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## **RE: Comment on the proposed revision of ENERGY STAR for windows, doors, and skylights. Recommendation that labels include a simple indicator of relative solar heat gain**

Dear Rich:

The Alliance to Save Energy proposes that the ENERGY STAR label include a simple indicator of whether the labeled product is a “high solar heat gain,” “moderate solar heat gain,” or “low-solar heat gain” product. Such a simple indicator would facilitate good fenestration selection based on orientation, local climate conditions, and occupant preferences and thus help consumers and professionals save energy and improve comfort at no added cost.

In northern climates, the existing as well as the proposed new ENERGY STAR criteria allow for a wide range of SHGC values among qualifying fenestration. The new proposed criteria for climate zones ES4 and ES5, with trade-offs available between U-factor and SHGC, are expected to increase the availability of the currently rare higher-gain options within this range. We acknowledge that this increase in the range of commonly available SHGC levels opens up more design possibilities, but we also caution that it increases the need for designers, builders, and buyers, to be made aware of the potential for unwanted solar heat gain from unshaded west-facing and south-facing glass. To facilitate optimum window selection, we strongly suggest that simple and clear information on relative solar heat gain be included on the ENERGY STAR label and encouraged in manufacturer product literature.

The trade-offs in the proposed ES4 and ES5 criteria take into account the average benefits of solar heat gain in a heating climate. Ideally, however, fenestration for a specific house should be selected based on the building’s actual orientation and shading conditions instead of average values calculated for a prototype house. It is not easy for product-based criteria such as those used for ENERGY STAR fenestration to take into account all the different circumstances in which these fenestration products may be installed. What the ENERGY STAR program **can** and should do, however, is provide a simple indicator of relative solar heat gain as a basis for house-specific decisions, and as a platform for information campaigns, incentives, and other market transformation activities by utility companies, energy educators, and others.

The indicator of relative solar heat gain should be based on the rated SHGC value. The SHGC number is already provided with all ENERGY STAR fenestration, but by itself does not offer an easy-to-use indicator of whether a given product is at the high or low end of solar gain from available ENERGY STAR compliant products.<sup>1</sup> A simple, 3-level indicator of where a fenestration product falls within the SHGC ranges that meet the ENERGY STAR criteria would offer much clearer information, allowing consumers to identify the ENERGY STAR product that is best suited to each application.

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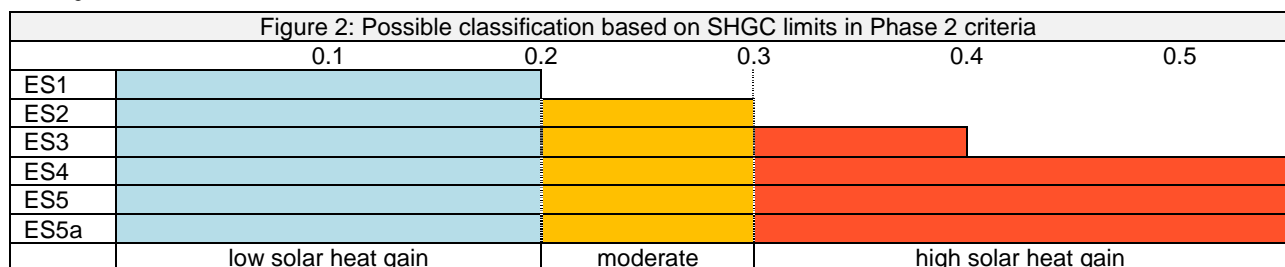
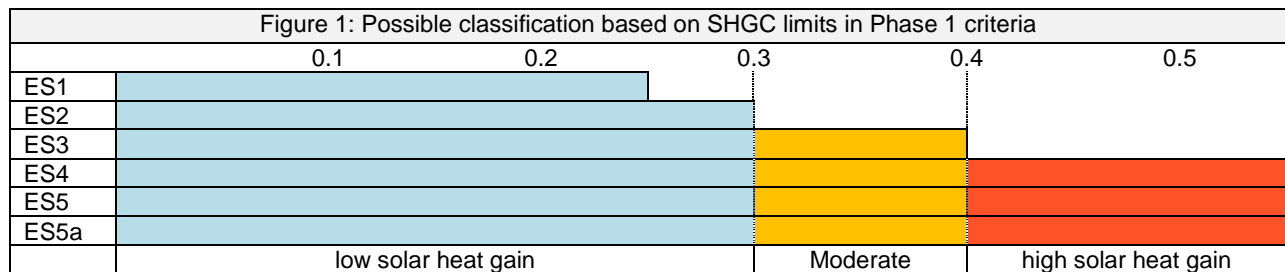
<sup>1</sup> Even literature on window performance does not always help to clarify the question of what is a low or a high SHGC. On the one hand, many older and even some recent publications still reference the shading coefficient (SC) whereas some other literature provides design guidance based on center-of-glass SHGC values. Neither SC nor COG SHGC values provide good points of comparison for whole-window SHGC values. A case in point is the guidance on passive solar window design by EERE ([http://apps1.eere.energy.gov/consumer/your\\_home/windows\\_doors\\_skylights/index.cfm/mytopic=13360](http://apps1.eere.energy.gov/consumer/your_home/windows_doors_skylights/index.cfm/mytopic=13360)). Here, a SHGC of greater than 0.60 is recommended for south facing windows. While this is not stated, this recommendation is likely based on the center-of-glass SHGC. In the RESFEN 5.0 window library, the only high-solar-gain low-E option with an SHGC of greater than 0.60 is the aluminum-framed option without thermal breaks (see <http://efficientwindows.org/glazing.cfm?id=6>). This shows the potential for confusion even among professionals if the SHGC provides the sole guidance for selecting windows with solar heat gain considerations in mind.

The reason why we propose a simple indicator for solar heat gain but not for the U-factor is as follows. The U-factor's range is limited under the proposed criteria, which allow a considerable range only in cooling-dominated climates where the effect of the U-factor is minimal. Therefore consumers are assured that any ENERGY STAR fenestration product will provide good performance in terms of the U-factor. The same is not always true for the SHGC. The proposed criteria allow a wide range of SHGC in the northern zones. Thus, a buyer who wants to emphasize passive solar heating cannot depend on all ENERGY STAR fenestration to admit enough solar gain. At the same time, where the main concern is with controlling unwanted solar gains, the buyer cannot rely on all ENERGY STAR fenestration to provide this protection.

Although LBNL's analysis ensures that windows with different combinations of U-factor and SHGC values all provide good energy performance on an *annual* basis for the *average* home, it can make a big difference to *individual* home owners whether they install windows with an SHGC of 0.50 or 0.25 – including the impact on thermal comfort, peak electricity demand, and air conditioning sizing which are not reflected in a calculation of annual HVAC energy alone. The dominance of heating demand in the North does not mean that solar heat gain can be neglected, either in terms of its ability to offset heating needs and provide winter comfort or in terms of its implications for cooling demand and summer comfort. From this, we conclude that while consumers can trust in the ENERGY STAR to guide them toward close-to-optimum choices in terms of the U-factor, additional information is needed, in a clear and easily understood form, to provide that same guidance with regards to solar heat gain.

The proposed new criteria for ENERGY STAR windows offer a basis for defining 3 categories of high, moderate, and low solar heat gain:

- Windows with an SHGC that can only qualify in the northern climate zones ES4, ES5, and ES5a (SHGC >0.40) could be considered “high solar heat gain.”
- Windows meeting the criteria of cooling-dominated climates ES2 (SHGC ≤0.30) could be considered “low solar heat gain.”
- Windows with an SHGC of 0.31-0.40 that meets the mixed-climate criteria of ES3 but does not qualify further south could be considered “moderate solar heat gain” (see Figure 1).
- Under the new criteria as presently proposed, this classification could work for both Phase 1 and Phase 2. However, the average SHGC of products qualifying in Phase 2 can be expected to be substantially lower, not only because of a more stringent SHGC limit in ES1, but also because of the lower SHGC that comes with triple-pane windows. Therefore it seems reasonable to use lower SHGC numbers for the classification of relative solar heat gain in Phase 2 (see Figure 2). For dynamic windows with variable SHGC, “variable solar heat gain” would be the appropriate designation.



The Alliance to Save Energy is aware of the need to retain the simplicity of the ENERGY STAR label. Adding an indicator of a fenestration product's relative solar heat gain by using three simple categories based on the SHGC would *enhance* rather than detract from ENERGY STAR's clear and simple message – while at the same time helping to guard the integrity of the label by discouraging selection of an ENERGY STAR window that is poorly matched to the needs of a specific application and could lead to lower energy savings, reduced comfort, or other consumer problems. ENERGY STAR is a highly-visible designation trusted by consumers.

Our proposed addition to the label would reinforce this trust, at no added cost, by providing an easy tool for designers, consumers, and utility programs to choose the right window for the right application and thus maximize energy savings and value.

Sincerely,

Nils Petermann  
Project Manager, Efficient Windows Collaborative  
Alliance to Save Energy

### Suggested Format for Displaying a Solar Heat Gain Indicator



This illustrates a possible approach to display an indicator of relative solar heat gain on the ENERGY STAR label (based on the current label design). Under the line "In All 50 States" (in this example), one line of text and a simple symbol could be added with little increase in space requirements.