

ENERGY STAR Connected Criteria Q&A

General

1. *Is connected functionality required for a product to be certified as ENERGY STAR?*

1. No; connected criteria is optional, and is available for the ENERGY STAR product categories listed below. Products that meet energy efficiency criteria may certify as ENERGY STAR. Products that meet both the energy efficiency and the optional connected criteria (including demand response test method, once finalized) set out in the relevant product specification, may certify as ENERGY STAR and will additionally be differentiated as having connected functionality on the ENERGY STAR website including Product Finder and the Qualified Products List.

- [Clothes Dryers](#)
- [Clothes Washers](#)
- [Dishwashers](#)
- [Lighting](#)
- [Refrigerator-Freezers](#)
- [Air Conditioning, Room](#)
- [Pool Pumps](#)

Note that a [Connected Thermostats ENERGY STAR specification](#) for which connected functionality will likely be required, is under development.

2. *When can an ENERGY STAR appliance with connected functionality use the connected allowance?*

A 5% allowance to ENERGY STAR efficiency criteria is available for Clothes Dryers, Clothes Washers, Dishwashers, Freezers, Refrigerators, and Room Air Conditioners that:

1. Comply with all connected product criteria; and
2. Are certified using the final (product category specific) ENERGY STAR Test Method to Validate Demand Response.

At this time, while an ENERGY STAR Test Method to Validate Demand Response is available for Refrigerators and Freezers, Demand Response test methods for the remaining product categories are under development by the U.S. Department of Energy (DOE). Once a product category specific Test Method to Validate Demand Response is finalized, stakeholders with compliant products will have access to the allowance. EPA will notify stakeholders upon test method finalization.

3. *How can a stakeholder participate in the development of Demand Response test methods?*

Stakeholders interested in Demand Response test method development and/or able to provide connected appliances for testing in support of the development of these test methods should contact Bryan Berringer, DOE, at Bryan.Berringer@ee.doe.gov or 202-586-0371. Stakeholders may also contact EPA for an introduction or to set up an initial discussion.

Communications / Open Standards / Open Access

4. *Is there a document and/or internet site that provides information on or examples of open standards?*

The Association of Home Appliance Manufactures (AHAM) published a study, *AHAM Assessment of Communication Standards for Smart Appliances*, which evaluates existing communication protocols designed for the smart grid. You may access this document [here](#). All recommended standards in this document would be considered open standards.

5. *For the optional connected criteria, is it acceptable for an external communication module to be provided to the consumer after the sale?*

Communication hardware needed to enable connected functionality may either be built in to the product, or provided via an external module or device. If an external module/device is used, it shall be either: a) shipped with the appliance; b) provided to the consumer at the time of sale, or c) provided within a reasonable amount of time after the sale. While the Agency provides some flexibility in the final specifications, it is EPA's intention that ENERGY STAR products with connected functionality include, at time of product shipment or sale, all required elements to deliver this functionality. If option c must be used, manufacturers should provide communication hardware to the consumer in as seamless of a package as possible, with minimal, if any wait time and at no separate cost. Further, manufacturers shall ensure that consumers are provided clear instructions on the availability of a module and a simple process to request its delivery.

6. *Could the following product meet the connected criteria requirements for open standards, open-access and communications hardware architecture?*

"Product connects via proprietary communications to a cloud service. An API is available that enables 3rd party open access to requisite ENERGY STAR connected product functionalities via the cloud service using open standards."

Yes, it is permissible for the product to use proprietary communications to interconnect via the cloud service, so long as all connected criteria are met (in the given example, the product enables open-standards connectivity via a cloud service). Note however, that a number of utilities have indicated a strong preference for connected products that are able to connect using open standards on the customer's premises.

7. *How should a certification body confirm that a connected product is using an open communication protocol?*

The ENERGY STAR Connected Criteria states that compliance with the connected criteria is through inspection of the product and/or product documentation. This offers flexibility for a CB to determine how to best certify that products use an open standards protocol for all communication layers. This could be done through a number of different approaches, i.e., reviewing existing company documentation, such as an Application Programming Interface (API), that specifies use of open standard(s), leveraging existing product certifications (where available), or testing.

8. *Is it permissible to use proprietary messaging in the Application Layer?*

Open-standards must be used for all communication layers. However, EPA recognizes that in regard to the current state of standardization, there are cases where standardized messages to enable requisite connected functionality are not available. In such cases, manufacturer-specific messaging is unavoidable, and is permitted by certain open standards. In cases where proprietary messaging is necessary, the API or similar documents must ensure open access to all connected functions.

Energy Consumption Reporting

9. *Can EPA provide guidance on how my product implements energy consumption reporting? Is it preferable to implement in hardware or software? Is there criteria for the error rate or accuracy of energy consumption reporting?*

In order to limit associated incremental product cost, EPA has elected not to specify a minimum level of accuracy associated with energy consumption reporting. The criteria was structured in this manner to allow manufacturers implementation flexibility and to minimize incremental cost. As such, we believe that either hardware-based measurement or estimation of energy consumption through software algorithms could be implemented. Accuracy, units and measurement interval must be provided to interested parties in an API or similar document. Note that reporting of real-time power will be considered as representative of the product's energy consumption.

10. *Must accuracy, units, and measurement intervals associated with energy consumption reporting be reported over the communication link?*

No, transmission of this information across the data link is not required.

11. *Is reporting of real time power permitted?*

Yes, real-time power reporting that is representative of the product's energy consumption is allowable.

12. *Can EPA provide guidance on the determination of accuracy for energy consumption reporting?*

Manufacturers are responsible for assessing and specifying the accuracy of energy consumption reporting. Appropriate specification of accuracy will vary with implementation of this feature. For example, if the product uses metering circuitry to measure consumption, measurement accuracy will be closely associated with the metering circuitry. If however, energy consumption is estimated, the manufacturer may need to assess accuracy of the estimation.

13. *Is it required, as part of the vendor submission, to include the method/procedure of determining accuracy of energy consumption reporting?*

No, EPA does not require such a submission. However, as test labs and Certification Bodies are responsible for evaluating compliance, it is reasonable to expect that submission of technical information in support of specified energy consumption reporting accuracy would be useful.

14. *For cycle-based products, is it acceptable if the product only sends energy consumption data at the end of each cycle run?*

Yes; cycle-based appliances such as Clothes Washers and Clothes Dryers must be capable of either reporting real time power draw or interval energy consumption for intervals that are not significantly greater than 15 minutes. Manufacturers may also elect to report full-cycle energy consumption after the cycle has completed.

Remote Management

15. *Are there expectations for availability of remote management Apps? Are they needed to certify the remote management criteria?*

EPA has framed connected functionality as enabling both near-term direct consumer benefits as well as future benefits associated with smart grid capabilities. Accordingly, with the exception of Demand Response, EPA expects manufacturers would develop connected products that provide consumers access to remote management capabilities.

16. *Must remote management be operable both within and away from the home (e.g. regardless of whether the smart phone (with control app), is on the same Wi-Fi network as the connected ENERGY STAR product)?* ENERGY STAR Connected Criteria does not specify consumers be able to interact with the appliance both within and outside the home. As such, specific implementation is at the discretion of the manufacturer. EPA notes, however, that many consumers have come to expect ubiquitous connectivity regardless of their physical location.

Delay Defrost (Refrigerators & Freezers specific)

17. *Is it permissible for a refrigerator to maintain the delay defrost capability even after it is enrolled in a Demand Response (DR) program?*

No, once the refrigerator is enrolled in a DR program, delay defrost must be disabled.

18. *The V5.0 Refrigerators & Freezers specification requires delay defrost to be active once connected functionality is configured by the consumer, but requires it to be disabled once the consumer enrolls in a DR program that sends consumer-authorized signals to the R/F System. Are these requirements contradictory?* In mandating delay defrost only after the product is interconnected, EPA intends to enable delay defrost at a lower incremental product cost. Once interconnected, access to network date and time will help ensure proper timing and seasonal alignment of the avoidance period. However, once the consumer is enrolled in a signals-based program, e.g. utility DR, the product is required to disable its as-shipped delay defrost functionality to ensure there is enough defrosting such that consumer product performance expectations continue to be met.

Demand Response

19. *For a cycle-base product such as a Clothes Washer, if a consumer elects to override, must the product respond to subsequent signals that request a response in the same operational cycle? Or, is it acceptable for the override to apply to the current cycle?*

When a consumer elects to override, the appliance does not need to respond to subsequent DR signals for that cycle. However, responses in subsequent cycles shall not be automatically overridden.

20. *A Delay Appliance Load (DAL) event is received for an extended period of time (example 10 hours). The cycle-based appliance receives the DAL event and delays the start of a cycle. However, the consumer overrides the DAL response to start the cycle. The cycle completes. The consumer attempts to start a new cycle; must the appliance delay the start of this cycle, or may the new cycle be started without requiring a subsequent override?*

While in a response period, the product must meet the specified DR criteria; namely for Delay Appliance Load, it must respond by delaying the start of each consumer initiated operating cycle. Note that consumers may elect to override their appliances' response to any number of subsequent cycles.

21. *Please clarify the required frequency of responses to DR signals, for example is a Refrigerator required to provide one DAL AND one Temporary Appliance Load Reduction (TALR) response in a 24 hour period, or one DAL or TALR in a 24 hour period?*

Products must be capable of providing all requisite response types in a 24 hour period. For example, Refrigerators with connected functionality must be capable of providing at least one DAL AND one TALR

response in a rolling 24-hour period. A Pool Pump with connected functionality must be capable of providing at least one Type 1 response in a rolling 12-hour period, AND at least three Type 2 responses in a rolling 24-hour period.

22. *How should the connected product respond if a DAL signal is received while the product is providing a TALR response or vice versa? What if DAL and TALR signals are received simultaneously?*

EPA understands that utilities are unlikely to send overlapping signals. EPA recommends that TALR (or Type 2 for pool pumps) responses have precedence over DAL (Type 1) responses. These short, deep load reductions are expected to be used for fast and emergency response scenarios, where load-shed is critical to grid stability. As such, in the event of conflict, a product should complete its TALR (Type 2) response and forgo or cancel its DAL (Type 1) response.

23. *A DAL event is received while the cycle-based appliance is off. Subsequently, the appliance is powered on and a cycle start is attempted, must the appliance respond to the DAL event?*

Yes, this is the intent of Delay Appliance Load criteria. As such, if a cycle-start is attempted during the DAL response period, the appliance should respond by delaying the start of the cycle beyond the delay period. Note that if the consumer needs the cycle started right away, they may freely override.

24. *5 DAL signals are received while the cycle-based appliance is off. Subsequently, the appliance is powered on and a cycle start is attempted, must the appliance respond to the 6th DAL signal?*

The Connected Criteria requires the appliance to be capable of providing a minimum number of DAL “responses” (e.g. 3 DAL responses per rolling 24-hour period for Clothes Dryers). In the example, since the appliance did not respond to the first 5 DAL signals, it must respond to the 6th signal and doing so would count as response #1 for the 24-hour period. Note that if the consumer needs the cycle started right away, they may freely override.

If you have additional questions or feedback on the connected criteria, please contact Melissa Fiffer, EPA, at Fiffer.Melissa@epa.gov and 202-343-9464, or Doug Frazee, ICF International, at douglas.frazee@icfi.com and 443-333-9267.