ACEEE
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VIA E-MAIL

November 14, 2008

Richard H. Karney, P.E.
ENERGY STAR Program Manager
US Department of Energy
Washington, DC

Re: Comments on Criteria Revision for ENERGY STAR for Windows, Doors, and Skylights

Dear Mr. Karney:

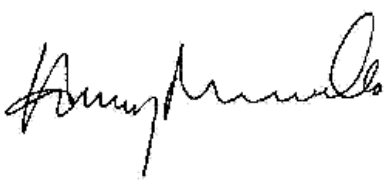
The American Council for an Energy Efficient Economy offers a few brief comments on the proposed criteria revisions for Energy Star Windows, Doors and Skylights. The American Council for an Energy-Efficient Economy (ACEEE) is a nonprofit, 501(c)(3) organization dedicated to advancing energy efficiency as a means of promoting economic prosperity, energy security, and environmental protection.

Climate zones. DOE proposes specifying additional climate zones beyond the current four zones. For Phase 1 beginning in 2009, there are six zones proposed. For Phase 2 beginning in 2013 the number of climate zones will decrease to five. While DOE describes how these climate zones may more closely follow the IECC climate zone borders and be beneficial, there are some important considerations not discussed in the body of the report or the climate zone appendix. Increasing the number of climate zones may lead to increased costs for inventory, distribution and marketing and an overall loss of economies of scale as more and different windows are introduced to meet more narrow criteria. In addition, near-term and future changes to the climate zones can lead to market confusion and possibly less market transformation effects. Perhaps the climate zones are best left as-is or simplified even further. We ask DOE to revisit its climate zone proposal in light of these other considerations.

Solar heat gain coefficient trade-offs. In setting the new criteria, DOE relies heavily on a wide range of U-factor and solar heat gain coefficient (SHGC) trade-offs that are deemed to provide "equivalent aggregate annual energy performance." These are the criteria shown in Figures 5, 6, 7 and 8 for climate zones 4 and 5 in Phase 1 and Phase 2. We call to DOE's attention that a proposed trade-off approach for specifying window performance criteria in the "EC-21" code change proposal for the 2009 IECC was recently rejected by both the IECC and IRC development committees. Because the proposed DOE trade-off approach for Energy Star criteria is similar in concept to that proposed for EC-21, we would like to add an IECC public comment on SHGC trade-offs to the record for DOE's process. Public Comment 4 in the attachment to these comments (see pages 544-546) was prepared by the Energy Efficient Code Coalition (where I was one of the proponents) and argues against these trade-offs on the following grounds: increase in summer peak electric demand, higher HVAC equipment sizes, risk of occupant discomfort, no consideration of proper window orientation, and creating confusion in what should be a simple compliance path. We ask DOE to consider a more simple prescriptive approach and maintain consistency of simple requirements across the climate zones.

We wish DOE every success in updating the Energy Star criteria for windows, doors and skylights.

Sincerely



Harry Misuriello
Visiting Fellow

Public Comment 4:

Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Bill Prindle, representing Energy Efficient Codes Coalition; Jeff Harris, representing the Alliance to Save Energy; Steven Rosenstock, representing Edison Electric Institute; Harry Misuriello, representing the American Council for Energy Efficient Economy, requests Approval as Modified by this Public Comment.

Modify proposal as follows:

TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

CLIMATE ZONE	FENES-TRATION U-FACTOR	SKY-LIGHT U-FACTOR	GLAZED FENEST-RATION SHGC	CEILING R-VALUE	WOOD FRAME WALL R-VALUE[g]	MASS WALL R-VALUE	FLOOR R-VALUE	BASEMENT WALL R-VALUE	SLAB R-VALUE & DEPTH	CRAWL SPACE WALL R-VALUE
1	1.20	0.75	0.37	30	13	3/4	13	0	0	0
2	0.75	0.75	0.37	30	13	4/6	13	0	0	0
3	0.65	0.65	0.40	30	13	5/8	19	0	0	5 / 13
4 except Marine	0.40	0.60	NR	38	13	5/10	19	10 / 13	10, 2ft	10 / 13
5 and Marine 4	0.35	0.60	NR	38	19 or 13+5	13/17	30	10 / 13	10, 2ft	10 / 13
6	0.32 ~~or 0.35 if SHGC ≥ 0.45~~[†]	0.60	NR	49	19 or 13+5	15/19	30	10 / 13	10, 4ft	10 / 13
7 and 8	0.32 ~~or 0.35 if SHGC ≥ 0.45~~[†]	0.60	NR	49	21	19/21	30	10 / 13	10, 4ft	10 / 13

a. through h. (No change to current text)

~~i. SHGC shall be NFRC tested value.~~

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This proposed modification corrects the major flaw in the original proposal while retaining the undisputed benefits of a reduced window U-factor in climate zones 6-8. The original proposal introduced a special limited exception for high solar gain window products in these northern climates; this concept has been consistently rejected in prior proposals for many years. These proposals have typically oversimplified the key differences between heating and cooling energy saved, and the proponents have not demonstrated that this tradeoff would actually save energy in homes with varying operational and design characteristics. Even though appended to a reduction in U-factors for fenestration in these climate zones, neither the *IECC* nor *IRC* Code Development Committees were able to find that the benefits from a lower U-factor outweighed the negative impact of the trade-off. As originally written, the proposal cannot guarantee any energy savings, since it does not recognize the orientation of the fenestration and ignores other important issues like comfort and peak demand.

This modification cures this problem and secures the benefit of lower U-factors across-the-board to save energy all-year-round by simply eliminating the trade-off exception while recognizing the necessary improvement in window performance for climates that range from 7,200 to more than 12,000 Heating Degree Days during the heating season. It also responds the *IECC* Code Development Committee's accurate reasoning that, "Given that the advantages for SHGC gains depends upon the direction of the wall in which the windows are installed, the Committee believes that this provision is an oversimplification of the value of the tradeoff. This would be better dealt with in performance design."

Support for Proposal As Modified.

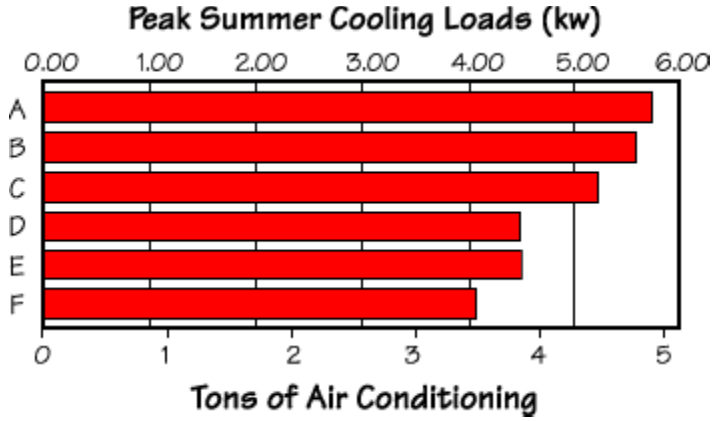
We support lowering the U-factor to 0.32 in zones 6-8 without any exceptions because this would result in a guaranteed increase of almost 10% in window insulating value (almost a 10% reduction in heat loss through these windows) in these cold climates and guaranteed energy savings year-round in every home. A lower glazing U-factor is a proven energy saver for heating and cooling energy, so there will be savings on natural gas, heating oil and electric bills. Many windows sold in the northern U.S. that meet the 0.35 U-factor also meet the 0.32 U-factor. Typically, the difference between a 0.35 and 0.32 window is argon-fill, a fairly low cost option. While lowering the U-factor to 0.32 may be aggressive, the area weighted average approach incorporated into the code will allow some windows to exceed this value, so long as the windows selected for the home on average meet the 0.32 value.

Opposition to the Original EC21 with High SHGC Special Product Exception.

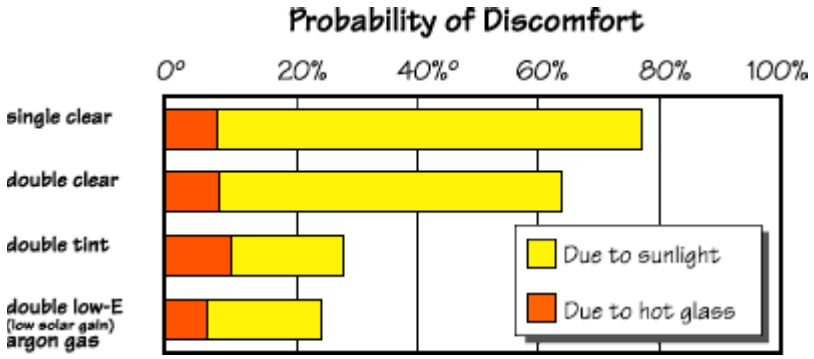
Regardless of the approach to the lower U-factor, we fundamentally disagree with the concept of creating a special exception that allows higher U-factors in windows with higher SHGC values. There is no valid evidence that a window with a minimum SHGC of 0.45 and a maximum U-factor of 0.35 would use equal to or less energy in most, much less all cases, regardless of orientation, in reasonably designed and operated houses, than a window with a 0.32 U-factor. Indeed, the risk is substantial that a higher SHGC would actually create occupant discomfort in the summer and increase summer energy use (where windows face west and south), especially during critical times of peak electric demand. Moreover, higher SHGCs could result in upsizing the air conditioning equipment by as much as an additional half-ton and increasing peak summer electric load per home by as much as half a kilowatt (0.5 kW). The *IECC* and *IRC* should not be weakened to make room for specific product exceptions.

1. **Promotion of Higher SHGCs Would Negatively Impact Electric Peak Demand and HVAC Sizing.** One of the most serious challenges facing the electric system is reliably meeting peak demand. Most utility systems in the US, including those across the northern part of the US, have peak demands that occur in the summer as a result of meeting residential and commercial air conditioning

loads. Peak demand growth requires utilities (and indirectly consumers) to construct and pay for expensive additional generating units to supply power for only a few hours per year. Increasing peak demand and summer HVAC sizing are unintended negative consequences that support rejection of an approach that promotes high solar gain. The following chart provided by Lawrence Berkeley National Laboratory (LBNL), which can be found on the Efficient Window Collaborative (EWC) website – www.efficientwindows.org), illustrates the peak demand and HVAC sizing issue by showing the potential peak demand impact from different window types. Window F is the low SHGC, low U-factor window while window E is a high SHGC, low U-factor window. As is readily apparent, promoting a higher SHGC would have a negative impact on electrical peak demand and equipment sizing.



2. **Promotion of Higher SHGCs Would Negatively Impact Summer Comfort.** As written, EC21 encourages the installation of high solar heat gain glazing, regardless of the orientation, by establishing an exception to the lower U-factor. High solar gain will lead to significant occupant discomfort in the summer, even in colder climates (while possibly impacting winter comfort during the daytime). As explained by the EWC, as more direct sunlight passes through glazing, the probability of occupant discomfort increases enormously. The following chart provided by LBNL on the EWC website shows that use of a double pane clear window (with no low SHGC treatment) makes it almost three times more likely that the occupant will be uncomfortable, as compared to a sensible low SHGC low-e window. When occupants are consistently uncomfortable, they are likely to lower thermostat set-points in the summer and produce energy losses instead of savings (it is also possible in some cases that some may also lower their thermostats during the daytime during the winter).



3. **Special Product Exception is Inconsistent with Proper Passive Solar Design and Improperly Ignores Window Orientation.** There is already room in the *IECC* and *IRC* for a passive-solar designed home. Builders have used the simulated performance alternative for years to take advantage of sophisticated designs that involve the correct windows for each orientation, thermal mass capable of absorbing heat gain, and overhangs to shield solar radiance when it is unneeded. With the performance path, builders can simulate the actual impact of specific window choices for specific orientations on a specific house. However, the oversimplified trade-off proposed by EC21 does not require any of the measures necessary for passive solar design, and as such, is not a reasonable addition to the simple prescriptive path. Recognizing that high SHGC windows are beneficial only for southern orientations with the proper design, the US Department of Energy's own recommendations for passive solar design recommend low SHGC windows (not high SHGC) for east and west oriented windows in northern cold climates. (http://www.eere.energy.gov/consumer). In addition, given the lack of solar gain on northern exposures during the winter in these climate zones, there is no basis for trading off the guaranteed benefits of a lower U-factor for no possible benefits from SHGC for north-facing glazing. As proposed, EC21 does not apply only to passive solar-designed homes, nor does it require proper orientation, but instead could apply to any home with any window orientation built in the northern portion of the country.
4. **Special Product Exception is Confusing and Inconsistent with Simplified Prescriptive Path.** This proposal, if adopted as written, will establish another confusing prescriptive alternative that runs counter to the simplified approach presently embodied in both the *IECC* and *IRC*. The changes adopted in the 2006 cycle as developed by the U.S. Department of Energy established a single, simple prescriptive path to encourage ease of compliance and enforcement, as well as economies of scale and more effective competition, resulting in lower overall building costs. Permitting such a specific prescriptive trade-off for one feature (high window SHGC) will encourage other interests to seek their own prescriptive trade-offs, ultimately resulting in over-complicating the recently simplified 2006 version of the code. This will only make the job of the code official more difficult without any offsetting benefits.
5. **Similar High SHGC Proposals Have Been Consistently Rejected by the ICC.** Similar proposals have been disapproved repeatedly by the *IECC* Committee in past code cycles for the same reasons (these proposals have also been rejected on public comment by the ICC membership for both the *IECC* and *IRC*). The *IECC* Development Committee stated in the last code cycle:

-EC44 and EC45-06/07: "Regarding the new concept of introducing minimum SHGC values in northern climates, there are still too many unknown variables to justify this. For one, the orientation of the building will affect how much savings is realized. For another, the change in temperatures over the past few years in northern climates makes it unclear whether we can move to the concept of using windows to save on heating values."

-EC54-06/07: "The concept of heat gain windows in heating climates brings concerns as discussed in other code change proposals regarding the dependency on orientation or other factors that could limit solar access to truly gain the advantages from these windows. In addition, many of these climates now have longer cooling seasons due to change in human behavior as well as climate changes.

EC21, as written, suffers from the same fundamental flaws as these earlier proposals, and should be likewise rejected at the Final Action Hearing. EC21, as modified by this public comment, would eliminate these flaws while retaining an improvement in U-factor to save natural gas, heating oil, and electricity. It should be adopted only if it is modified as described above.

Final Action: AS AM AMPC____ D