

Comments on new Energy Star Home Specifications
Building Energy Codes Program
Pacific Northwest National Laboratory
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The Building Energy Codes Program (BECP) at PNNL works to advance the efficiency of residential buildings through the International Code Council's (ICC) International Energy Conservation Code (IECC) and International Residential Code (IRC). As part of these efforts we develop tools and materials that facilitate coordination between the codes and beyond-code programs such as Energy Star, and that educate builders and code officials via DOE's energy-code information delivery infrastructure. We appreciate the opportunity to provide feedback in that context on EPA's new Energy Star specifications.

The proposed update to qualification requirements for Energy Star Homes represents a substantial improvement over the existing requirements. In particular:

- The proposed requirements are easy to understand. Tying the Energy Star specifications to a prescriptive format similar to that of the 2004 Supplement to the International Energy Conservation Code and/or the 2004 Supplement to the International Residential Code (IRC), chapter 11 (both are based on the DOE code change submittal) is a simplification that greatly improves readability and will result in a more uniform "understanding" of what Energy Star represents.
- Setting the requirements independent of a specific HERS score or of a specified percentage "above code" is a sensible approach. The IECC and the IRC are both updated every three years, and the current versions are almost guaranteed to be outdated in a few years. Likewise, the recent/ongoing changes to the HERS rating procedures illustrate the difficulty of tying Energy Star to a specific score. For example, it is entirely possible that an older house may be rated with a higher score than a new house on the same street, yet the newer house may actually be more energy efficient. The new Energy Star specifications that are independent of specific scores—yet retain the verification benefits of HERS—will guarantee that homebuilders are free to advertise their homes as Energy Star qualified regardless of any code or score confusion.
- The use of Energy Star products as components of an Energy Star Home design is a logical approach. This will allow the Energy Star Homes specification to be readily updated as the specifications for Energy Star Products improve. The alternative of setting the performance levels relative to an energy use level for lights and appliances could result in the levels becoming outdated in a few years, considering how rapidly appliances have been improving in terms of energy efficiency.

While the proposed specifications are clearly improvements, we believe there are a few changes that would improve the specifications:

- 1) The performance path should be restricted so that the use of Energy Star appliances does not allow reductions in building envelope efficiencies to below-code levels. Consider limiting envelope tradeoffs to IECC/IRC prescriptive levels, not below. Appliances typically fail many years sooner than envelope measures such as insulation and windows, limiting the long-term benefits of today's efficient appliances. Additionally, Energy Star lighting fixtures or ceiling fans can be installed in locations where they will

be infrequently used, whereas envelope measures have a more reliable benefit on heating and cooling loads. Finally, it may be possible in some situations that enough credit can be garnered via the performance path from the use of Energy Star appliances that envelope and/or HVAC measures are reduced enough that the home fails to comply with the 2004/2006 IECC. Such cases could harm Energy Star's credibility in the marketplace.

2) Clarify how lighting and appliances are to be applied in the performance approach. The specs currently provide insufficient guidance on how energy calculations are to be done in the performance path. This may leave room for gaming. A methodology for including appliances in the performance path needs to be specified. For example, suppose a builder decides not to use any Energy Star lighting fixtures or appliances in the proposed design. What appliances are to be assumed in the reference design for the calculation of the baseline HERS score required in this case? To compensate for the lack of Energy Star lights/appliances in the proposed design, there should be a well-defined energy penalty applied.

Deferring to the current HERS Rating Standards for appliance energy use calculations is not adequate. Amendment EXP 2004-01 to the HERS Standards specifies how to account for lighting, refrigerators, dish washers, mechanical ventilation energy use, and photovoltaic energy production, but does not specify how to do energy calculations for other appliances like clothes washers or ceiling fans. Additionally, the HERS standards specify an inappropriate annual energy use of 775 kWh/year per refrigerator in the reference home. This is much higher than the energy use of an average new refrigerator and will likely become more outdated in a few years. This means that a refrigerator with average energy efficiency (i.e., not Energy Star qualified) can be installed and actually earn credit in the performance path, allowing other building elements to be less energy efficient and making the performance path less stringent than the prescriptive path. EPA should specify that lights or appliances that are not Energy Star qualified shall not receive any credit in the performance path.

3) Consider more ambitious lighting/appliance/ceiling fan requirements. This will help prevent Energy Star from losing its efficiency benefit over energy codes and current construction practice. Improvements in the lighting requirements should be considered sooner rather than later. If the builder chooses to use five Energy Star light fixtures, it is possible that these fixtures could be in locations where they are seldom used by the occupants, or that they are installed in parallel with traditional (e.g., incandescent) fixtures, resulting in very little energy savings. One possibility for strengthening the lighting requirements would be to prohibit or restrict the use of non-Energy Star fixtures in rooms that have Energy Star fixtures. The 2005 California residential energy efficiency standards have robust, second generation lighting requirements; EPA should consider using some or all of these in its next-generation Energy Star specifications.

The "savings calculator" on the Energy Star web site indicates that an Energy Star ceiling fan without an Energy Star light fixture saves \$1 or less in annual energy costs. This is not a sufficient savings to merit credit in qualifying as an Energy Star Home. Therefore, either delete credit for Energy Star ceiling fans or require those fans to have an Energy Star light fixture.

Consider climate-based appliance requirements. Simulations indicate improvements in lighting and appliances that impact internal gains save about twice the whole-house

energy use in hot, southern climates compared to cold, northern climates. Therefore, it is much more beneficial to have stronger lighting/appliance requirements in southern climate zones than in northern climate zones.

4) Strengthen the "Right Sized" equipment language. The specifications for "Right Sized" equipment are insufficient in their proposed form. ACCA manuals are not written in "mandatory" language; they use the term "should" rather than "shall." Worse, the Energy Star Specification Notes also uses the term "should" when referencing the ACCA manuals, which arguably allows the builder to ignore this issue completely. Equipment sizing specifications should be required with mandatory language.

5) Clarify the Thermal Bypass Inspection Checklist. The draft Verification Instructions state, "Complete the Thermal Bypass Inspection Checklist, noting Yes or No for each measure." The language should be clarified to indicate that all items on the Thermal Bypass Inspection Checklist must be field verified as complying. "No" should not be an option.

6) Evaluate the accuracy of the "Estimated Savings Table". The Example of the "local specs" shows estimated annual savings of \$840 to \$960 for a 2000 sq. ft. house in Montgomery County, Maryland. This may be unrealistically high and may approach the total annual energy bill for many typical new houses. Without knowing the source of the savings estimates or the baseline against which they are compared we are unable to verify the estimates? EPA should verify that these estimated savings are correct.