



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
AIR AND RADIATION

July 30, 2019

Dear ENERGY STAR® Stakeholder:

With this letter, the U.S. Environmental Protection Agency (EPA) is sharing stakeholder feedback and EPA responses in regards to the [ENERGY STAR Connected Criteria for Large Load Products Discussion Guide](#) that was released in February, 2019.

EPA has maintained optional connected criteria in ENERGY STAR specifications for several products since 2011 and is looking to advance connected functionality for a subset of ENERGY STAR products to encourage additional efficiency and load flexibility potential. This work aligns with current activity in these large load product areas, such as AHRI 1380 development in central air conditioning. The Discussion Guide laid out the general landscape of grid evolution along with detailed considerations for the following ENERGY STAR products: water heaters, central air conditioners and air source heat pumps, electric vehicle supply equipment, and pool pumps. This approach enabled stakeholder feedback both on a cohesive strategy for demand response criteria for ENERGY STAR and on the market status and challenges for these individual product types. As ENERGY STAR connected criteria for each of these product categories are developed, EPA will take into account the comments received on this discussion guide and invites stakeholders to continue engaging with and informing their development.

Please direct any questions to Abigail Daken at EPA, [Daken.Abigail@epa.gov](mailto:Daken.Abigail@epa.gov) or 202-343-9375 or John Clinger at ICF, [John.Clinger@icf.com](mailto:John.Clinger@icf.com) or 215-967-9407. Thank you for taking the time to review this document. I look forward to working with you to further connected criteria in ENERGY STAR products.

Sincerely,

A handwritten signature in cursive script, appearing to read "Abigail Daken".

Abigail Daken, Manager  
ENERGY STAR HVAC Program

# ENERGY STAR Connected Criteria for Large Load Products Discussion Guide Stakeholder Comments and Environmental Protection Agency Response

1.	General Comments .....	3
1.1	Application Layer .....	3
1.2	Location Information .....	5
1.3	Response to DR Signals.....	5
1.4	Product Operating Data .....	6
1.5	Consumer Override of DR Requests .....	7
1.6	Cost and Technical Barriers .....	8
1.7	Standby Power of the Controller .....	8
1.8	Controllers Sold Separately .....	9
1.9	Qualified Product List .....	10
2.	Product-Specific Comments .....	12
2.1	Water Heaters .....	12
2.2	CAC/ASHP .....	12
2.3	EVSE .....	12
2.4	Pool Pumps .....	13
3.	Timeline and continuing development .....	14

# 1. General Comments

## 1.1 DR Communication Architecture

EPA set out a number of questions about the architecture and protocols for DR communications. It became clear from the comments that not everyone understood the scenarios we were comparing and the words we used to compare them. For reference, we've included several diagrams of possible architectures, in order to make our questions, the comments, and our responses clearer.

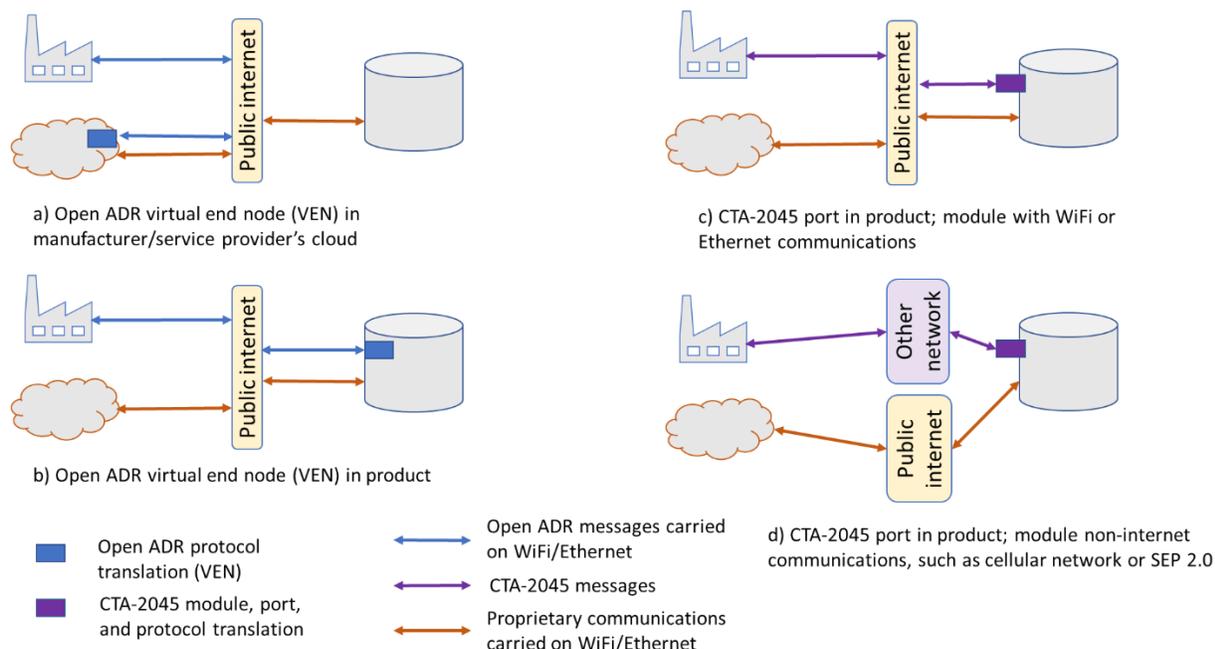


Figure 1: Examples of some architectures using open standards for DR. Example a) demonstrates protocol translation in the cloud; examples b), c) and d) all feature on-premises protocol translation. Note that while the CTA-2045 protocol used in examples c) and d) covers all application layers, OpenADR is an application-layer-only protocol, and all other layers would need to be carried by some other open standard, such as Wi-Fi. The test boundary for ENERGY STAR purposes would include the Open ADR virtual end node (VEN), wherever it's physical location, for products opting for this protocol. For products using CTA-2045, the test boundary would not include the module. Please see [additional and more detailed examples here](#), generously contributed by the Electric Power Research Institute (EPRI).

In the Discussion Guide, EPA asked stakeholders to comment on the advantages and disadvantages of using local message translation (such as contained in CTA 2045) and cloud connection (such as some configurations of Open ADR) for DR and to quantify the utility support for products that have local application layer protocol translation

## Stakeholder Comments

### Local DR Message Translation and Response

Stakeholders were not able to quantify utility support for on-premises translation but did submit comments on the advantages and disadvantages of local application layer DR message translation. The advantages of local translation include:

- No intermediate station, such as a cloud server,
- Having enhanced translation capabilities across multiple open source DR protocols;
- Certain products would only require a software modification to enable local application layer translation; and
- A reduced risk of stranded assets as utilities can reach the asset directly and gain access to recorded data without depending on the manufacturer's proprietary communication.

Stakeholders commented that the disadvantages of local application layer DR message translation include:

- Security challenges;
- Optimization and support of multiple protocols;
- Expense of product changes without revenue streams;
- Large design changes and product development efforts (though no specific cost was mentioned);
- Complex standards;
- Direct communication could require less investment in infrastructure but would result in latency due to the firewall between the product and the DR station;
- Lack of scalability; and
- Each product would need to maintain a connection with a DR station.

### **Cloud Connection for DR Response**

Stakeholders commented that the advantages of using a cloud connection for DR response include:

- Network connections to the DR aggregator would be simplified and network traffic could be cut back significantly;
- Real-time access to log data and issue commands;
- Ability to update software as needed;
- Cloud architectures scale relatively easily;
- Ability for brand owner or authorized 3<sup>rd</sup> party to leverage data analytics;
- Manufacturer can maintain proprietary controls;
- Allowing DR message translation to occur in the cloud would allow simultaneous optimization for DR and for other goals, including e.g. for consumer cost and GHG emission;
- Lower cost of entry for intelligent systems;
- Decreases management burden for the utility; and
- Reduction of utility maintenance for device connectivity and the burden remains with the manufacturer.

Stakeholders commented that the disadvantages of using a cloud connection for DR response include:

- Sending data through the cloud adds administrative load to the operator of the cloud to route messages to and from the DR station;
- Increased potential for stranded assets if a manufacturer goes out of business;
- Reliance on the cloud intelligence for DR participation;
- Product ability to respond to different event types rests on the capabilities of the cloud implementation (some of this risk is mitigated by requiring compliance to open standards, which mandates ability to perform these different event types);
- A manufacturer maintaining a cloud server system requires constant resource and administrative allocation,
- Operational data is only available to the cloud operator; and
- The consumer is limited in their participation in DR programs based on the cloud operator.

## **EPA Response**

EPA appreciates the thorough engagement from stakeholders regarding this topic. While EPA sees considerable advantages to standardizing across product categories, we will consider the DR protocol and architecture requirements for each product in light of their particular market needs and practices. At this time, EPA has not seen a compelling reason to exclude cloud-based architectures in categories where considerable support for them already exists. We intend to focus instead on supporting open standards and interoperability via protocols supporting cloud connections. Open ADR 2.0 is generally the protocol with the most current and anticipated widespread adoption that would be well suited for integrating into existing and in-development cloud back-ends. EPA anticipates further discussion on this topic. These comments made it clear to EPA that while the benefits and drawbacks of local or cloud-based application translation are fairly general, each product type is subject to unique considerations. EPA has included comments and responses specific to each product below.

### **Water Heaters**

EPA has released Draft 1 V3.3, proposing optional connected criteria for ENERGY STAR certified water heaters. The draft specifies CTA-2045 and/or OpenADR on premises or in the cloud. EPA notes that comments from water heater stakeholders indicate that both CTA 2045A and OpenADR 2.0 are viable in this product category, with numerous benefits and drawbacks to each. CTA-2045 was preferred in the form of lower hardware complexity required to implement, whereas OpenADR was considered a preferred option in cases where a network connected product was already operational and needed modification to engage in DR programs. OpenADR was also noted to have the benefit of supporting proprietary cloud connections already in operation or in development. While a plurality of commenters supported EPA's proposal, some preferred a less prescriptive approach that allows any open

standard to be used for local or cloud DR messaging and others advised EPA to require CTA-2045 compliance. EPA encourages further stakeholder discussion on this topic.

### **CAC/ASHP**

On July 29, EPA released a [proposal](#) on connected criteria for the CAC/ASHP Version 6.0 specification, which is in development. In it, EPA proposes that connected CACs and ASHPs meet communication and performance standards for CTA-2045A and/or OpenADR2.0 in alignment with AHRI 1380. This may be accomplished either via local application layer translation (i.e. VEN implementation on the product/controller) or cloud translation via implementation of a VEN as an extension of an existing proprietary cloud DR interface.

### **EVSE**

Stakeholders have not indicated whether on-premises or cloud connection is preferred. Rather, it seems both are acceptable and there are business models in place for cloud connection. As a result, EPA will maintain the proposal to allow either option in the connected criteria for EVSE. EPA has additionally heard from two manufacturers that are considering adding the CTA 2045 module to their products. As a result, EPA considers this module to be a viable option for enabling EVSE-grid interaction.

### **Pool Pumps**

Multiple comments on DR protocols and architectures were received from pool pump stakeholders. One noted that cloud connected pool pumps are already on the market, while multiple commenters noted that Wi-Fi connectivity from a pool location (e.g. backyard) could have unreliable coverage, which would potentially impact cloud solutions. Others noted the need for waterproof, hardened connectors, which could impact protocols with hardware requirements, such as CTA 2045A. Another commenter noted that application layer translation on the device would result in more complex hardware requirements. EPA encourages additional discussion with pool pump manufacturers on this topic, as no clear consensus is apparent at this time.

## **1.2 Location Information**

EPA asked about the mechanisms used to determine where a particular load sits in the grid topology and how this information could be communicated and used by utilities.

### **Stakeholder Comments**

Stakeholders stated that current mechanisms to provide location of connected products are either facilitated by user registration of their location details, or by assets grouping by DR aggregators (which has not proven effective for one stakeholder due to the number of assets required). Integrating location with utility systems beyond large general grouping could be accomplished by software solutions but becomes difficult due to confidentiality and cybersecurity issues, which are accompanied by potential regulatory concerns. Some stakeholders noted that they have access to such information, but others indicated that they had designed their software to avoid collecting, storing, or enabling access to location information.

Utility partners stated that location data may not be necessary for large scale grid operations, but some services such as Advanced DRMS would benefit from such information.

### **EPA Response**

EPA appreciates the stakeholder feedback on location data. At the moment, EPA does not intend to specify requirements for automatically collecting location data. It appears that there is no urgency for the capability, and there are significant privacy and security concerns to address for any such requirement. CTA-2045 and other protocols which support direct product endpoints benefit from location knowledge, as signals to these products with knowledge of location could be used to provide more fine-tuned grid benefits such as single block demand reduction or load shift. EPA intends to leave the application of this functionality up to manufacturer and grid stakeholders.

## **1.3 Response to DR Signals**

EPA asked about the level of specificity of response to DR signals that would be useful, and about any considerations particular to each product.

### **Stakeholder Comments**

#### **Water Heaters**

EPA received multiple comments on ensuring that the water heater DR operations were designed and operated by the manufacturer, not specified prescriptively. Stakeholders commented that this flexibility would allow manufacturers to compete to develop the best grid services without disrupting consumer use of their products. One stakeholder

comment on the Draft V3.3 specification advocated using this specification and the accompanying test method development to introduce metrics for DR performance for water heaters.

#### **CAC/ASHP**

Stakeholders supported communication and responses to be in alignment with AHRI 1380, which was determined by industry consensus. One commenter requested EPA add no additional requirements above and beyond AHRI 1380.

#### **Pool Pumps**

One stakeholder provided detailed comments to EPA on the potential impact of DR on equipment connected to a pool filtration pump, including a chlorine generator and/or pool heater. Another commenter noted the importance of ensuring pool filtration needs are met. An additional comment noted that pump control logic would be needed to ensure the product could respond to DR events safely.

### **EPA Response**

#### **Water Heaters**

EPA shares the stakeholder vision of flexibility and room for innovation in the DR responses for water heater products. In the current Version 3.3 Draft 1 Specification, EPA provides this response flexibility by requiring that specific DR signals are supported but does not provide prescriptive requirements on how these responses are implemented. EPA and DOE are considering whether the V3.3 specification could usefully establish metrics for DR performance.

#### **CAC/ASHP**

For CAC/ASHP products, EPA has [proposed](#) DR signal responses harmonized with the requirements of AHRI 1380, with the intention that products meeting this standard will also meet the DR criteria in the specification.

#### **Pool pumps**

EPA agrees with pool pump stakeholder feedback that many aspects of the specific pool installation must be accounted for in DR responses to ensure that consumer needs (as well as downstream product safety and reliability needs) are met. EPA also notes that filtration is the core priority with this product, so pool pump manufacturers will be free to make sure those needs are met when responding to any DR requests. EPA anticipates further discussion on how best to quantify and monitor filtration parameters in DR operations. In addition, EPA will work with stakeholders to identify programmatic and technical solutions that address other equipment in the system, such as pool heaters.

## **1.4 Product Operating Data**

EPA asked stakeholders what product operation data would be important to collect, and what would be important to have available through a communication link.

### **Stakeholder Comments**

#### **Water Heaters**

Regarding water heaters, one stakeholder offered an equation that can be used to estimate energy storage capacity and recommended possible fields to collect for a test procedure.

#### **CAC/ASHP**

One commenter requested EPA add no additional requirements for CAC/ASHP products above and beyond AHRI 1380.

#### **Pool Pumps**

Stakeholders noted that additional data would be valuable for ensuring the efficient operation of a pool pump, including via DR. One commenter recommended that daily filtering remaining was collected as a DR metric, so that DR operations could be optimized to ensure that all required filtration at a location was met. Another commenter noted that pool pumps, including variable speed, are often oversized for their application. Sizing info and typical operating range would provide valuable information to ensure that load up operations would remain in the operating range of the pool filtration system.

### **EPA Response**

EPA anticipates further discussion with stakeholders on any regulatory concerns or personally identifiable information concerns on connected and DR data.

### **Water Heaters**

EPA is proposing to require reporting current energy storage capacity, and an optional maximum storage capacity. This data is intended to inform active DRMS what is available for load up based on the current connected product fleet.

### **CAC/ASHP**

Beyond the requirements of AHRI 1380, EPA has [proposed](#) certain consumer amenity communication features, such as system status and messaging and providing instantaneous power draw to energy management systems. These features have potential for great consumer value, and EPA expects robust discussion of their place in a connected CAC/ASHP specification.

### **EVSE**

EPA believes that, for EVSE, state of charge may be one important metric to determine which EVSE should respond to a DR event (perhaps only those that are closer to full charge, in instances where possible). For Vehicle to Grid (V2G) applications, battery capacity may be another important metric to be able to share with a utility/aggregator. Both of these metrics relate to the vehicle, but the EVSE may be able to communicate this information if it is the primary enabler of a DR event.

### **Pool Pumps**

EPA agrees with stakeholder comments regarding pool pump sizing and filtration requirements. Unlike other large load products, pool pumps have more case by case installation specifics, including sizing, downstream equipment, installation specific plumbing configuration (head), installation specific filtration speed, and installation specific cleaning speed. These variables are best addressed via additional data provided to the DR system, versus estimated (typical) installation parameters. EPA would like to engage stakeholders on how best to work with and adapt current DR protocols and programs to account for the complexity in pool pump DR, rather than assuming typical installation parameters.

## **1.5 Consumer Override of DR Requests**

EPA typically includes requirements allowing for consumers to temporarily override a DR event. Stakeholders provided feedback on instances where override may be necessary.

### **Stakeholder Comments**

#### **CAC/ASHP**

One stakeholder commented against non-overridable events for CAC/ASHP products as it may directly affect consumer comfort.

#### **Pool Pumps**

One stakeholder commented that it is crucial that DR does not interfere with freeze protection routines, or a pool heater heating cycle. Stakeholder comments encouraged automatic override of DR events when filtration needs and/or downstream equipment needs (e.g. Pool Heater) must be met.

### **EPA Response**

Generally, EPA favors allowing for consumer override in all situations. EPA is unable to control what utility programs allow specifically but does require that a technical override capability exists and is applicable in most circumstances.

#### **Water Heaters**

EPA notes that V3.3 Draft 1 Water Heaters Specification allows non-overridable grid emergency commands, as most scenarios with consumer power loss / blackout risk would have a higher priority than the immediate hot water generation needs.

#### **CAC/ASHP**

EPA intends to allow all CAC/ASHP DR events to be overridable as that seems appropriate for this product category to ensure user safety and product satisfaction.

#### **EVSE**

EPA will continue to require that an EVSE that is DR-capable be able to provide a consumer opt-out function. EPA has heard from several stakeholders that transportation in emergency situations has to be a priority for EVSE. As a result, consumers need to be able to opt-out of DR events.

### **Pool Pumps**

EPA is supportive of user override in this category, especially since pool filtration is a sanitation and safety concern. EPA encourages stakeholders to implement logic that ensures pool filtration needs are met automatically without the need for a user to manually override events.

## **1.6 Cost and Technical Barriers**

Stakeholders provided feedback on specific barriers that may hinder grid communication and connected products in general for each product type. EPA responded to these concerns and identified areas where additional discussion with stakeholders is expected.

### **Stakeholder Comments**

#### **EVSE**

EPA has heard from one EVSE stakeholder that IEEE P2030 and OCPP do not have a quick enough response time to handle frequency regulations. Also, a stakeholder noted that V2G is a new industry and standards are still under development. V2G capability has not been widely implemented in EVSE, only tested in pilot programs today. EPA will take this into account when revising ENERGY STAR connected criteria for EVSE.

#### **Pool Pumps**

Stakeholders commented that there are several technical barriers in pool pumps for connected and DR technology. One commented that there is a lack of standardization in pool pump connected approaches and DR. Another commenter noted that the motor on a pool pump product can create harmonics and feedback which can interfere with the communications hardware, so an optimal design has the communications hardware separate from the motor.

### **EPA Response**

#### **Water Heaters**

EPA anticipates more discussion with water heater stakeholders on costs and technical barriers faced by this product type and encourages stakeholders to engage with EPA and DOE on the Version 3.3 Water Heaters Specification development.

#### **EVSE**

EPA understands that V2G standards are still under development and that current EVSE are not capable of providing V2G services. As a result, EPA will develop connected criteria to allow for the future implementation of V2G in products. EPA appreciates the feedback on the response time of the IEEE and OCPP standards.

#### **Pool Pumps**

EPA acknowledges that the lack of connectivity standards in pool pumps does present an obstacle, where manufacturers generally must develop their connected system fully without available reference standards. EPA encourages stakeholders to develop industry standards to recognize best practices in pool pump connected hardware and communications, to lower the technical barriers to bringing this functionality to consumers.

## **1.7 Standby Power of the Controller**

Some stakeholders, including utility commenters, raised concerns that adding connected hardware to products invites the potential for greater standby power usage than was previously typical in those products. EPA responded to these concerns and identified areas where additional testing or requirements would have the most impact.

### **Stakeholder Comments**

One stakeholder suggested a requirement that products provide connectivity in an efficient manner, and that EPA develop a low-power test method that could be applied to all large connected loads to decrease test burden. This stakeholder encouraged the use of a wattage adder (connected products would be allowed X watts additional power) rather than a percent increase in allowed energy.

### **EPA Response**

EPA appreciates the suggestion but contends that an allowance for standby power is only minimally beneficial when a product's power draw is orders of magnitude larger than the anticipated standby power. EPA recognizes that it is possible to get standby savings for some categories, but for many products these savings are small and do not provide significant consumer benefit. In general, EPA will consider this issue but will be cautious about imposing requirements and testing burden without sufficient benefit to the consumer. However, if there's a product category

where it does make sense, EPA will consider a Watt limit instead of a % of product power use. Note, however, that power reporting is part of the connected criteria for most products, and as such entities connected to the products, such as DR programs, would have an easy way to determine connection hardware standby power and study whether it is indeed a problem. Product-specific considerations for standby power are included below.

## **EVSE**

The requirements for AC chargers in the Version 1.0 specification are based on standby power, and they include power of the communications hardware needed for connectivity.

## **1.8 Controllers Sold Separately**

Stakeholders commented on inclusion of proprietary controllers for testing, and on the need and viability for stand-alone controllers with DR / load management support to provide a connection pathway to products already in the field.

### **Stakeholder Comments**

#### **CAC/ASHP**

For CAC/ASHP products, one stakeholder supported considering proprietary controllers with the entire system for ENERGY STAR compliance as the proprietary controller paired with a variable capacity system will provide the most energy savings. This stakeholder expressed that utilities base rebates off the ENERGY STAR label and consumers may install a less efficient, third party controller with a variable speed unit in order to maximize rebates. A different stakeholder stated that there are existing smart thermostat solutions favored by consumers that are optimized for DR and these should not be excluded. A third stakeholder encouraged flexibility in meeting the objective so that both proprietary and third-party controls that meet the criteria could achieve recognition.

#### **EVSE**

One stakeholder noted that even though most home chargers now are not connected, 70% of light-duty vehicle chargers today are located in single family homes. They added that the timing of grid impacts caused by electricity load from residential charging would likely be coincident with electric system peaks.

#### **Pool Pumps**

One stakeholder recommended including stand-alone controllers in pool pumps, as many variable speed pumps in the field are equipped with sufficient controls hardware and connectors to be made connected / DR equipped via a control add-on unit.

### **EPA Response**

These comments touch on two issues, which are related but which EPA thinks about separately.

The first is whether EPA has any way to recognize standalone after-market controllers (usually offered by 3<sup>rd</sup> parties) that could be used to provide DR from non-connected products that are already installed. Often, these controllers work well on relatively simple products with conventional energy efficiency. For instance, there are many such products offered for electric resistance water heaters. The ENERGY STAR label is not available for such devices; however, EPA recognizes their value and is open to other suggestions for how our specification activity on relevant products can spur standardization for after-market controllers as well. Note that there will be the potential to include such controllers in an ENERGY STAR certified [Smart Home Energy Management System \(SHEMS\)](#).

The second issue is whether partners may include controllers that are sold separately in the boundary of the tested product for connected recognition. For instance, several pool pump manufacturers offer controllers optimized to work with their high efficiency pumps to provide DR, but do not package or sell these controllers with pumps under a single model number. Could a pump be considered “connected” if it fulfils the criteria when used with such a controller? EPA has not allowed this for pool pumps to date but is rethinking this policy. The connected criteria for appliances specifications allows for a module that provides connectivity, and specifically says that the module may be sold separately. The use of a proprietary controller is similar in all important regards, and in general EPA will allow for products to be identified as connected if they meet the criteria in combination with a controller that is sold separately.

It is important to note that proprietary controllers used to meet the connected criteria will not be allowed to bear the ENERGY STAR certification mark.

Product-specific considerations are addressed below.

### **Water Heaters**

EPA notes that products which meet performance requirements and meet all connected functionality requirements could exist as a combination of controller and product hardware. Draft 1 V3.3 included a provision for the connected functionality to be tested with a manufacturer-provided add-on module.

### **CAC/ASHP**

EPA has [proposed](#) to allow CAC/ASHP products to meet all connected criteria in combination with a proprietary controller. This aligns as well with the structure of the system status and messaging criteria for ENERGY STAR Most Efficient CAC/ASHP, which require a controller or controlling app. These criteria are similar to (though more specific than) the consumer amenity of “alerts” included in the connected criteria for most ENERGY STAR products. I

It is notable that the scope of the connected thermostat specification includes the proprietary controllers that HVAC manufacturers offer for their CAC/ASHP equipment. So, unlike for other products, controllers for CAC/ASHP can demonstrate energy savings and earn the ENERGY STAR. However, the details of the specification have made it difficult for most proprietary controllers for variable capacity HVAC to be certified. EPA is interested in working separately with partners offering proprietary controllers to find a path for such products to earn the ENERGY STAR mark, for instance through the connected thermostat specification.

Note that EPA is not addressing the possibility of CAC/ASHP meeting the connected criteria in combination with a third-party controller. This may be technically possible but is unlikely to arise in the market, not least because it is unclear who has a motivation to certify such a combination.

### **EVSE**

EPA appreciates the stakeholder comments regarding the importance of the grid impacts of residential chargers and affirms our intent to address both residential and non-residential markets. EPA acknowledges that most of AC EVSE are located in homes today and do not have network connection or the ability to communicate with the grid. However, they present an opportunity for grid balancing and load shedding applications with after-market controllers, which is why we address this comment in this section.

Unlike in other categories, EPA is not aware of many after-market controllers available to install for non-networked chargers that do not already have the capability to respond to DR events. It seems there may be a demand in the future to access non-networked charging stations, especially in residential applications (since 80% of charging is done at home), via installation of a controller, or some mechanism to access the station. EPA anticipates further stakeholder discussion on what mechanisms can be used to control non-networked products. Specifically, regarding if they be controlled through a dedicated controller (installed after EVSE is in use), a SHERMS with a 240-V smart plug, or if the EVSE needs to be replaced to allow for DR capability.

## **1.9 Qualified Product List**

### **Stakeholder Comments**

In order to make the ENERGY STAR Qualified Product List more useful, one stakeholder recommended creating a distinct field for manufacturers to list available communications functions and protocols.

### **EPA Response**

As EPA continues to develop criteria for these product categories, EPA anticipates stakeholder discussions on what information is best to collect for each connected large load product. For typical connected products, the QPL includes extensive information about communications protocols the product uses.

### **Water Heaters**

EPA notes that there are several program strategies in place for connected water heaters, including pricing models, load shifting, and specific protocol needs (e.g. CTA-2045/ ADR 2.0). EPA encourages stakeholders to submit feedback on which fields would provide the most usefulness to program implementers, such as publishing fields on application layer protocol and support for different types of DR messages.

### **CAC/ASHP**

For CAC/ASHP products, EPA is considering listing the communication protocol (CTA-2045 or Open ADR) in the QPL, as some DR programs may specify which protocol is eligible. This would allow consumers to sort and select products that will be compatible with their local utility programs.

**EVSE**

The Version 1.0 EVSE Qualified Product List currently has a summary of the connected capabilities of EVSE that meet the connected criteria. This summary collects key information, such as DR services the product provides and open communications the EVSE supports. EPA can include additional information on the QPL, per additional stakeholder feedback.

**Pool Pumps**

EPA notes that communications protocols in pool pumps do not appear to be centered around a specific application layer at this time, so would propose to report this information on the QPL.

## 2. Product-Specific Comments

Stakeholders also shared comments that were specific in nature to one product category. EPA includes a summary of those comments, by topic, and responds to them below.

### 2.1 Water Heaters

#### Reheat Time Calculation

One stakeholder provided an equation for Water Heater time to reheat, which may be used to calculate DR specific items such as current or maximum energy storage capacity.

#### EPA Response

EPA appreciates this feedback and will evaluate the potential for incorporating this information into possible DR requirements.

### 2.2 CAC/ASHP

All comments received for this product category have been addressed in the general sections above. A related [proposal](#) recently released as part of the Version 6.0 CAC/ASHP specification revision process contains proposed connected criteria, and stakeholders are encouraged to follow and continue to inform that specification development.

### 2.3 EVSE

#### Open Standards Protocols

One stakeholder commented that Open Charge Point Protocol (OCPP) is not necessary to specifically reference in a note, as is currently done in the Version 1.0 Program Requirements. They also stated that the note referencing OCPP is out of date and should be removed. One stakeholder recommended that EPA consider listing the Smart Energy Profile 2.0 (IEEE 2030.5) protocol because it is required for vehicle to grid operations.

#### EPA Response

The note in Section 3.6.1 regarding OCPP is outdated and Open Charge Alliance is now the Standard Development Organization (SDO). At the time of development of the Version 1.0, OCPP did not meet the EPA definition of 'open standard', so it was specifically called out to allow for its use in supporting EVSE/grid communications. In 2015, it was being integrated into the IEC framework and it appears that this process is still ongoing through IEC 63110. As a result, EPA still needs to specifically reference OCPP because it does not meet EPA's definition of an open standard since it is not currently recognized by a well-established international standards organization.

The IEEE 2030.5 (SEP 2.0) would be considered an open standard by EPA definition and as a result, it is inherently recognized to be used for grid communications. The SAE J-3072 protocol is specific to the inverter onboard the EV, while EPA is focused on denoting standards that make grid communications possible from the EVSE to a utility, or an aggregator, or to the vehicle.

#### EV-EVSE Communication Considerations

One stakeholder commented that they have incorporated ISO15118 capability for European products and stated that the U.S. adoption is unlikely, but they would be prepared for that case. This stakeholder also commented that they are evaluating the CTA-2045 interface as an alternate to their standard protocol. A different stakeholder stated that commercially available EVSE hardware does not currently support ISO15118 and cautioned against the EPA designating it as an exclusive or preferred approach. This stakeholder instead expressed support for SEP 2.0 (IEEE 2030.5), and the Open Vehicle Grid Integration Platform. This stakeholder did mention two pilot projects that involved ISO 15118 applications.

#### EPA Response

EPA heard that most EVSE manufacturers have plans to integrate ISO 15118 capability into their products in the future. However, it does not seem most available EVSE have this capability currently. As a result, EPA is not planning to require ISO 15118 capability to comply with the connected functionality requirements for ENERGY STAR. EPA already recognizes SEP 2.0 as an open standards communication link. EPA heard from a few EVSE manufacturers that noted they are considering the CTA-2045 interface.

## DC EVSE Considerations

One stakeholder proposed that Direct current (DC) Fast Chargers could have broader use cases, specifically for long-dwell applications (i.e., cars that are connected for an extended period, such as workplace charging) DC Fast Chargers could maximize shaping of EV charging load and/or mitigate demand charge.

### EPA Response

DC EVSE installed for applications where there are long-dwell times may be valuable load shaping resources for utilities. EPA hopes to encourage open standard grid communication for AC and DC EVSE.

## Test Method Development

A stakeholder noted the challenge of replicating an EVSE's role in the overall ecosystem. Another stakeholder noted that several utilities have robust test methods but that these primarily test back office networks, not the EVSEs themselves.

### EPA Response

EPA appreciates this feedback and understands that the EVSE's role in the connected ecosystem is seen differently in industry currently. EPA hopes to account for this while encouraging the use of open standards to support grid communication, where the EVSE is used.

## 2.4 Pool Pumps

### DR via Motor Control

One stakeholder commented that it would be possible to implement DR via direct motor control, as this would correspond directly to a change in pump speed.

### EPA Response

EPA is evaluating the potential of including this technology in the connected requirements and expects stakeholder discussions to continue on this topic.

### Single Speed Products

One stakeholder commented that single speed products could still participate in DR via direct load control (on/off), which provides the additional benefit that their power/energy reduction would be easy to estimate. This commenter noted that some utilities place an emphasis on this ability to estimate direct DR signal impact, so may prefer single speed products.

### EPA Response

EPA notes that single speed products are not in scope for inground products, due to performance requirements, but other categories would potentially not be excluded. In these cases, this functionality would be potentially viable; EPA anticipates additional stakeholder discussion on this case.

### Patent(s), DR in Pool Pumps

EPA notes that comments have referenced a potential patent concern on connected and DR products for pool pumps.

### EPA Response

EPA is expecting additional discussion with stakeholders on this concern, including the specific patent, scope and potential impact of this patent on this category.

### Load Up

One stakeholder recommended that pool pumps only load up to the maximum speed setting stored on the device.

### EPA Response

EPA is evaluating incorporating this requirement in some form in the DR requirements for this product.

### 3. Timeline and continuing development

#### Stakeholder Comment

One stakeholder expressed support for further incorporation of connected criteria in appliance and HVAC products in general and encouraged EPA to focus on connectivity standards for water heating and CAC/ASHP products first as these are more common than EVSEs and pool pumps.

#### EPA Response

EPA appreciates the stakeholder interest in the water heaters product category, and requests stakeholders interested in the [Version 3.3 Water Heaters Specification and Test Procedure](#) to engage with EPA via the development efforts for this specification.

As AHRI 1380 has now been published, EPA has released a [proposal](#) in connection with the Version 6.0 CAC / ASHP specification containing proposed optional connected criteria (and DR) for these products. EPA is proposing to align DR messages and responses with AHRI 1380. Any proposed deviations from the AHRI 1380 standard should be submitted as comment to the CAC/ASHP specification.

EPA will continue working with stakeholders to reassess and edit the connected functionality criteria that is in the Version 1.0 EVSE specification around the end of Summer or early Fall 2019 to coincide with the development of the Version 1.1 specification effort.

EPA appreciates the stakeholder feedback on pool pumps, and requests that stakeholders engage with EPA during the upcoming specification development effort for pool pumps in late 2019. EPA encourages stakeholders with specific questions or interest to engage with EPA earlier than that, although public specification documents and webinars may not be developed until later in this process.