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Mr Doug Anderson
USEPA Headquarters
Ariel Rios Building
1200 Pennsylvania Avenue NW
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Doug,

You should find our comments attached in response to the Version 6 Product Specification Framework Document for ENERGY STAR for residential windows and doors follow.

We appreciate the opportunity to engage with you and the team at the EPA and look forward to participating in the process as the dialogue moves forward. For assistance in your review, I've bold faced headings specific to each section. If you have any questions, feel free to reach me by phone: 425-882-1322, or by e-mail: jmeade@southwall.com.

Regards,

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Comments:

Introduction and Overview -

The second paragraph of the Framework Document's introduction and overview includes the following statement: "... Additionally, new data provided by Ducker Research demonstrated that the Energy Star market share for windows, doors and skylights is extremely high, at 81% for windows, 71% for swinging doors, and 99% for glass skylights." The executive summary of Draft Criteria and Analysis DOE presented at the August 6, 2008 Stakeholder meeting, notes that the ENERGY STAR market share for windows at that time was 59% nationally. Between 2008 and today, the performance requirement has been enhanced and yet the saturation rate has increased. While it is understood that part of this is due to the relative mix of new construction and replacement markets, it also indicates that the ENERGY STAR brand is strong enough to withstand potential loss of market share as requirements are made more demanding.

At the 2008 Stakeholder meeting it was noted that a general target of 25% was set for ENERGY STAR in most industries. If the 25% "rule" remains operative, we wonder why the proposed new values might be set as high as 0.27 with more than 41% of the current market meeting that standard. A chart Mr. Anderson presented at the recent NFRC meeting showed that at present 41.8% of the windows in the CPD meet the proposed Northern standard of 0.27. Assuming companies which do not currently have products which meet the 0.27 requirement will employ efforts to improve their product offering by the time the new criteria are adopted, it is likely that 41.8% number will balloon to more than 50% of the offering will meet the new criteria. If the lower end of the range 0.25 is selected, with a current share CPD availability of 25.8%, that percentage will likely drift to around 40% by the time the program criteria are adopted. With these percentages in mind, perhaps it should be more accurately stated that the ENERGY STAR labeled is targeted at the top 25% of products in most industry segments, except in the residential window, where the top 50% of windows are being given the recognition of having the industries "most efficient" products. If the 25% standard is truly meaningful, adopting a new criterion presently met by 15% to 20% of the marketplace today is more appropriate. In fact EPA is using such rationale in the proposed improvement to the criteria for skylights, with less than 20% of the products in the CPD meeting the proposed new standard. We urge the same rigor be used in develop a new performance requirement for windows.

Program Elements for Consideration

The EPA is to be applauded for having considered additional program elements. While there is some risk in diluting the focus of the program, there is merit in considering additional requirements and elements. We concur with EPA's decision to NOT include the five new elements which were considered. Having said that we believe that additional study should be given to the benefits of Daylighting. Daylighting has been well established as an energy saving driver in the commercial marketplace. Less evidence is readily available to justify its benefits in the residential markets. It would be useful to capture more information specific to the benefits of residential Daylighting to validate or invalidate the inclusion of a Daylighting component in future ENERGY STAR for Windows standards.

New additions to Program Requirements

We concur with EPA's proposal to add air leakage requirements to the criteria. However, we are surprised that EPA is proposing use of the IECC code requirements. As ENERGY STAR has typically sought to have requirements which exceed code, incorporating a 2010 code standard into a program which may be in force as far into the future as 2018 seems inconsistent. With this in mind, Southwall supports the inclusion of air leakage requirements, while urging EPA to work with industry to find more rigorous but reachable values.

Proposed Revisions to Product Criteria : Windows – Northern : Maximum U-factor to be set between 0.25 and 0.27.

The Framework document makes the following statement: “EPA is looking to establish criteria that recognize the highest-performing doubles and bring a greater number of triple pane windows into the mainstream.” We agree with this objective. However, we are concerned that the proposed criteria will not propel the market to take steps to realize this objective. We believe that most manufacturers will opt to improve their product performance by means of adding a surface four low-e coating and foam filling their frames, assuming their frames allow for foam filling. We believe that looking at the existing CPD data, which shows companies using both surface four coating and multi-cavity triple pane solutions, and assuming that that a similar mix of companies will be maintained going forward is flawed. Surface four low-e coating solutions are relatively new, and given the low bar set by the proposed standard, we believe that the preponderance of manufacturers will elect to go the surface four route. Ask this question honestly: Given the choice between adding surface four low-e glass with little or no capital cost, or expending \$500K to \$1M to manufacture triple pane IG cost effectively, what will the industry choose?

In the spirit of declaring victory and going home, as these new standards are adopted EPA will no doubt point to the energy saved as additional windows are sold with improved performance, but at the same time the opportunity to push the market to a fundamental tipping point will have been lost. Many window manufacturers have resisted and will continue to resist modifying their products to achieve next-level U-Factors in the range of 0.20-0.22. Such values would normally be met by designs employing leading-edge frame components and leading-edge glazing. Enabling manufacturers to incrementally improve performance without re-designing their products to move beyond the inherent performance limitations of a single cavity, reinforces the structural resistance to change that has been present in the industry since the introduction of R4 glazing in the mid 1980's¹. Missing this opportunity is doubly disappointing, because not only will this opportunity be lost, but the preparatory work done by the Department of Energy and EPA beginning with Stakeholder meetings in 2008 will also be lost. Southwall Technologies has been engaged with many leading window manufacturers subsequent to that stakeholder meeting in August of 2008. Interest in affordable multiple cavity solutions for the cold climate market segment has escalated greatly and to the best of our knowledge EVERY significant window manufacturer has been preparing plans to incorporate multiple cavity glazings into their product offering in the event that new rigorous ENERGY STAR criteria required them to do so. The modest improvements proposed in this particular section of the Framework Document lets the industry put these plans back on the shelf.

One might argue: what is the harm in maximizing the performance of double pane, via foam filling and via adding surface four low E coatings. Windows will be sold with better performance. Energy will be saved. Moving forward with broad use of surface four low-e without meaningful increases in multi-cavity IG availability it is harmful for a number of reasons:

- EPA will not achieve one of the objectives stated in the Framework document: “ bring a greater number of triple pane windows in to the mainstream.”
- The framework document further states: “triple pane products are still relatively uncommon and, based on our preliminary cost analysis, may not be cost-effective.” We take exception to the cost-effective comment in an absolute sense, but we agree that multi-cavity products are relatively uncommon, and currently command a premium in the market. A key to market transformation is increasing availability and supply.
 - Multi-cavity IG is uncommon and costs more because major manufacturers do not want to add the complexity to their product offering. The proposed criteria will enable manufacturers to

continue promoting an ENERGY STAR product without requiring multi-cavity construction. Multi-cavity IG supply will remain limited.

- Limited supply allows manufacturers to command a premium well beyond the cost of goods sold.

Delaying market transformation efforts to create broad market multi-cavity availability delays the market's move to the significantly higher performance afforded by multi-cavities. Lack of competitive availability for higher performing products at decreasing prices keeps builders and homeowners from having meaningful options to purchase higher performing products. The public welfare is NOT fully met.

- DOE's own documentation in 2008 indicated that the 15% premium for a window with multi cavity glass would drop to 5% by the time the standard was adopted. (D&R Draft Criteria and Analysis, Aug 2008). Adopting a standard that fosters multi-cavity IGU's continued to existence as niche product will deny the market the broader choice, broader competition and the improved price point predicted in DOE's own analysis.
- As manufacturers incorporate design changes to incorporate multi-cavity glazing, an important technology chasm will have been crossed. Having multi-cavity capability in place, manufacturers will have the option of adding a second low-e coating in the triple pane, or perhaps even using krypton gas or krypton argon blends to give them greater levels of performance. The multi-cavity platform creates the possibility for these progressive improvements.

One might question whether there will be downward velocity in dual-cavity price points, if broader use of multi-cavity products is required. Southwall believes applying the standard market transformation paradigm to forward improvements in multi-cavity glass pricing is accurate. The next phase of ENERGY STAR performance enhancement has not been determined and Southwall Technologies has already seen significant moderating of costs of multi-cavity IGU's. It's important to note that in Europe where adoption and use of multi-cavity glass in the broad market is more mature than in the U.S., costs have continued to fall dramatically since 2008. In keeping with our commitment to improve the selling price of multi-cavity glass units, Southwall Technologies forward integrated into the manufacture of sealed glass units in 2008. As we have automated our manufacturing process our prices points have improved, and as we have engaged with the market place, we have improved our visibility into anticipated forward pricing anticipated by leading residential window manufacturers. For EPA's reference, we've summarized North American and European price point velocity in the table below. When Southwall researched market pricing in 2008, multi-cavity IG was typically priced in the \$9.00 per square foot range. It is currently being sold in the \$7.00 range, and leading window manufacturers indicate they expect to be paying less than \$5.50 per square foot in 2013 for multi-cavity glass they outsource. It should be noted that the \$5.50 price is based upon the assumption that they would need triple pane or dual cavity IG to meet ENERGY STAR performance requirements. If multi-cavity glazing is not required, and competition is less rigorous, pricing will not be as favorable to the consumer.

	2008	2011	2013
Low-e /triple pane IG (N.A.)	\$9.00	\$7.00	\$5.50
Low-e /triple pane IG (Eur)	\$7.00	\$4.00	\$3.50
Heat Mirror triple IG (N.A.)	\$11.00	\$9.00	\$6.00

In support of DOE and D&R's assertion expressed in the 2008 document previously referenced that companies would innovate and compete to improve pricing, Southwall's anticipated pricing on Heat Mirror insulating glass is worth noting. In anticipation of growing demand, Southwall has invested more than seven million dollars in automation efforts to streamline our manufacturing process, and will begin bringing these enhancements on

line early in 2012. Our prices on Heat Mirror multi-cavity units have improved since 2009 and will improve significantly as the automated line currently being installed comes on line.

Southwall is not alone in investing in multi-cavity IG automation efforts. If ENERGY STAR requirements lead the market forward, many manufacturers of multi-cavity IG using three lites of glass will adopt manufacturing improvements the equipment producers are bring on line. Companies like GED have been investing heavily in developing automated equipment to enable the industry to produce multi-cavity glass more cost effectively. GED is now shipping automated lines to produce multi-cavity IG at low cost increments over the price of double pane.

Multi-cavity pricing has been moderating, capital equipment developments are coming on line which will enable manufacturers to produce or purchase multi-cavity IG at even better prices. The European model shows that multi-cavity prices have room for continued downward momentum. And the window industry has been preparing alternatives to include multi-cavity glazing in their strategic product plans. The pieces necessary to move the market forward are in place. EPA has the option of supporting ENERGY STAR standards which support accelerated market transformation, or it can elect to move forward with modest incremental improvements, and for the next five to seven years have a standard which acts as a brake on innovation rather than the transformative tool it can be. We understand that the industry has reasons to avoid the investments necessary to offer multi-cavity glazing at cost effective prices. They have had such reasons since 1985ⁱⁱ, and will also have these reasons in 2018, or whenever the next round of ENERGY STAR improvements is undertaken.

We urge EPA to reconsider these modest improvements and select a Northern zone performance level close to 0.20. When cost analysis is undertaken, do not use the price points given by a select group of manufacturers who currently take advantage of limited market availability to charge a significant premium for multi-cavity pane options. Consider the forward pricing cited in the 2008 D&R study, which is supported by the downward trend in multi-cavity pricing already evident, a trend that can accelerate and follow the European model as capital improvements by companies like Southwall and GED come on line. The industry needs a push – EPA can choose to provide it, or take a pass.

ⁱ The first low-e type coating was introduced to the market by Southwall Technologies in 1980 – providing R-4 center of glass performance. By 1985 the competitive IGU's providing similar performance were available on the market incorporating coated glass and argon gas. Since 1985, the broadest part of the residential market has seen marginal improvement in thermal performance as glass emissivities dropped from 0.15 to the 0.02 range seen in current coated glass products. The industry has introduced numerous iterations of solar control improving technologies, and "self-cleaning" glass products, but for twenty six years has broadly avoided pushing performance forward on the thermal side of the equation, because meaningful improvement would require moving from single to dual cavity glazing. It is only the perceived "threat" of aggressive improvement in ENERGY STAR introduced in the 2008 Stakeholder meetings that certain portions of the industry have begun to offer surface four pyrolitic low-e products. While these products offer some improvement, it must not be missed that they have been embraced in part because they do not require a switch to multi-cavity glazing – and the attendant re-designs required in window systems to allow for the use of multi-cavity glass: thicker glass pockets, hardware changes, etc.

ⁱⁱ It should be noted that while manufacturers have avoided investing to incorporate multi-cavity construction in their products, governmental involvement in the industry, with the best of intentions has had unintended consequences. In the

late 1980's the NFRC develop a rating system that reduced the impact of glass on window performance, and at the same time changed the metric of performance from "R-value" to "U-factor." The numbers looked smaller, and the consumer didn't understand their significance. The ratings were counter-intuitive (smaller meant more insulating performance) and hard to understand. Manufacturers' focus on glazing performance moderated. Following this, in 1998 DOE's introduction of the ENERGY STAR brand into the window market, defined "energy efficiency" at the lowest common denominator of improved performance: a low-e coating and argon gas. As a result of this manufacturers who by the nature were reluctant to invest in performance improvements which required re-design of their products, were aided by the creation of a standard that defined energy efficiency at a level which enabled them to extend the life of fully capitalized single cavity designs. While DOE's strategy made sense from a market transformation perspective, it had a chilling effect on performance innovation. Energy Efficiency in windows had become binary: ENERGY STAR or NOT. And as the consumer still didn't understand U-factors, questions existed specific to whether the consumer would understand the performance difference between a 0.35 window and a 0.25 window. We have an historical record which makes it clear. If standards define performance at a low level, the broad market will not move forward.