Mr. Richard Karney
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
1000 Independence Ave SW
Washington, D.C. 20585

November 14, 2008

Dear Rich,

On behalf of the Aluminum Extruders Council, thank you once again for the opportunity to provide comments on the proposed revisions to the Energy Star® program for Windows, Doors, and Skylights.

As we have for many years, we will continue to work with DOE and other stakeholders to advance energy efficiency of the fenestration industry while also considering other important factors such as life safety, structural and durability requirements, sustainability, and cost effectiveness. To that end, we offer the following comments on the proposed changes to the Energy Star program:

1. The scope of the current program is for Low-Rise Residential Homes only.

Until an Energy Star program for commercial glazing is developed, DOE and D&R must make it absolutely clear that the Energy Star program for Windows, Doors, and Skylights only applies to products used in lowrise residential homes, not residential buildings over 3 stories or nonresidential buildings of any height. This is required to be consistent both with the technical and cost analyses underlying the Energy Star criteria, but also the dividing line used by ICC, ASHRAE, and other programs.

On a weekly basis, our members and colleagues run into situations where "Energy Star" windows are specified for commercial and highrise residential buildings, even though they would almost never meet the structural and durability requirements. Not only does this abuse of the Energy Star name create confusion in the marketplace, but it also potentially creates a life safety issue if windows are installed which do not satisfy the building code.

Recommendation: All websites, marketing materials, and labels related to the Energy Star program for Windows and Doors must include a disclaimer statement such as *"The Energy Star designation only applies for use in residential homes 3 stories or lower."*

If DOE decides to develop an Energy Star program for commercial glazing, we will be happy to provide advice on how to promote the best of the best, while also properly accounting for added complications in the commercial sector such as life safety and structural requirements in a diverse range of building types.

2. ES1 Southern Zone U-factor and SHGC

U-factor ≤ 0.60

In the August 6 draft criteria and analysis, DOE initially set a proposed U-factor of 0.50 for phase 1 based on the IECC preliminary hearing results, but noted that this was a significant change from the current Energy Star program. Therefore, DOE also stated that "Should IECC set a less stringent U-factor at the final status hearings, DOE will relax its U-factor to that level or to 0.60, whichever is more stringent."

I am sure the Department is aware that the ICC did revise its final requirements for the 2009 IECC to a 0.65 U-factor, along with adopting separate criteria for hurricane products.[1] Likewise, the 0.50 U-factor was specifically rejected amid concerns about cost effectiveness and promoting products with lower structural performance.[2] Therefore, we encourage DOE to do as previously stated, and adopt a 0.60 U-factor requirement for ES1 in phase 1. The phase 2 requirement can be similarly adjusted.

While this topic was fully vetted at the code hearings and may not require further explanation, we will summarize a few of the supporting concerns.

As shown in Table 12 of DOE's analysis, the initial proposed criteria would eliminate a large portion of aluminum products (95% in the vertical slider example), despite the fact that aluminum is one of the dominant material choices in this region because of durability and structural requirements. This elimination is unwarranted, particularly because the U-factor is of only secondary importance is this cooling-dominated climate.

Also, eliminating aluminum would promote products with lower structural performance, raising life safety concerns. For example, looking at the Miami-Dade listings of hurricane impact resistant products, the large majority of listed products are aluminum, and the non-aluminum products that do meet the impact requirements are rated at lower design pressures. The average design pressure of these listed products is:

Aluminum	92 psf
Wood	66 psf
Reinforced vinyl	60 psf

Therefore, eliminating aluminum would result in over a 30% decrease in design pressure for these hurricane products, and even more for normal vinyl windows where reinforcement is not included. This was one reason the Institute for Business and Home Safety (IBHS) testified against EC16 and the 0.50 U-factor at the ICC final hearings.

Additionally, the cost effectiveness of the 0.50 U-factor is questionable in this region where U-factor has less importance. In Table 11 of DOE's analysis, the annual energy savings is

[1] Proposal EC18-07/08 was approved as modified by public comment #1.
[2] Proposal EC16-07/08 was disapproved.

estimated from $76 – $101 in three different ES1 cities. Most of this is related to cooling benefits and SHGC. LBNL's spreadsheets show a ratio of nearly 3:1 between cooling vs. heating total source energy usage in ES zone 1, which would then place the heating cost component at roughly $19-$25. On the other hand, the marginal cost is greatly underestimated, where it seems D&R selected an arbitrary 4% marginal increase, or only $180 per home. This might be reasonable for the additional cost of new advanced low-e coatings to achieve the SHGC, but ignores the additional thermal break required for this U-factor. The mature cost to add a thermal break is around $1.33 - $1.50 per square foot,[3] or an additional incremental cost of $400-450 per home, and much higher for impact resistant products. Consequently, the simple payback associated with the thermal break averages around 20 years, and twice as long for impact resistant products. A more detailed analysis of the U-factor effect shows that the specific payback period is even longer in central and southern Florida cities, with payback periods of over 40 years. The 0.50 U-factor is simply not justified.

DOE's intention to modify the U-factor to 0.60 is consistent with the decision of the body of code officials at the ICC final hearings, alleviating these concerns about structural performance and cost effectiveness.

SHGC ≤ 0.27

The proposed maximum SHGC of 0.25 is very stringent, which does significantly boost energy savings in this region. Our only concern is that this is reaching the point where the low SHGC will also result in lower visible light transmittance, negating one of the primary purposes for having windows!

This is especially true for certain products like picture windows and glass doors, which are often on the edge for reaching the 0.25 SHGC even with the newest low-e coatings. For borderline products, the criteria will actually encourage manufacturers to use a darker coating and/or tint to get below 0.25 and achieve the Energy Star rating, reducing the visible light transmittance and increasing lighting energy use.

D&R did examine the availability of products that meet the 0.25 SHGC requirement, but only for vertical sliders which tend to have lower SHGC from greater frame area and grids. Low SHGC products of all types certainly exist, but we suggest that D&R look at the average VT for different product types in the NFRC database, making sure to not restrict the study to advanced high VT coatings only available from one supplier.

We do understand that the 2009 IECC requirement of 0.30 sets a boundary for DOE. However, DOE may want to consider a slight modification from 0.25 to 0.27. This small change has little

[3] Result of an informal survey of manufacturers. The ASHRAE envelope subcommittee also uses an incremental price of $1.50 per ft^2 for its cost-benefit analysis. For impact resistant products, the cost is even higher, over $3 per ft2.

impact on total energy savings, but may increase availability of products with a higher average VT. An analysis by D&R of the product availability and average VT at different SHGC levels (e.g. 0.24, 0.25, 0.26, 0.27, …) will help determine the optimum level.

3. Performance-Based Trade-Offs

Performance-based alternative criteria are core to one of Energy Star's guiding principles to account for equivalent functionality and performance of different product technologies. While providing the consumer equivalent energy performance, performance-based alternatives also provide manufacturers the ability to offer a wider range of options and innovative new products. Increased options for consumers lead to increased competition and decreased market prices for improved technologies.

We applaud DOE's previous inclusion of performance-based criteria in the south, as well as the new proposed performance-based criteria in the north. Now that DOE is intending to modify the U-factor in ES1 to 0.60, we also encourage DOE to reinstate the appropriate performance-based criteria in this southern zone up to the code limit.

Some have falsely claimed that performance-based alternatives are overly complex and confuse the consumer. These claims are simply unfounded. We are not aware of any such problems since performance-based alternative criteria were first established for the south and south central zones in 2004. Whether the program is for windows, light bulbs, or washing machines, the consumer only looks to see whether or not the product is Energy Star qualified, not the details of how the product qualifies.

Finally, we believe DOE should consider including the effects of air leakage (AL) and visible light transmittance (VT), which also determine energy performance along with U and SHGC.

4. Hurricane Impact Resistant Products

We understand that DOE will be examining setting appropriate criteria for hurricane impact resistant products next spring, after the main criteria for windows and doors are finalized. This is very important, and we will happily assist in this endeavor.

Hurricane impact resistant products are different from other residential products in structure, energy performance, and cost. Just as the current program recognizes that skylights and entry doors are different than windows, the Energy Star program should set separate requirements for hurricane impact resistant products. The body of code officials at the ICC final hearings came to a similar conclusion, and adopted separate requirements for impact resistant fenestration for the 2009 IECC and IRC.[1]

Building codes in coastal areas from Texas to Massachusetts are being updated at a dramatic rate to greatly increase structural wind load and impact requirements. At the same time, requirements in both Energy Star and the energy codes are also being increased. We must be

very careful to create criteria which promote energy efficient products while not conflicting with or discouraging compliance with structural and life safety requirements.

For example, the data shown above in item #2 demonstrate how an inappropriate U-factor could promote lighter framing materials and lead to a 30% decrease in average design pressure for hurricane products. This is very concerning.

It would be misleading and/or confusing to consumers if the Energy Star program makes no distinction between normal residential products and impact products. In the worst case, demand for Energy Star products could lead to less safe, non-impact products being installed in coastal areas in contradiction to building codes. By establishing requirements which acknowledge the difference in impact products, the Energy Star program would encourage products that satisfy *both* energy and life safety concerns.

5. Sliding Glass Doors are different from Swinging Entry Doors

We are aware that one group will be proposing to combine sliding patio doors with the same criteria as swinging entry doors. We strongly oppose this proposal. The swinging entry door criteria don't vary by climate, and the proposed U-factor (0.32 for a fully glazed door) would simply be unrealistic and not cost effective for sliding glass doors that must meet wind load and deflection requirements in southern zones like Florida. In essence, this would drop the U-factor from 0.65 in today's Energy Star program to 0.32, which is simply not justified.

It makes no sense to ignore climate variation for sliding glass doors, which are much closer to windows than ½ opaque doors when considering energy performance. These products have important differences in SHGC and U behavior from south to north. If anything, DOE should undertake the exact opposite, and include climate-specific criteria for swinging entry doors that are more than ½ glazed.

6. Energy Star must also consider Environmental and Sustainability Issues

We would like to challenge DOE to think more broadly about environmental and sustainability issues beyond simple energy consumption. While energy savings are the focus, DOE should avoid unintended consequences which may be detrimental to the environmental interests of U.S. residents. For example, in ES Zones 1 and 5, the initial draft criteria push consumers away from green materials like aluminum and wood towards questionable, less environmentally friendly products. We should examine all aspects of cradle-to-cradle sustainability, but at a minimum, one easy concept is to promote use of recycled materials.

We previously submitted a detailed proposal and analysis for a new recycled content credit, in which a credit towards meeting the U-factor criteria could be earned by using a higher amount

of recycled material in the product.[4] We shall not repeat the proposal here, but as the analysis shows, *the embodied energy savings from the use of recycled aluminum can be as significant as the energy savings from proposed reductions in U-factor*! This is particularly true in the south. This proposed credit is consistent with the guiding principles of Energy Star to promote significant and measurable energy savings, while recognizing equivalent functionality and performance of different product technologies.

Besides the measurable embodied energy savings, promoting the use of recycled materials is also consistent with the general sustainability goals of DOE and EPA. More efficient use of materials reduces the ecological impact of a building. This includes reduced landfill waste, as well as reduced energy and emissions associated with manufacturing, transportation, and disposal. Additionally, for certain materials, emissions associated with incineration and/or decomposition are of particular concern.

7. Don't ignore Durability and Long-Term Energy Performance

IG certification is being proposed as part of qualifying for the Energy Star program, to help ensure the claimed energy performance of the glazing is preserved over a long term. We believe this is a step in the right direction, but wish to remind DOE that IG certification is only one aspect of durability, and does not address long term energy performance of the frame.

Frame deformation from thermal cycling can dramatically change air leakage and energy performance of the window over time. Currently, this issue is ignored by both Energy Star and NFRC. We acknowledge that this is a difficult issue to include in Energy Star at this time, but we encourage the DOE to expand their current durability research from just IG units to also include frames.

Thank you for your consideration, and please feel free to contact me at any time if you have any questions or would like further details.

Sincerely,

Thomas D. Culp, Ph.D

[4] See detailed proposal at
http://www.energystar.gov/ia/partners/prod_development/archives/downloads/windows_doors/AluminummExtrudersCouncil_15Aug08.pdf