



March 18, 2019

Ms. Abigail Daken

U.S. Environmental Protection Agency

(ConnectedProducts@energystar.gov)

Re: Carrier Comments on ENERGY STAR Connected Criteria for Large Load Products Discussion Guide

Carrier is part of United Technologies, (recently renamed from Climate, Controls and Security) which provides fire safety, security, building automation, heating, ventilation, air conditioning and refrigeration systems and services to promote integrated, high performance buildings that are safer, smarter and sustainable. Carrier is the founder of the modern HVAC industry and operates across the globe. Our range of products includes unitary residential and commercial heating and cooling products - including ducted and ductless, refrigeration products, transport refrigeration products, air and water cooled chillers, and HVAC building services. Given our longevity in the industry and our wide breadth of products we feel we are uniquely qualified to comment on this discussion guide.

General Questions 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)**

Adding Demand Response ("DR") locally to the processor will add software complexity. The function of responding locally to DR messaging will add another task to the thermostat. Even for a thermostat that is already capable of communicating with the cloud or some other external station, locally responding to DR messages will require logic and resources to maintain contact and process input from an additional location. We are not implying that adding a DR function by itself will require an upgrade to every thermostat. A requirement to add external communication to a third party, that is the utility or other DR agency, does require a continuing requirement for people to monitor the connection and be available to troubleshoot the external connection between the thermostat and the DR station.

**2) What are the pros and cons of DR application layer message translation locally in the product?**

Pro: Locally translating in the product disconnects the product from an intermediate station such as a cloud server. Administration of the connection to a DR program would then cut out a cloud operator.

Con: The solution of individual products directly connecting to the DR provider is likely to scale poorly. Assuming the connection between the product and the DR station is over the internet, the product will be behind at least a NAT firewall. In order to maintain contact, the product will be required to 'ping' the DR station periodically. The DR station will need to maintain a capacity to accept a periodic ping for each device. Network traffic will expand as participation in DR programs increase

**3) What are the pros and cons of products using a cloud connection for DR response?**

Pro: Network connections to the DR station and the product are simplified for the product in that it does not need to maintain the extra connections. Network traffic can be cut back dramatically because the cloud can maintain a connection point for the DR station that does not require constant periodic 'pinging' of the DR station. It is possible for the DR station to use the cloud connection to abstract the details of the specific location each individual product into the capacity of the cloud for various areas.

Con: Sending data through a cloud adds an administrative load to the operators of the cloud to route messages to and from the DR station. The additional responsibility of routing between the product and the DR station requires some level of business coordination between the cloud provider, the product owner and the DR station for participation in DR programs.

**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?**

Direct communication with the end product would remove the cloud layer, which could be less investment for the infrastructure, however because of the nature of the network connection from the product through the firewall, there is built in latency to a direct connect system limiting the responsiveness of the system. A cloud based system with event based status change reporting would have the latest values available on an end point at any time

**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?**

Connected thermostats today know and can send their location to a DR station. There are no specified requirements for this, however, in OpenADR2.0b there is a message that sends out a service area polygon. The thermostat could interpret this message and determine which service area it is part of. There is a message in OpenADR2.0b that can indicate the area on a map where the service is available. If the thermostat (which knows its location) got such a message it would know if it was in an affected area.

Considerations Specific to Central Air Conditioners and Air Source Heat Pumps

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?**

Carrier has supported the Energy Star® program since inception, and appreciates the opportunity to provide comments which can help shape the next version of the program.

To Carrier's knowledge, the process of working with manufacturers on AHRI 1380p has not altered utilities' positions on the question of on premise open standards, or the appropriateness of such criteria in an Energy Star® specification. Carrier supports Energy Star® using AHRI's 1380 standard for Demand Response as an optional connected criteria. Carrier's preference is for the EPA to not overly complicate the Energy Star® program with adding additional connected criteria beyond AHRI's 1380 standard in the Energy Star® CAC/ASHP 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?**

Carrier completely supports Energy Star® using AHRI's 1380 standard for DR, but asks EPA to wait until all stakeholders have an opportunity to provide input as the standard is finalized. Carrier recommends EPA and Energy Star® wait for the final published version before reviewing or utilizing this standard in Version 6.0.

- 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?**

Variable capacity systems using the proprietary Wi-Fi system controller will give the homeowner the most system efficiency, therefore the system controller should be evaluated with the entire system. Typically Wi-Fi enabled proprietary system controllers don't work with other types of systems other than what they were specifically designed for, so they should not be considered separately.

In this question you asked "Should controllers or thermostats be included or considered for other system types". We are not sure what you mean by "other system types". System controllers should be eligible for ENERGY STAR compliance if they meet the connected criteria as a system. The reason is that many utility rebates are specifically designed for thermostats that meet ENERGY STAR compliance. Today, the highest efficiency systems (variable capacity systems) can't get that rebate with a proprietary system controller and it confuses the homeowners. This has led homeowners to request their contractor to install a standard 24 volt thermostat just to get the rebate. This will then reduce the system operation to only 2 stages and not be as efficient as the system with the proprietary system controller.

We wish to thank ENERGY STAR for the opportunity to provide feedback on this matter. If there are additional questions or clarifications needed, please feel free to reach out at your convenience.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John Gibbons". The signature is fluid and cursive, with the first name "John" being more prominent than the last name "Gibbons".

John J. Gibbons  
Executive Director, Regulatory Affairs  
Carrier

Cc: Matthew Thornblad, Director, UTC Government Relations

Cc: Matthew Pine, President, Carrier HVAC-Americas