation from solar assets, small-scale photovoltaics make up 2.6 to 59.3% of solar total with 25.2% being the average.[9] Small-scale PV presents both opportunities and challenges. Like targeted energy efficiency investments, installation close to load can make small-scale solar attractive as a DER. However, it can also pose challenges, if there is an oversupply of generation and customer output needs to be curtailed.

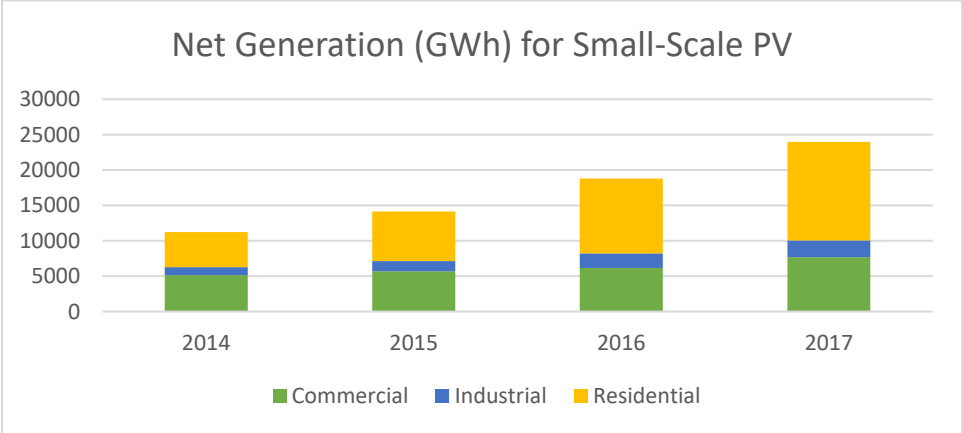

Figure 2. Annual Net Generation from Small-Scale Photovoltaic
Source: compiled from https://www.eia.gov/electricity/monthly/current_month/epm.pdf

Combined, these factors contribute to the substantial interest among utilities in energy efficient products with features that also are DR ready, capable of being controlled or dispatched to provide electric grid services.

[9] Based on EIA Electric Power Monthly table 1.17.A, August 2018 data. (Does not include HI).

What This Means for ENERGY STAR

Considering this trend, EPA has identified a small set of products that have particularly large potential to support this evolved grid landscape. Those are water heaters, central air conditioners and air-source heat pumps (CAC/ASHP), pool pumps, and electric vehicle supply equipment (EVSE).

- Water heaters and pool pumps have considerable flexibility in when they use energy, before it starts affecting user service.
- Water heaters and EVSE act as energy storage, as do CAC and ASHP to a much lesser extent.
- CAC and ASHP energy use is highly peak coincident, meaning they present a great opportunity for limiting demand, particularly in critical shortages.
- Lastly, all of these products impose large loads, compared to other common residential equipment.

The ENERGY STAR specifications for EVSE and pool pumps currently include optional connected criteria, while the water heater and CAC/ASHP specifications do not. EPA plans to work with stakeholders to incorporate connected criteria in these two specifications. For all four products, EPA expects utility actions to significantly impact the spread of connected capability into the market, because the loads have such impact or potential impact on the grid. For some of these products, connectivity may also offer consumer amenity.

This discussion guide begins with a summary of the recent history of connected technologies delivering environmental and grid benefits. We will focus most of this document on the ENERGY STAR connected criteria – what they look like now in ENERGY STAR specifications, with a particular eye to balancing grid, manufacturer[10], and consumer interests, and will then discuss the potential divergence in approach for these four products from what we have historically done. We will also examine considerations for each of the product categories, along with timing and how revising or adding connected criteria fits with other specification activity. Lastly, we will outline test method and data reporting considerations for these revisions. Questions associated with each of these topics are listed at the end of each section. EPA appreciates all stakeholder input regarding these questions. Once comments are received on the guide, progress will switch to revisions of individual product specifications. For CAC/ASHP and EVSE this will be combined with ongoing revisions. For water heaters and pool pumps they will be independent minor revisions, and the timing will depend on other work and on resources available. We will take the pace of other market developments into account as we manage these revisions.

The Evolving Approach to Connected Criteria for ENERGY STAR Products

The ENERGY STAR program began including optional connected criteria in specifications in 2011, starting with the specification for refrigerators/freezers. Seeing that connected products intending to offer grid services were entering the market, consistent with the ENERGY STAR brand promise, EPA sought to ensure that customers derived immediate value from connected functionality, beyond the potential value of providing grid services. EPA has since developed

[10] We use the term “manufacturer” throughout this document to refer to all companies that offer products (hardware, software, service). We understand that service providers are likely to be involved, which could be the same as the manufacturer of the physical equipment but need not be.

connected criteria for ten other specifications, bringing the current total to eleven. Except for the connected thermostats specification, connected criteria are optional, meaning products do not have to meet the criteria to be certified as ENERGY STAR. Our new approach recognizes the increasing relative value of grid services versus consumer amenity for the large load products and leads us to consider changes in our requirements as outlined below.

	Existing (in most specifications)	Expected to be proposed (large loads only)
Energy Consumption Reporting	Required; accuracy must be documented	Able to receive and respond to application layer messages typical of Open ADR or CTA-2045 that are relevant to these elements.
Operational Status Reporting	Defined more specifically for some product types, not all	
Demand Response	Defined responses for Type I, Type II and Type III requests for some but not all product types	
Remote Management as consumer amenity	Yes, for most product types	May not be required or specified
Open Access	Uses standards in the SGIP catalog or similar; interface documentation or API required; open access may be cloud to cloud	Uses standards in SGIP catalog or similar; able to receive and respond to application layer messages w/o cloud connection (possibly with controller)
Modular DR communication	Allowed and encouraged, not required	Allowed and encouraged, not required
Connected Capability not Optional	Connected Thermostats only	Connected criteria remain optional (except Connected Thermostats)
Standby power limit	Some product types; limits vary	TBD
Consumer alerts	Many product types: alert consumers to energy wasting conditions (e.g. open refrigerator door)	Look for opportunities; not an area of concentration
Data elements reported	On-premise connectivity protocol (e.g. Wi-Fi, zwave, etc.) What additional hardware is needed to connect (e.g. WiFi router, module) For a few products, DR capability summary in lieu of specific criteria	On-premise connectivity protocol (e.g. Wi-Fi, zwave, etc.) Whether a specific controller, sold separately, is needed to access connected capability What other additional hardware is needed to connect (e.g. WiFi router, module) Additional data elements to be identified.

On-site open standards allow use for load control throughout the time the product remains in service, reducing the risk that a manufacturer cloud shutdown, rebrand, or product sunset would effectively eliminate capability that was planned for a specific time period, size, and location. This planning capability is central to the utility market, which must demonstrate resource availability when conducting load control and incentive programs. For many utilities, the preferred solution to provide this is a physical port on the device that accepts a module provided by the utility. The port is designed so that residents can receive the module in the mail and install it themselves. This is conceptually similar to a USB port. There is a standard for such a physical port and corresponding module for load control purposes, CTA-2045.

Manufacturers have hesitated to provide on-site open standards access to load control capability, with most manufacturers objecting particularly to CTA-2045 or a similar open standard port, arguing it is costly, and in some cases presents a security risk. However, EPA has seen manufacturer support for application layer translation. As such, for large loads EPA is exploring criteria that require application layer translation take place in the device itself, rather than in the cloud. This means that whatever the protocol carrying these application-layer messages to the device, it can respond to them in the absence of connectivity to a particular manufacturer's cloud. This architecture was also in the AHRI 1380P standard for grid-ready HVAC equipment. While that standard has not been released, its development by utilities and HVAC manufacturers signals the potential for agreement. Lastly, this is a position that while not supported by all utilities, is supported by the Consortium for Energy Efficiency (CEE) and the Electric Power Research Institute (EPRI), representing the consensus of a majority.

The modifications required in the product itself to achieve application layer translation without a cloud connection are essentially some firmware and potentially an upgraded processor. This would be significantly less expensive for manufacturers to implement than a physical port, because most of the hardware and control software required to facilitate it would be included in the products for other purposes. Most manufacturers that EPA has spoken with feel this is a manageable design change, though some remain concerned about whether the customer's experience of their product would suffer, with responses mediated by the product locally without the support of their cloud.

From EPA's perspective, this strategy has a side benefit in that products could be tested for DR response considerably more simply, by presenting the product with a DR message in an open protocol it supports and measuring its response.

Feedback Request:
EPA seeks feedback on the following:

1) What are the implications to upgrading local processors to be able to respond locally? (added hardware, software changes, energy use, other considerations)
2) What are the pros and cons of DR application layer message translation locally in the product?
3) What are the pros and cons of products using a cloud connection for DR response?
4) Is there a way to quantify the additional utility support that would be available for products that do have local application layer protocol translation and therefore are a less risky investment?

5) The flexible load resources these products could provide would be most useful to the grid if distribution system operators know where they sit in the grid topology. For instance, this would allow optimum use of these resources to alleviate distribution bottlenecks. What mechanisms are used currently to provide this insight (e.g. in program deployment)? Are there specification criteria that could facilitate this?

Considerations Specific to Pool Pumps

EPA is not aware of technical considerations specific to pool pumps that have implications for the proposed approach, but there are market considerations that affect the opportunity and timing of updating connected criteria. The pool pump market is expected to undergo major changes leading up to the July 2021 effective date for Federal Standards on pool filtration pumps, subject to resolution of standards activity referencing pool pump replacement motors.

Variable speed pumps will be widely adopted for the first time in most inground pools. Variable speed pool pumps are generally the flagship products of their respective manufacturers and contain much more advanced controllers than the comparable single speed and 2 speed pumps, making this equipment the most capable deployed products for advanced load control strategies. Currently, multiple pool pump market leaders offer connected functionality in their products, usually through optional controllers, encouraging consumer adoption based on consumer amenities such as convenience, monitoring, and scheduling. This presents a considerable load control opportunity across the US. Pool pumps are well positioned as a product that can effectively be used for load shifting, can curtail with limited end use impact, and can “load up” to use overgeneration when excess energy is present.

EPA will engage pool pump stakeholders to revisit the Connected and Demand Response (DR) provisions in the ENERGY STAR Pool Pumps Specification Version 2 (i.e. as part of a Version 2.1). In consideration of the current regulatory uncertainty in the pool pumps market, EPA may delay action on the specification until late 2019 or 2020. Any criteria changes would remain optional and would not affect the certification of currently certified products.

Feedback Request
EPA requests information on the following aspects of the current and future pool pump DR market:

1) Market Changes: In 2019 and 2021, ENERGY STAR requirements will reward increased availability of variable speed products. Further, Federal 2021 Standards are expected to drive this market change further, which can support more advanced Demand Response. Is this anticipated to drive more pool pump DR products, interests, and programs?
2) Technical: What are the technical barriers to pool pump DR and to creating an out-of-the-box connected product? Would industry or reference standards mitigate some of these issues?
3) Market Adoption: What are the current adoption barriers for pool pump DR? Stakeholders have previously mentioned: first cost, lack of equipped products, and lack of consumer interest/awareness. Will connected criteria lower some of these barriers?
4) Cost: First cost is often considered a key driver in pool pump purchases. Does the industry anticipate the incremental costs for connected and DR equipped pool products to decrease significantly? What would help drive adoption to reach a critical mass?

5) What data would pool pumps need to be able to send to a DR management entity (DRMS, etc.) about their state to optimize usefulness to the grid (e.g. daily filtering remaining)?
6) Can manufacturers remain in control of user experience when service may be impacted by use of pool pumps as grid resources? If so, are there any criteria necessary to ensure it's possible? If not, how will user impact be minimized?

Considerations Specific to Central Air Conditioners and Air Source Heat Pumps

Currently, the ENERGY STAR Version 5.0 Residential Air Source Heat Pump and Central Air Conditioner Equipment specification does not include connected criteria. EPA recently released a Discussion Guide as a kick-off to the Version 6.0 specification revision process. EPA intends for this to be a full revision of the specification and plans to incorporate optional connected criteria into it.

At this point, EPA has participated in many conversations with manufacturers, utilities, and other invested stakeholders regarding the best approach for incorporating connected criteria into the CAC/ASHP specification. EPA intends to build on the work of the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and the CEE on the AHRI 1380p standard for grid responsive equipment and on the field trials of grid responsive equipment that the EPRI has run. As stated previously, the AHRI 1380p standard already reflects a compromise between manufacturer and utility interests.

Revision of the CAC/ASHP specification is a high priority for EPA. EPA is closely monitoring the progress of relevant work at the Department of Energy (DOE) and industry groups. In addition, we are awaiting release of AHRI 1380p, which is currently expected March 2019. EPA anticipates completing this revision by the end of 2019.

Feedback Request

EPA requests information on the proposed path toward optional connected criteria in the ENERGY STAR CAC/ASHP specification:

1) Has the process of working with manufacturers on AHRI 1380p altered utilities' positions on the question of on-premise open standards, or the appropriateness of such criteria in an ENERGY STAR specification?
2) Should EPA refer directly to a table of appropriate responses to specified grid requests, as expected to be in the AHRI 1380p standard?
3) Most variable capacity systems achieve optimal energy efficiency and consumer satisfaction when operated with a proprietary controller instead of a third-party thermostat, and most are currently installed with one. Meanwhile. most owners of fixed capacity and staged capacity systems use a third-party thermostat. For variable capacity systems with proprietary thermostats, it makes sense to allow the entire system (with controller/thermostat) to meet the connected criteria. Should controllers or thermostats be included or considered for other system types? If so, how?

Considerations Specific to Water Heaters

Water heaters present a particularly interesting load for grid balancing purposes, as they can store energy on the scale of hours to days, without reduction of consumer service. In addition, every home has a water heater. Because of this, there are many relevant utility and regulatory activities which EPA would seek to coordinate with.

- CEE recently added a connectivity section to their Residential Water Heating Initiative.
- The Northeast Energy Efficiency Alliance (NEEA) is revising their Advanced Water Heating Specification to include a requirement that products above Tier 3 must provide load control capabilities.
- Many municipal utilities and cooperatives own water heaters in customer homes and use them to keep customer rates low.

As in other product categories, most but not all water heater product providers are willing to consider application layer translation local to the product. A minority would prefer a specification that allows all protocol translation to take place in the cloud, with a strictly proprietary on-premises link. In addition, providers that offer both CAC/ASHP and water heater products want to be able to use the same approach for both. EPA's approach represents a compromise position, with application layer protocol translation on site but not necessarily with an open standards module, as some of the utility efforts require.

Aside from connected criteria for heat pump water heaters, EPA is aware that control of electric resistance water heaters is promising for flexible load response. Though EPA has not reconsidered its position regarding the exclusion of electric resistance water heaters from the ENERGY STAR specification, there is potential for these water heaters to eventually use an ENERGY STAR grid response test method, if developed. The ENERGY STAR platform could help drive a more consistent approach for demand response and grid balancing through both ENERGY STAR and non-ENERGY STAR electric water heaters. EPA requests information on the approach for integrating optional connected criteria into the ENERGY STAR water heaters specification, and related considerations.

EPA does not currently include connected criteria in the ENERGY STAR Version 3.2 Residential Water Heaters specification. Given that EPA would incorporate optional connected criteria into the water heater specification as an amendment (i.e., Version 3.3), all currently-certified products would remain certified whether or not they met the optional connected criteria. Products that met the criteria could update their certification information to include this and be presented on the ENERGY STAR list of certified products as "connected". EPA will initiate a revision to update uniform energy factor (UEF) criteria (and eliminate EF criteria) at a later date.

Developing connected criteria for water heaters is a high priority for EPA, and we anticipate starting as soon as possible. We hope to have a draft released before the ACEEE Hot Water Forum in March 2019 and to hold a stakeholder meeting in conjunction with it.

Feedback Request
EPA requests information on the approach for integrating optional connected criteria into the ENERGY STAR Water Heater specification, and related considerations.

1) If an ENERGY STAR DR test method is developed, what issues specific to heat pump water heaters would need to be addressed?

2) If an ENERGY STAR DR test method is developed, what considerations should be addressed so that it is also useful for electric resistance water heaters outside of the ENERGY STAR program?
3) EPA would include a requirement that allows consumers to temporarily override a DR event. What is the appropriate length of time before the water heater returns to normal DR-ready operation?
4) Can EPA easily build off response requirements, such as those in CEE's Residential Water Heating Initiative, or is more specificity required for ENERGY STAR?
5) What data would water heaters need to be able to send to a DR management entity (DRMS, etc.) about their state to optimize usefulness to the grid (e.g. current energy storage capacity, tank temperature, etc.)? What data are water heater manufacturers and service providers willing to send?
6) Can manufacturers remain in control of user experience when service may be impacted by use of water heaters as grid resources? If so, are there any criteria necessary to ensure it's possible? If not, how will user impact be minimized?

Considerations Specific to Electric Vehicle Supply Equipment

While EPA is currently working on an effort to include direct current (DC)-output EVSE into the scope of the ENERGY STAR specification, the current Version 1.0 pertains to alternating current (AC)-output EVSE only. This specification has optional connected criteria that require products listed with this functionality to be capable of supporting DR, similar to the requirements for other connected products. Rather than specific responses to specific grid requests, the current EVSE criteria ask for a summary of DR capabilities. This is the same approach used in the connected thermostat specification. In addition, EPA recommends that once DR capability is integrated into EVSE, the product be capable of directly or indirectly supporting price response as well as signals-based DR.

As EPA moves forward with the Version 1.1 revision effort to include DC EVSE, there is an opportunity to revisit the connected requirements to determine appropriate criteria for the future for both AC and DC EVSE. If EV charging can be managed and coordinated based on grid conditions, EVSE could be a powerful resource to increase grid stability.

There are two important differences between EVSE and the other products discussed in this guide. First, bi-directional communications and energy metering capabilities support financial transactions involving EVSE, which is unneeded for the other products. Second, system architecture questions include the additional issue of whether functions reside in the charger or in the vehicle itself – some systems are designed for a dumb charger and a smart vehicle. Because of these differences, the approach for EVSE may be significantly different than for the other three products. For instance, for EV chargers, we have not heard utilities say it is critical that the connection between the EVSE and the utility be on-premises as opposed to in the cloud. The remainder of this section outlines what EPA has learned thus far and includes questions we seek more information about.

EPA has heard from a stakeholder that utilities have more advanced programs in place for grid communication for AC EVSE given that they are more established in the market, while DC EVSE grid communications are mostly in the pilot stage. It is also worth noting that EV chargers

are frequently deployed as a fleet that is controlled locally, as in a company's parking lot. In addition, connectivity in this case may be driven by the need for an EV charger service company to connect to their chargers and manage payment for charging services. This applies to AC chargers located elsewhere than in individual homes and is expected to apply to virtually all DC chargers.

EPA received feedback that grid service potential may be strongest for AC chargers, because the expected use involves vehicles being connected for longer times. When EV owners park at a DC EVSE, they are usually in need of a quick charge session and would not want a load control event to prevent them from charging their vehicle. Another stakeholder noted that this is true unless the DC EVSE is integrated with an on-site generation or storage system. Both stakeholders noted that for instances where DC charging is more flexible, like for fleet applications, the ability to communicate time-of-use pricing would be valuable to encourage load shifting. Utilities are not yet communicating price signals, but a few have begun running pilot programs to determine the effectiveness of price responsiveness.

This summarizes the types of communication and considerations upstream from the EVSE to the utility, but the EVSE also needs to be able to communicate with the EV. The ISO 15118 *Vehicle to Grid Communication* standard specifies communication between a vehicle and an EVSE. The goal of this standard is to determine the best option for load management based on grid conditions and mobility constraints of the consumer. Eight vehicle manufacturers support the development and use of ISO 15118, so the vehicle does not need to be designed with various load protocol communications. EPA has heard that ISO 15118 may not be applicable for residential EVSE, but EPA is interested in continuing conversations with stakeholders to make appropriate considerations for referencing the standard, as applicable.

EV Chargers can be used to shift load and, in the future, even act as an energy storage system that could provide bi-directional flow of electricity (i.e., vehicle to grid capability, or V2G).

As the V1.1 revision continues, EPA will continue working with stakeholders to determine the most helpful connected requirements as part of it.

Feedback Request
EPA requests more information to inform any updates that will be proposed to the ENERGY STAR EVSE connected criteria:

1) Are there other open source protocols available to enable DR than those listed in Section 3.6 of the Version 1.0 EVSE Specification that EPA should consider?
2) Are EVSE manufacturers considering integrating the CTA-2045 interface into their network-connected products?
3) Have EVSE manufacturers adopted the ISO 15118 standard into their network-connected products or do they plan to have ISO 15118-capable EVSE in the future?
4) If EPA were to develop a grid response test method, what issues specific to EVSE would need to be addressed?
5) What are the business models of companies currently offering grid services through EVSE?

Test Methods and Data Reporting

The kind of specific criteria EPA envisions including in these specifications would be amenable to a test method that ensures products respond to grid requests as the criteria specify. Such

tested performance would be very valuable to utility programs. The Department of Energy (DOE) is the lead agency for ENERGY STAR test methods and would work with EPA to establish (or revise) methods for the grid responsiveness of these products. These would be different in detail but similar in type to those DOE has already established for pool pumps, refrigerators, and room air conditioners. In the case of CAC/ASHP, DOE will examine the test method associated with AHRI 1380 and consider relying on it. EPA and DOE anticipate that test methods would be developed in coordination with specification revisions to include or revise the connected criteria.

Product test method	***Action***	***Timing***
CAC/ASHP	Create or refer to industry	TBD
Water Heaters	Create	2019
EVSE	Create if needed	TBD
Pool pumps	Revise	2019/2020

Data about grid responsiveness would be submitted along with other product data through EPA's qualified product exchange (QPX) system. Certification bodies collect information and review test data of candidate products and, upon certification, upload specified product data to EPA's product database using QPX. The database is publicly accessible, including through an API, and it is common for entities that want to highlight a subset of ENERGY STAR products to use the database and associated API to develop their own list that is a subset of certified products. If there are particular data fields that would facilitate this practice for connected products, EPA would consider including them in the QPX. For instance, if some utilities are interested only in products with a physical CTA port or in products that include a non-WiFi connection, this mechanism could make it easy to identify those products. EPA is interested in feedback that could maximize the usefulness of our certified product database.