

REF No.	Topic	Comment	Response
1	Scope	Wine storage products and other similar beverage centers should not be included within the scope of the ENERGY STAR program. EPA should wait for DOE to complete its rulemaking on these products before adding them to the ENERGY STAR program.	Through the Version 5.0 specification development process, EPA has formalized the program's current policy of not covering wine refrigerators in the ENERGY STAR residential refrigeration program. In Draft 2, EPA has incorporated additional clarification that products not meeting the DOE definition of electric refrigerator, electric freezer, or electric refrigerator-freezer, are not eligible. As noted by the commenter, DOE is conducting test procedure and standards rulemakings for these products.
2	Refrigerator Lifetime	New refrigerators last a lot less than 17 years which would make imbedded energy much more significant.	EPA has used average product lifetimes developed by DOE in their latest residential refrigerator - freezer standards rulemaking (see the 2011 Technical Support Document) to develop savings and payback estimates. EPA welcomes additional data on the average lifetime of residential refrigeration products used in the U.S.
3	Refrigerator Adjusted Volume and Test Procedure	<p>When calculating adjusted refrigerator volume. The figure 1.63 accounts for the extra heat leaking into a 5 deg F freezer (compared to a refrigerator) in a 90 deg F room. This figure would be 2.0 in a more commonly encountered 70 deg F. Removing 1 Btu of heat from the freezer compartment requires about 1.7 times more energy than removing a Btu of heat from the refrigerator compartment. The volume adjustment factor for a freezer may be as high as 3.4. We suggest increasing the correction factor. We manufacture a model which is half freezer and half refrigerator, this unit saves energy by often making is unnecessary to buy a separate freezer. If the volume correction for this model was more realistic it could be Energy Star rated.</p> <p>Refrigerator performance is being optimized for a 90 deg F environment. Kitchens are typically closer to 70 deg F. Two factors which are optimized for 90 deg F are cap tube size and system charge. These factors can have a significant effect on energy consumption. I would like to see consideration given as to how more realistic test standards could save additional energy.</p>	<p>DOE and EPA appreciate the comment on volume adjustment factors and implications of ambient temperature settings, and the comment regarding extreme test conditions. The volume adjustment factors currently used provide a method for comparing different types of units under the same test conditions. The test conditions were chosen to simulate normal usage and provide a repeatable and relevant baseline for refrigerator testing.</p> <p>The comment period for the DOE test procedure rulemaking is closed; however, DOE will review the applicability and effectiveness of its test procedure and analysis tools as part of future test procedure rulemakings. DOE will take the recommendations into consideration in future federal rulemakings affecting the DOE test procedure. The ENERGY STAR R/F test method is harmonized with the current DOE test procedure to minimize manufacturer and marketplace confusion and avoid increased test burden.</p>
4	Price of Electricity	Suggest increasing the cost of electricity in calculations, as when the spec will go into effect the price will be higher than 10.8 cents per kWh.	EPA appreciates the comment. In its calculations, EPA generally uses the latest EIA data on the average of electricity prices across the country for program calculations for consistency but recognizes prices will change over time.

5	Potential Out-Year Criteria	<p>ENERGY STAR should facilitate the ability to comply early with the Version 6.0 levels and closely coordinate this early compliance with DOE's and the FTC's efforts in this area. AHAM would like to work closely with ENERGY STAR on this important implementation.</p>	<p>EPA does not plan to propose levels for 2014, as mentioned in Draft 1, through the current Version 5.0 specification development process. EPA will instead consider levels for a Version 6.0 specification through a subsequent specification development process, allowing additional time for consideration and discussion with stakeholders on efficiency opportunities beyond the 2014 standard levels. EPA's general practice is to allow manufacturer partners to certify their products to a new specification as soon as it is finalized and would plan to apply this approach to the future Version 6.0 specification. Recognizing there will be Federal standards change in September 2014, EPA plans on coordinating closely with DOE, FTC, and program stakeholders on this transition.</p>
6	Potential Out-Year Criteria	<p>While the hyperbolic tangent approach outlined by EPA provides a workable interim alternative for 2012 and 2013, GE believes it is critical that EPA only proceed with this alternative with the explicit understanding and agreement that such a hyperbolic tangent approach will not be appropriate in future revisions. Given the multiple, upcoming changes in the energy use test procedure that will take effect in 2014, it will be difficult, if not impossible, to develop a crosswalk to a hyperbolic tangent curve that would be credible and would assure a fair and even impact across the industry.</p> <p>Specifically, any curve created for 2014 could not be based on previous data due to the implementation of the new test procedure. Thus, the curve would need to be estimated which would lead not only to uncertainty and potential confusion on the part of development teams, but also customers comparing products from one year to the next.</p> <p>EPA is urged to clarify in moving forward with the hyperbolic tangent for this revision, that an alternate approach, such as a flat percentage, will be adopted in subsequent years.</p>	<p>See response 5. Also, EPA plans to extend the approach that is used in V5.0 when developing future V6.0 criteria. EPA will base its new levels on the performance of products, as tested to the new DOE test procedure (Appendix A and Appendix B) that will be used by manufacturers to comply with the 2014 Federal standards. When energy performance data is not currently publically available, EPA's practice is to build a data set, inviting manufacturers and other stakeholders to share their test data and other supporting information with EPA. EPA plans to use this data and information to inform level setting. EPA is happy to discuss this approach and its data needs with stakeholders in advance of this specification revision.</p>
7	Model Numbers	<p>Strongly encourages ENERGY STAR to follow DOE requirements as it relates to model numbers. FTC allows "wild cards" for single listings, while DOE does not.</p>	<p>DOE and EPA appreciate the comment. All products must be labeled in accordance with DOE standards. However, DOE also notes that its reporting requirements permit the use of "wild card" placeholders in the model numbers, as long as the model numbering scheme is consistent with DOE's definition of a basic model of refrigerator, refrigerator-freezer, or freezer.</p>

8	Low GWP Foam Blowing Agent	<p>EPA should not wait until the next round of ENERGY STAR revisions to recognize the environmental benefits of products that use low GWP foam blowing agents and rather should consider interim measures to recognize products utilizing these foam-blowing agents. Recognizing the use of low GWP agents is an important first step in accelerating the environmental benefits achieved through adoption of these products, and in providing consumers with important information regarding the environmental footprint of the products they are purchasing. EPA is urged to study, over the coming year, which low GWP foam-blowing agents should be recognized and how to most effectively recognize them, and then to provide a methodology in 2012 to begin to recognize these products through a label designation in 2013.</p>	<p>EPA recognizes a number of manufacturers have already taken steps to incorporate low GWP foam blowing agents into their products. Presently, EPA is exploring alternative near-term approaches for further encouraging transition to low GWP foam blowing agents outside of the ENERGY STAR Refrigerator-Freezer Version 5.0 specification.</p>
9	Embedded Delay Defrost	<p>As refrigerators become more efficient it will be less cost effective to load shed a refrigerator. A 270 KWH/year refrigerator only consumes 31 watts on average. A fringe benefit of energy efficiency is that it should simplify energy management practices. On energy star models or all models the defrost heater could be programmed to always come on at off peak hours.</p>	<p>EPA seeks to encourage more intelligent and intuitive energy use in product categories covered by ENERGY STAR. To this end, EPA could consider specifying all labeled refrigerators and freezers with automatic defrost be able to move their defrost off peak times as specified in Section 4B, in future specification revisions. EPA recognizes refrigerator efficiency has improved significantly over the last three decades although products, on average, have also become larger and tend to incorporate additional energy-using features; the shipment weighted average energy use of a refrigerator was about 460 kWh/year in 2010, according to industry data.</p>
10	Embedded Delay Defrost	<p>Assumption is that the reference to the term "connected" in this context, as well as in general usage in this document, refers to a product/device that qualifies according to the proposed ENERGY STAR program. This should perhaps be clarified as this section [Section 4B] refers to the operation of ENERGY STAR devices that are not currently "connected."</p> <p>It is also assumed that the embedded delay defrost feature must be fully functional for all ENERGY STAR qualified refrigerators, whether "Connected" or not. The wording is somewhat ambiguous and the message should be clearly in the final specification.</p>	<p>In both Draft 1 and Draft 2 Version 5.0 specifications, EPA has proposed this functionality as part of the connected criteria. EPA notes that connectivity is optional for this functionality. Also see response 9.</p>

<p>11</p>	<p>Embedded Delay Defrost</p>	<p>The wording of the section suggests that the feature of automatically avoiding defrost operation between the “3 to 7 pm” period will be an embedded default. However, it is unclear to what extent the refrigerator’s internal clock will be calibrated to its corresponding time zone “out of the box”, or whether the burden falls on consumers to set the correct time. This needs to be specified.</p> <p>Moreover, it is noted that some utilities are winter-peaking and some are summer-peaking. The utility’s annual period of maximum usage may occur in winter or summer and the hours between which this occurs vary by utility and region. As such, an assumption that 3-7 pm is the period to avoid may not be beneficial in all regions of the country and could actually increase the probability of defrost during the morning peak period. For products that have no communication connection, perhaps targeting a certain window of the day for when defrosting can occur (such as midnight to 4:00 am) would work better as the non-connected default for the defrost cycle.</p> <p>In similar support of the above notion, peak periods often exceed 4 hours. This would also be accommodated by specifying defrost hours as noted above in lieu of the specified peak as noted in this section.</p> <p>It should be clarified that this peak-time-window is to be provided to the appliance electronically in the event the appliance is connected. This is important for other design implementations that avoid energy consumption during peak hours.</p> <p>In line 349 the word “may” should be changed to “must” in the sentence “The product may provide the consumer with the option to modify the scheduling of this functionality”. The reasons are noted in previous comments.</p>	<p>EPA appreciates this feedback. For the Draft 2 Version 5.0 specification, EPA has added a second default four-hour deferral period in the morning to address winter peaking and is seeking further feedback on this proposal.</p> <p>With regard to clock setting and maintenance of time, EPA seeks to balance delivery of benefits with consideration of incremental cost impacts. For the Draft 2 specification, EPA is continuing to allow qualification of connected products where time must be set by the consumer as is specified. In regards to scheduling, the deferral times and duration are defaults. Connected products are required to allow consumers to alter the default schedule periods, in order, for example, to better align with the needs of their local utility.</p>
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12	Demand Response Functionality	<p>An approach that focuses on successfully informing devices of grid condition rather than on their particular responses is recommended. This approach assumes that consumers will have the ability to set preferences and lifestyle settings that establish the extent to which they are willing to participate in demand response events. Moreover, this approach would empower appliance manufacturers to innovate in terms of the types of demand-responsive actions it makes available to consumers.</p> <p>In support of a diversity of demand response services, smart metering systems can determine and validate the credit due to the customer for their participation in demand response programs in accordance with variable consumer preferences. In addition, forward-looking schedules would be very useful for thermal devices. Advanced visibility to price increases would allow units to prepare their systems in advance and could give a notable advantage to extended efficiency.</p>	<p>EPA's intention in Section 4C has been to establish a set of minimum capabilities and to this end, the Agency has incorporated additional language in Draft 2 V5.0 that relays this more explicitly by specifying that products, at a minimum, need to be able to provide the two responses detailed in Section 4C. EPA and DOE believe it is important to specify a minimum set of specific criteria that can be validated. Testing is a key component of verifying that a unit qualifies as a "connected" device and meets the requirements stipulated in the ENERGY STAR specification. EPA has also added language specifying, more broadly, products must be able to receive, interpret and act upon a signal, responding based on the signal's content and consumer preferences.</p> <p>Since the criteria in Section 4C represent minimum requirements, additional stakeholder collaboration and discussion to consider additional load management opportunities and products' response to forward looking electricity prices, is welcomed and encouraged.</p>
13	Demand Response Functionality	<p>It is suggested that the specific demand response types and levels indicated in this document might be better presented as a collection of minimum requirements, to ensure that qualified connected products can "at least shed xx% for yy hours."</p>	<p>See response 12.</p>
14	Demand Response Functionality	<p>Suggests that special consideration be given to grid security, particularly in the area of how responses to presumed grid signals might be more securely aligned with grid needs. For example, time-randomization at event edges might eliminate the possibility of sudden surges (or changes) in demand for grid services, disabling automation of undesired patterns of responses, and filtering algorithms that prevent unnatural recurrences might be specified to reduce certain risks.</p>	<p>EPA is aware that grid cybersecurity and additional grid security issues are being considered within smart grid standardization initiatives such those being conducted by the NIST Smart Grid Interoperability Panel (SGIP) and standards bodies developing data communication standards relevant to the smart grid. In Draft 2, EPA recommends use of communication standards that are listed in the SGIP Catalog of Standards (CoS), being considered for listing in the SGIP CoS, and/or standards adopted by ANSI or another well established standards development organization. EPA welcomes further feedback on how the grid security considerations could be addressed in the specification.</p>
15	Demand Response Functionality	<p>Given that device responses may be determined through communication verification, sub-metering, or whole-home interval metering, it is suggested to avoid trying to predict the specific services that will be needed and instead define a "connected" device as: "A device capable of receiving information from the grid (e.g. price, events) and responding to this information according to the preferences and configuration of the consumer."</p>	<p>See response 12</p>

16	Demand Response Functionality	While a 4 hour time duration might be selected as a minimum duration that an appliance must respond in order to qualify, it must be recognized that the duration of actual grid-need cannot be constrained. It should be recognized that DR requests from a system operators beyond 4 hours may occur and that some products may be able to sustain even a partial response for a longer period of time. The timing of high-price energy periods and other load management signals are true reflections of actual grid need, not contrived boundaries. System efficiency can only be optimized when products are provided with accurate indicators, regardless of their preconceived limitations. EPA is encouraged to discuss further with manufacturers if longer delays are possible without affecting food products to accommodate peak periods of longer than 4 hours.	The Delay Appliance Load Capability specifies the appliance must be capable of sustaining the response for at least four hours. This capability is a minimum response and does not prevent manufacturers from providing products that can provide greater load reductions or load reductions over a longer period of time.
17	Demand Response Functionality	Suggests that the 24 hour period be defined as an elapsed period and not a daily 24 hours cycle that could place two response requests back-to-back with one at the end of the 24 hours and the other at the beginning.	In Draft 2, EPA clarified that the 24-hour responsiveness requirement is intended to be a "rolling clock" rather than a 1-per calendar-day minimum capability. That is, if a product responds to a signal received at 11:45pm and provides TALR, it would not be required to respond to subsequent request for a TALR received prior to 11:45pm the following day.
18	Demand Response Functionality	Line 380 allows for the deference of ice-maker activity as a substitution for general energy consumption reduction. Since the relationship between this deference and actual energy reduction is not clear, it would be difficult for any value to be associated with this behavior. If the two are thought to be interchangeable, why not just focus on reduction in consumption, and allow ice-maker deference to be among the many tools that a manufacturer might utilize to accomplish the goal?	DOE appreciates the comment and has developed the draft test method (Rev Feb-2012) to evaluate overall reduction in energy consumption during the demand response period. The unit is analyzed as a whole, enabling manufacturers to utilize all available tools to reduce the necessary energy consumption. In the Draft 2 Version 5.0 specification, EPA has revised the Delay Appliance Load criteria, removing the option to shift ice maker cycles. Connected products must reduce load by at least 13% relative to the baseline in response to a Delay Appliance Load signal, providing a more technology neutral approach and more equitable treatment of products regardless of the inclusion of automatic icemaking.
19	Demand Response Functionality	Recommends dropping DR response specifics, focusing instead on the refrigerator's ability to receive unambiguous signals from the grid, and letting manufacturers creatively compete in terms of their product's responses - balancing consumer savings and consumer experience. For example, if 13% is a minimum reduction, there should be an incentive for exceeding this requirement.	DOE and EPA welcome suggestions to better balance consumer savings and experience but believe it is appropriate that the ENERGY STAR specification requires a minimum of specific responses to qualify a product as connected. Optional reductions are acceptable as long as they do not interfere with the minimum requirements proposed in the Version 5.0 specification that will be verified with the associated ENERGY STAR test method. EPA encourages stakeholders to further consider and recommend revisions or new criteria that can add additional societal and grid benefits, while minimizing impacts to consumers.

20	Demand Response Functionality	The support of as few as one event per day may significantly lower the value of the demand response for these products. Many traditional load management programs and simple residential TOU rate plans include two periods of shed/high-price each day.	DOE and EPA appreciate the comment regarding number of demand response events per day. A minimum of one event per day was initially specified in the Draft 1 test method to ensure product safety and consumer satisfaction. In the Draft 2 specification, a connected product must be capable of providing each specified response, at least once in a rolling 24-hour period. EPA welcomes feedback from stakeholders on whether additional responses should be required and information on whether this would have an impact on product performance.
21	Demand Response Functionality	It is not clear what existing grid needs the Temporary Appliance Load Reduction Capability is intended to serve. It would be beneficial to provide examples associating this function with existing demand response services in the ISO/RTO Council's "Demand Response Program Comparison" spreadsheet, with particular attention to the ramp times and sustained-hold times provided for each existing service.	For connected appliance DR functionality in the Version 5.0 specification, the DR criteria are based upon language recommended by a coalition of stakeholders including appliance manufacturers, the Association of Home Appliance Manufacturers (AHAM), and efficiency groups through the "Smart Appliance" petition. The Temporary Appliance Load Reduction is intended to provide an immediate load reduction and when aggregated across households or as part of a larger building or industrial energy management response, a collection of response end loads could be called upon to provide ancillary services (a set of capacity resources for maintaining the reliability of the grid) such as spinning reserves and regulation. EPA encourages further collaboration between appliance manufacturers and utilities to further discuss product capabilities and existing and future grid needs. EPA believes it is important for DR criteria to align with utility needs so that utilities are able to leverage these new capabilities on connected products and welcomes further feedback on the Draft 2 criteria.
22	Demand Response Functionality	It is recommended that the methods by which the energy reduction would be met for the DAL (4 hour shift) not be specified, but left to a competitive environment to decide.	The Draft 2 Version 5.0 specification specifies that defrost be shifted and energy use be reduced by 13% over the specified time period.
23	Demand Response Functionality	It was noted that increases in consumption prior to a curtailment period are of potential value (pre-cooling the refrigerator). Also note that such increases may be particularly valuable at any time of day when excess clean renewable energy is available. Achieving this requires communication of additional information to the end device and responses not documented in the specification.	See response 12; Additionally, EPA encourages further collaboration between appliance manufacturers and utilities to further discuss product capabilities and existing and future grid needs.

24	Demand Response Functionality	<p>To account for some DR services involving both requests to run/increase and stop/decrease, recommend a minor adjustment to the definition here to say "... immediate or scheduled increase or reduction of residential load". Note: this point is already reflected in line 373.</p> <p>In addition to regulation services, the general ability to increase load when an abundance of clean renewable energy is available may reduce consumption at other times, providing a valuable service.</p>	<p>EPA does not specify the timing associated with the reductions of load specified in Section 4C, and generally understand that they could either be scheduled or immediate/near-immediate. The criteria in Section 4C are a minimum capabilities; they do not specify a product be able to increase its load though this would be permissible as long as it does not interfere with the specified responses. In general, EPA believes it is important for DR criteria to align with utility needs so that utilities are able to leverage these new capabilities on connected products and welcomes further feedback on the Draft 2 criteria. To this end, EPA also encourages further collaboration between appliance manufacturers and utilities to further discuss product capabilities and existing and future grid needs.</p>
25	Demand Response Functionality	<p>Believes the timing for operation of shortened or delayed defrost cycle and icemaking should be based on regional peak demand and seasonal demand as these vary from region to region.</p> <p>Supports the proposal of a consumer override.</p>	<p>EPA recognizes that regional peak demand and season demand differs across the nation but also, that appliance manufacturers generally do not produce and sell region-specific products. EPA intends for the delay defrost feature to enable grid benefit out of the box and incorporates default peak avoidance periods. The criteria allows flexibility for the consumer to modify the schedule, which may be used to adjust for regional or seasonal differences in peak periods. EPA has retained and clarified the consumer override in Draft 2, specifying consumers should be able to override the response before or during the response period.</p>
26	Definitions	<p>The revised definition for system operator is supported.</p>	<p>EPA appreciates this comment. However, based on changes to the criteria, EPA decided the system operator was unnecessary and potentially limiting. Thus the system operator definition is not included in the Draft 2 document.</p>
27	Criteria Levels	<p>To enable rebate programs to complete the analysis required to determine whether products will be cost-effective and justify promotion, EPA should share average price data and retail availability for ENERGY STAR refrigerators that meet the proposed requirements.</p>	<p>The dataset that EPA used to inform the proposed criteria levels is posted to the ENERGY STAR website. EPA shared data on cost-effectiveness and product availability during the Nov. 15th webinar and can share additional information upon request.</p>
28	Criteria Levels	<p>The hyperbolic tangent adds unnecessary complexity to an already complex regulatory agenda for refrigerators/freezers.</p>	<p>The draft Version 5.0 specification contains levels expressed as curves. EPA does not believe these mathematical formulas add complexity to the specification.</p>
29	Criteria Levels	<p>Recommends the through-the-door ice adder be adjusted by product class to be consistent with the in-depth analysis done by DOE during its rulemaking of federal minimum standards. The 30 kWh/year adder across product classes should be changed to a fixed 76 kWh/year for Top Mounted units, a fixed 52 kWh/year adder for Side-by-Side units, and a fixed 84 kWh/year adder for Bottom Mount units, which is consistent with DOE's standards.</p>	<p>In Draft 2, EPA has provided some additional energy use for the through-the-door ice adders for bottom-freezers and side-by-sides. This latest draft proposal accommodates a number of additional, higher efficiency models with through-the-door ice.</p>

30	Criteria Levels	<p>Continuing to have ENERGY STAR levels for manual and partial defrost full-size refrigerators, full-size freezers, compact refrigerators and compact freezer product classes will not allow for purchasers to recover their investment in increased energy efficiency through utility bill savings, within a reasonable period of time.</p> <p>Violating this key guiding principle of the program undermines the credibility of the program with NGOs, utilities and manufacturers. Moreover, it risks diluting the ENERGY STAR brand with consumers who we feel that unless</p>	<p>EPA reviewed the cost-effectiveness of the Version 5.0 levels using DOE TSD, retail store prices, and through additional outreach to stakeholders. Based on this review, EPA believes consumers will continue to have cost-effective ENERGY STAR qualified choices available under the new Version 5.0 specification in the product categories mentioned. EPA will continue to take this feedback into account when reviewing opportunities for further efficiency gains in advance of the V6.0 specification development process.</p>
31	Criteria Levels	<p>The hyperbolic tangent will impact the built-in class of refrigerator/freezers. In DOE's recent final rule setting, DOE recognized the unique consumer utility provided by built-in products as well as these products' more technical challenges to achieve continuing increases in energy efficiency. EPA is encouraged to acknowledge the unique utility of built-in products that are offered to consumers who wish to participate in the ENERGY STAR program. Built-in refrigeration products have inherent functional differences from conventional free-standing products. These lead to lower efficiency, or higher energy consumption, for built-ins with comparable parts as their free-standing counterparts.</p> <p>Propose that EPA recognize the Built-In product classes by developing crosswalk relations as part of its discussions with DOE, factor in the offsets for built-ins that have been developed by DOE for the 2014 standards in order to include a class specific Annual Functional Adder expressed as a percentage of the base energy consumption, or determined through other calculations.</p>	<p>EPA has proposed an allowance for built-in refrigerators in Draft 2 that would enable s number of bottom-freezers and side-by-sides to be eligible to earn the ENERGY STAR under Version 5.0 specification. Using its data set, EPA also found that a number of built-in refrigerators and built-in full-size upright freezers, from different manufacturers, meet the Draft 1 proposed levels. Therefore, the Agency has not proposing built-in adders for these product types in the Draft 2, Version 5.0.</p>
32	Connected Refrigerators	<p>Energy consumption interval reporting should be specified as the energy consumed by the device (e.g. watt hours) during that period to ensure that systems that might collect and present this data from a number of end devices can consistently and accurately present the data.</p>	<p>EPA has revised the Draft 2 Version 5.0 specification energy reporting criteria to specify interval reporting of the product's energy consumption in watt-hours.</p>
33	Connected Refrigerators	<p>Capturing additional benefits via "connectivity" is welcomed, if the core ENERGY STAR value is protected. Are in favor of working towards the integration of energy efficiency and demand response programs, where consistent messaging to customers will be very important. While it is not believed that ENERGY STAR should be a laboratory for untested integration, EPA is applauded for working towards this integration.</p>	<p>EPA appreciates this comment and agrees consistent messaging is important. To complement listing "connected" as a product feature for relevant ENERGY STAR qualified models, EPA plans to work with stakeholders to develop messaging on ways connected functionality enables consumers to save and control their energy costs, both now and in the future, which EPA believes can add value to the ENERGY STAR brand.</p>

34	Connected Refrigerators	<p>Only when "Connected" functionality can be precisely defined, and the benefits independently verified, would the consideration of "Connected" features within the program be supported. EPA is encouraged to ask the following questions of industry and efficiency program administrators:</p> <ol style="list-style-type: none"> 1) What products are good candidates for yielding consumer benefits if they possess "Connected" functionality? 2) What are the consumer benefits (energy efficiency, demand response, or other) associated with each "Connected" attribute, and is realization of those benefits dependent on something? 3) What test procedures exist - or are in development - for "Connected" functionality? 4) What are the brand implications of expanding ENERGY STAR into "smart grid," and is a term such as "Connected" preferable? 5) Would the potential benefits of "Connected" products merit the creation of a separate, complementary, federal program that identifies smart products? 	<p>Through this stakeholder process, EPA has been developing consumer-oriented criteria for connected products leveraging input from manufacturers and other stakeholders, and welcomes additional feedback on the attributes proposed in Draft 2. Once these products are available on the market, the benefits can be further studied and quantified.</p> <p>DOE has developed a Test Method to Validate Demand Response (Rev. Feb-2012), released with this specification for stakeholder comment.</p> <p>EPA is sensitive to the need to carefully manage consumer expectations while pursuing new opportunities presented by intelligent appliances so as to avoid undermining the ENERGY STAR brand. EPA has consulted with an expert in marketing and brand management who has advised EPA against using labels such as "smart grid" but supports the idea that products with "connected" features/functionality present an opportunity for the ENERGY STAR brand. "Connected" has the potential to enhance the program's credibility among consumers to the extent it is positioned as a way for them to be more in control of their energy use.</p>
35	Connected Refrigerators	<p>EPA's position that expanding the specification to recognize "Connected" products must start with identification of features that will directly benefit consumers, including new energy efficiency measures that may be enabled is supported. However, this recognition, requires at least 2, currently unfulfilled, conditions:</p> <ol style="list-style-type: none"> 1) Consensus among manufacturers, retailers, and energy efficiency program administrators on what the most promising efficiency and nonefficiency features of a "Connected" refrigerator are to a consumer. 2) A mechanism to verify if connected features function properly, ideally through a vetted test procedure. If EPA intends to rely on market forces to control for quality of consumer-facing "Connected" features, then manufacturers should be required to advertise the benefits of connected features being used to qualify for any future specification of ENERGY STAR. 	<p>EPA has actively sought feedback from industry and program administrations through our specification development processes and will continue to do so. EPA has not sought to identify and specify every single promising opportunity. Based on significant input already gathered, EPA has worked towards ensuring there is a strong bundle of both immediate and future-oriented functionality, so as to honor our commitment to consumers and the brand. In addition, EPA anticipates manufacturers will pursue additional avenues to add value through connected functionality.</p> <p>DOE is developing a new ENERGY STAR test method (Rev Feb-2012) to evaluate overall reduction in energy consumption during the demand response period. This DOE test method developing is also leveraging the recently developed AHAM "smart refrigerator/freezer" test procedure. EPA has proposed that additional connected functionality specified be verified by a certification body (CB) through inspection of product and/or product documentation, since many of the items are more amenable to inspection/verification than testing. EPA and DOE welcome feedback on the proposed test method.</p>

36	Connected Refrigerators	<p>"Smart" appliances are not new. Appliances such as clothes washers and refrigerator-freezers have been getting "smarter" for many years. These days, many appliances have electronic controls that are designed to optimize the performance of the product, including optimizing its energy use. In some cases, the optimal performance may involve an increase in energy use. It's not at all clear at this time that all "smart grid" interventions with "connected" appliances will result in energy use reductions. In fact, some interventions that interfere with the product's own "intelligent" controls could increase energy consumption. Only data from an appropriately crafted test method, and field data from actual installations, can shed light on this issue, of which none have been found to date.</p>	<p>EPA recognizes many refrigerators and other household appliances sold today use various types of "intelligence", including sensors and controls, to deliver greater efficiency and additional consumer amenities and features. In consideration of this, EPA has not referred to appliances with demand response capabilities as "smart" appliances.</p> <p>DOE and EPA appreciate the comment regarding testing of network-connected appliances. DOE is investigating the energy consumption impact that network-connected products have on network "standby".</p>
37	Connected Refrigerators	<p>Supports the proposal that the connected product criteria must meet safety standards and cannot adversely impact the operation of the product. Suggests the inclusion of a high temperature alert (that is the door is shut, but the temperature is rising) in addition to the door left open or coil cleaning alerts.</p>	<p>EPA agrees that connected features on products should enhance and not impede product performance. For the Version 5.0 specification, EPA has structured the proposed criterion on alerts to provide manufacturers with the flexibility on how to meet.</p>
38	Connected Refrigerators	<p>ENERGY STAR's support of this functionality is supported. Announcing the "connected" requirements, identifying those models that voluntarily comply initially and setting a schedule for making them mandatory to qualify for the ENERGY STAR label would be a more effective approach to achieve widespread adoption of "connected" functionality and would not create perverse incentives that undermine market transformation efforts.</p>	<p>Since this incentive is designed to help "jump start" the market, EPA does not envision the connected allowance will become a permanent part of this specification. EPA plans to highlight connected functionality on the QPL to help interested consumers and stakeholders identify models with connected functionality. Given these products have not yet been introduced into the market, at this stage of deployment and with some uncertainty in terms of consumer acceptance, EPA feels it is premature to consider making connected functionality a requirement for ENERGY STAR qualification.</p>

39	Communications	<p>It is recommended that the specific reference to the Home Area Network (HAN) be removed for a number of reasons. These include that nearly 100% of the presently managed residential load is achieved using wide-area communication signals, such as FM, Pager, Cellular, and PLC. It is not beneficial to be technologically- or architecturally-prescriptive in a document of this type, and it is unnecessary to presume that consumers or utilities will choose to utilize Home Area Networks for load management.</p> <p>In addition, employment of HANs assumes additional other equipment onsite that bridge from a wide-area communication system to a local area. These additional devices drive cost, consumption, and complexity; and may or may not be desirable. Elsewhere, this document acknowledges the option of communication modularity, making it possible for these refrigerator products to work equally well with any communication technology or architecture.</p> <p>It is recommended that this section has an added statement to the effect of: "A modular communication interface may be used to enable a refrigerator to be compatible with any communication technology. If this option is used, open standards such as the Consumer Electronics Association R7-8 interface are recommended, so that the refrigerator may be compatible with any third-party module."</p>	<p>EPA removed references to Home Area Network (HAN) in the Draft 2 Version 5.0 specification. The Draft 2 specification allows appliance manufacturers to use either built in or modular communication hardware, for purposes of Home Energy Management (HEM) and Demand Response (DR). Manufacturers could opt to use a modular communication interface. EPA further recommends for all layers of communication, the use of standards listed in, or being considered for, the SGIP Catalog of Standards, and/or standards adopted by ANSI or other well established international standards development organizations.</p>
40	Communications	<p>Recommend modifying the statement that standards used be identified as "SGIP NIST HAN Standards." Recommend recognizing the following items. As stated in other comments, system architectures may or may not be "HAN" based. A further note is that the NIST SGIP list of standards is a living list, continuously being revised. Optimal solutions may not yet be listed, and manufacturers ought not be restrained from selecting the best market options at the time of refrigerator design. Also, at the present time, there are not complete sets of standards (all layers), sufficient to enable residential demand response, so non-standard elements are required. Finally, at present, most DR communication systems, including those that allow consumers to choose third-party aggregators, are based on proprietary technologies.</p>	<p>In the Draft 2 Version 5.0 specification, EPA has proposed separate, but similar criteria for HEM and DR functionality that in both cases recommends, but does not mandate standards-based communications. However, for products that use modular communications for DR but are sold without a compatible communication module, EPA has proposed the appliance must use standards-based criteria both for the modular interface and for the communication protocol. EPA will continue to monitor relevant standardization activities including the CEA-2045 modular communication interface standardization effort and welcomes feedback on other related standardization efforts. EPA has received some feedback that CEA-2045 appears to be favored by utilities in order to control deployment costs for future DR programs that would potentially include connected appliances. Also see response 39.</p>

41	Communications	<p>It is believed that forcing the consumer to use a module provided by the manufacturer is an unnecessary restriction that would hamper innovation and limit competition. If communication modules are used, it should be possible to use those from any module supplier, and not tied to the manufacturer of the appliance. The CEA standard modular communication interface, as an example, is specifically intended to enable interoperability between any end device and any consumer-installable communication module.</p>	<p>EPA has removed the references to the manufacturer as the entity that provides suitable communication modules.</p>
42	Communications	<p>Suggests that the support of customer-installable communication modules via a standard interface has significant benefits to the public and suggests that it be acknowledged as a viable option for manufacturers in the context of this specification. These benefits include avoiding obsolescence of long-life appliances as communication technologies evolve, minimizing both cost and power consumption at the time of purchase, and deferring both until such time as a consumer elects to participate in a utility program, fostering ongoing competition among companies and technologies to provide lower-cost, lower power consuming solutions, and compatibility with all kinds of present and future DR programs and technologies.</p>	<p>In Draft 2, EPA recommends the use of standards-based communications for all layers, and for both built-in and modular communications. EPA may consider more robust criteria as relevant standardization efforts mature.</p>
43	Communications	<p>It is recommended that consideration be given to separate testing of refrigerators and communication technologies, whenever the refrigerator utilizes a modular communication interface. This is consistent with recognizing that a single product might be utilized with many different communication modules over its service life and in different regions of the country. In other words, it should be possible to certify a product that uses a modular communication interface by testing commands at that interface, with no foreknowledge of what communication technology might be used in field service.</p> <p>It is also reasonable to consider that various communication/networking technologies, both present and future, might benefit from a kind of "ENERGY STAR" ranking system.</p>	<p>DOE and EPA appreciate the comment regarding testing multiple communication interfaces. At this time, we understand that manufacturers may plan to produce connected appliances with manufacturer-specific communication modules, using standardized messaging protocols such as Zigbee Standard Energy Profile (SEP) 1.0 or 2.0, as the method for initiating demand response capabilities. As the market develops and alternate methods for initiating signals become available, DOE and EPA will investigate the feasibility of testing units without their associated communication devices. DOE encourages stakeholders to share data and information pertaining to testing units without the provided communication device.</p> <p>Additionally, in the Draft 2 Version 5.0 specification, standards-based communications are recommended, but not required. Similarly no testing or certification is required to verify standards compliance.</p>
44	Communications	<p>Manufacturer ability to use remote management as an extension of the communication ability could be safely assumed in the general sense. If, perhaps, the purpose of this line [Line 272-275] is to ensure that a product does not contain the enablement of two concurrent communication interfaces (thus increasing energy usage) it should be clearly stated as such. Otherwise these lines should be removed as they don't directly apply to the DR specification.</p>	<p>Section 4A contains Remote Management criteria relevant to Home Energy Management (HEM), and not the Demand Response (DR) criteria. EPA agrees minimizing the additional energy use associated with communications is important. DOE is investigating the energy consumption impact that network connected products have on network "standby".</p>

45	5% Allowance	<p>Highlighting products with "connected" functionality on the ENERGY STAR Qualified Product List, as EPA intends to do in any case, would assist consumers, rebate programs and other interested stakeholders to identify these products without raising concerns. Instead of adopting a more or less arbitrary and clearly distortionary 5% allowance, the EPA should aim to raise the bar for all appliances that qualify for the ENERGY STAR - and plan to make "connected" functionality a prerequisite on a reasonable timeframe. This is the same approach that EPA intends to take with respect to low-GWP foam blowing agents.</p>	<p>EPA intends to list connected as a product feature for relevant ENERGY STAR qualified models on the ENERGY STAR qualified product list. Given these products have not yet been introduced into the market, EPA feels it is premature to consider making connected functionality a requirement for ENERGY STAR qualification.</p>
46	5% Allowance	<p>A number of stakeholders expressed related concerns with the proposed five percent allowance for connected functionality, noting:</p> <ul style="list-style-type: none"> - Testing cannot measure and verify the value of the "connected" functional adder - - Expanding into the "Connected" appliances as currently stated, may violate some of the basic tenets of the ENERGY STAR program, thereby jeopardizing the future success of ENERGY STAR. - It rewards manufacturers producing marginally efficient appliances with the ENERGY STAR label as well as allowing reducing the incentive to produce more efficient models and will also penalize the manufacturers whose products meet the specifications without the credit, calling the fairness of the program and its rating regime into question. - The approach does not create any incentive for manufacturers to integrate connected functionality into their more efficient models. - The allowance will result in higher energy consumption and less efficient refrigerators. - Connected functionality does not make a given appliance technology inherently more efficient. It is therefore misleading that some refrigerators with a given base average energy consumption will be labeled ENERGY STAR, while others will not. - Concern it will have the effect of damaging the ENERGY STAR brand while diminishing energy savings because consumers who have utilities have not yet invested in such capabilities won't see benefit from their choice of a "connected" appliance. 	<p>At the core of EPA's proposal for the next refrigerators and freezer specification is a new set of strengthened energy criteria that will better recognize the most efficient refrigerators and freezers on the market. All products earning the ENERGY STAR – including models that would use a credit in order to meet the energy criteria – will continue to deliver significant, reliable and quantifiable energy savings for consumers, while preserving consumer choice of different configurations and features. The connected criteria have been structured to deliver both near-term value to consumers through new information and control of their product while helping to recognize future-oriented demand response (DR) that could provide benefit to the grid and society, as well as consumers, once supporting infrastructure is built. EPA believes the proposal will provide consumers with new functionality that can enable immediate energy-savings and convenience opportunities (e.g., alerts to their smart phone via an existing home area network).</p> <p>An allowance has been proposed as a temporary step forward in the interest of “jump starting” the market for appliances with demand response capability. With the strengthening of the minimum energy performance requirements in the Version 5.0 specification, models will need to reduce their energy consumption with respect to the Version 4.0 energy use requirements even if they are able to use the incentive. Also see response 34.</p>
47	5% Allowance	<p>Recommends the connected allowance be a percentage adjustment for the whole unit including any adders. The purpose of the 5% allowance for smart appliances is to give a percentage allowance to appliances if they meet the threshold for connectivity. Thus, if a unit as a whole achieves connected status, it should obtain the 5% allowance not just a 5% allowance for the base model of that unit. The original intent behind the allowance was to be an adjustment incentive for Smart Grid enabled appliances as a whole.</p>	<p>EPA has proposed a 5% allowance for units that meet the connected criteria and are tested and validated using the final ENERGY STAR test method being developed by DOE. The approach of including expressing the allowance as an adder to the product's base allowance of energy is consistent with EPA's approach in other product areas of the ENERGY STAR program.</p>

48	5% Allowance	<p>The program's specifications have traditionally focused on delivering significant, reliable, quantifiable, and durable energy savings for consumers while maintaining consumer choice of product features and performance. Concerns exist that the current expectations surrounding the "smart grid" banner extend well beyond that which can be specified (or managed) within the ENERGY STAR program. When the consumer benefits can be specified in terms of the goals of the ENERGY STAR program, EPA would be advised to consult with a brand expert on the feasibility and means of how ENERGY STAR should encompass "Connected" functionality. This should be done prior to any final decision.</p>	<p>As discussed in response 45, all products earning the ENERGY STAR – including models that would use a credit in order to meet the energy criteria – will continue to deliver significant, reliable and quantifiable energy savings for consumers, while preserving consumer choice of different configurations and features. EPA intends to work with stakeholders to develop messaging on ways connected functionality enables consumers to save and control their energy costs, both now and in the future. See also response 34.</p>
49	5% Allowance	<p>Concerned that the approach currently under consideration for refrigerators and freezers, will expand into other areas such as HVAC.</p>	<p>EPA will continue to evaluate connected opportunities and approach on a per-product basis. With respect to HVAC, EPA is developing a Residential Climate Controls specification that includes criteria for products capable of participating in Demand Response programs as well as interconnecting with home-control and home energy management systems. An allowance is not under consideration for this specification.</p>

50	5% Allowance	<p>EPA should drop this element of its proposed specification as there is no current justification for an energy savings credit of any kind on the basis of an appliance simply being capable of being "connected." It is premature to specify "Connected" features, let alone award a 5% energy efficiency credit for "Connected" products. Consumers are unlikely to gain any significant energy-savings opportunities to offset the 5% allowance. The potential for societal and individual consumer benefits attributable to "Connected" functionality is recognized, however only when this potential is fully specified and a basis for independent assessment to validate that such benefits exist can inclusion in ENERGY STAR be weighed to determine messaging for incorporation as well as managing the overall brand meaning. It is also recommended that partners with significant investments be consulted and the market readiness for connected benefits that are dependent upon yet-to-be-made investments, e.g. advanced meters, be considered. EPA cites a "consumer value proposition associated with a connected appliance that can interface with an energy management system", but this value remains purely hypothetical for the vast majority of consumers, as the kind of energy use impacts envisioned by credit's proponents can only be realized where utility activation of or data provision to a "connected" appliance's "smart" capabilities is possible. ENERGY STAR is a national program, but most consumers do not even have access to smart grid infrastructure, let alone electricity pricing or incentives that would enable them to benefit from "connected" functionality, and it is impossible to know when benefits will be realized by individual consumers.</p> <p>The data that is cited by EPA is in essence, based on assumed behavioral patterns and purchasing preferences by consumers and not increased efficiency gains.</p>	<p>With the proposal for connected, EPA seeks to:</p> <ol style="list-style-type: none"> 1) Offers consumers new functionality that can enable immediate energy-savings and convenience opportunities (e.g., alerts to their smart phone via an existing home area network). 2) Helps to ensure the consumer is being considered as smart grid enabled end-use products are designed and brought to market; and 3) Encourages manufacturers to begin to make available, products with future-oriented demand response capabilities that could improve the reliability and flexibility (e.g., enabling greater penetration of intermittent and variable renewable energy sources) of the electric grid. <p>EPA is not yet aware of a connected refrigerator-freezers on the commercial market. EPA's intention is that the proposal allowance will be a small, temporary step forward, costing the consumer little, if anything, as it is offset by new, more stringent ENERGY STAR efficiency requirements plus additional near term benefits. Since this incentive is designed to help "jump start" the market, EPA does not envision the connected allowance will become a permanent part of this specification. EPA is sensitive to the need to carefully manage consumer expectations while pursuing new opportunities such as connected, so as to avoid undermining the ENERGY STAR brand. EPA believes connected has the potential to enhance the program's credibility among consumers to the extent it is positioned primarily as a way for them to be more in control of their energy use and save more. EPA welcomes further stakeholder input to shape future messaging to consumers.</p>
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51	5% Allowance	<p>For refrigeration, ENERGY STAR is a performance based standard, not one determined by technological innovations. DOE specifically noted in September 2010 that information supplied by manufacturers on the benefits of Smart Grid controls "did not clearly indicate that smart grid controls could provide significant benefits when used in refrigeration products comparable to the benefits associated with the proposed" energy reductions. DOE found that refrigeration products do not belong to the group of products for which DOE can set design requirements. DOE also considered if a credit may be allowed for demand response features, however, found that while demand response enabled units could shift portions of the energy use associated with defrost or icemaking to times when electricity costs are lower, they would not contribute significantly to the reduction of energy use.</p> <p>The Framework's 5% credit proposal attempts to accomplish a credit system that DOE has already rejected and opens a slippery slope for ENERGY STAR standards. Simply put, the proposal makes an exception for a specific technology that EPA wishes to see widely incorporated into appliances without providing data to support claims of similar efficiency.</p>	<p>As part of this stakeholder process, EPA considered the proposal requesting a five percent allowance requested by a group of stakeholders including appliance manufacturers, AHAM and efficiency groups. In response to the high level of interest from the industry, EPA has been working closely with stakeholders on a product-by-product basis, to develop a basic set of features/ functionalities that deliver near term benefit so as to honor our commitment to consumers and their expectation of the ENERGY STAR brand. In the near term, consumers purchasing a connected refrigerator or freezer will receive feedback on product's energy use, energy-related messages and alerts (e.g., door left open, unusual energy consumption). Products will also automatically shift defrost away from times of peak electricity demand, providing immediate grid benefit. Once supporting infrastructure is in place, it is expected that consumers could opt to enroll in future appliance DR programs that provide direct monetary benefits for enrollment and/or participation. In addition, the grid could benefit from increased operating efficiency with those savings passed on to all consumers through lower rates. The ENERGY STAR program is a voluntary partnership program managed jointly by the EPA and DOE and plays a different role in the marketplace than the DOE's appliance standards program.</p>
52	5% Allowance	<p>The market for connected appliances does not need "jump-starting." From 2011 to 2015, the US household smart appliance market is projected to grow from \$1.42 billion to \$5.46 billion, respectively. Sales of smart refrigerators are projected to reach \$.95 billion and account for 17.4 percent of the US household smart appliance market. Freezers are projected to account for \$.33 billion and 6 percent of the US smart appliance market. Finally, it is estimated that 40% of all new appliances sold in the US will have Smart Grid functionality within 36 months. This is hardly a market that needs jump-starting with incentives.</p>	<p>While EPA does not have access to the market research report that is cited, based on stakeholder discussions, EPA believes these projections may have been developed under the contingency that there would be some sort of external facilitation to help "jump start" the market, including progress on standards development and/or some sort of incentive. EPA believes the proposed allowance could help provide some initial stimulus to the market. EPA and DOE have found that no connected refrigerator-freezers exist on the commercial market. To date, only one pre-market connected refrigerator-freezer has been provided to DOE for testing and validating the proposed test method.</p>

53	5% Allowance	<p>EPA should consider recognizing the benefits to consumers that Smart Products can bring in a different way. First, there should be no qualification credit for any technology. All products must meet minimum thresholds. Products with "Smart Technologies" as outlined in the ENERGY STAR refrigerator framework document are eligible for a new mark (perhaps ENERGY STAR with Smart type of mark). Another possibility is to give no qualification credit for any technology, but make Smart Grid, as defined by AHAM, mandatory for the ENERGY STAR program.</p>	<p>EPA appreciates these suggestions. EPA is not currently considering a separate label or designation for "connected." Rather, in addition to defining a core set of features that any "connected" product would have -- an important step in terms of managing and delivering on consumer expectations -- EPA has signaled its plan to help interested consumers identify products that offer them. At this early stage of deployment and with some uncertainty in terms of consumer acceptance, EPA does not plan to make "connected" a required attribute of an ENERGY STAR qualified model but instead list it as a product feature for relevant ENERGY STAR models. This approach is consistent with how the program generally flags functionality of interest to consumers through our qualified product lists (e.g., through the door ice, configuration, volume, and type of defrost). In addition to consumers, energy efficiency program sponsors could leverage these lists to identify "connected" appliances for their own purposes, enabling interested consumers and/or program administrators to more easily identify models with enhanced "connected" functionality.</p>
54	5% Allowance	<p>Strongly supports ENERGY STAR's decision to incorporate smart grid functionality and to provide a 5% allowance consistent with the Joint Petition given to EPA.</p>	<p>The Draft 2 specification document includes an allowance; in order to use this allowance, a product's demand response functionality will need to be verified using the ENERGY STAR test method being developed and validated by DOE.</p>