

VELUX America Inc.

Comments Regarding:

**ENERGY STAR® Program Requirements
Product Specification for
Residential Windows, Doors, and Skylights**

**Eligibility Criteria
Draft 2 Version 6.0**

Issued February 8, 2013

VELUX America Inc. is providing comments on the latest Version 6.0 draft in the pages below. They build upon comments submitted by VELUX® in September 2012 on Draft 1, November 2011 on EPA's Framework Document, and during face-to-face discussions held with EPA and D&R International on several occasions in Washington. We continue to engage with EPA in a constructive manner, which we hope is recognized as further evidence of our long-term partnership with ENERGY STAR, along with our past designation as Partner of the Year and our historical commitment to earn ENERGY STAR qualification for all of our residential skylight products.

We would hope to renew that commitment following the process of collaboration set up to ensure key stakeholder input is duly considered for Version 6.0. VELUX has come to look at ENERGY STAR as a major reason for our continued growth, and view it as one of the most powerful drivers of our national energy efficiency performance. Many above-code building programs and federal, state and utility incentive programs identify ENERGY STAR as the qualifying level for participation, making it much more than the purely voluntary program it was originally designed to be. Since it has become a de facto standard in many arenas, we think it is essential that it remain true to its Vision and Guiding Principles as it evolves.

In the case of the skylight qualification criteria that are contained in Draft 2, it is clear that EPA has, so far, missed their stated objective of balanced adherence to the Guiding Principles. We are convinced that the reliable market and cost information we were able to offer in prior confidential submissions begs further analysis by EPA in order for our category to be fairly and fully assessed. Following are the major unresolved concerns, which are explained in more detail in subsequent sections:

1. In the cost effectiveness analysis, estimated incremental cost increases were oversimplified and understated
2. The calculated simple payback, based on the unrealistically low cost increases, does not support the below-code SHGC levels proposed

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3. EPA has not considered the affordability of initial outlays, as higher performing products will eventually get too expensive for many potential buyers to keep skylights on their list of home amenities
4. Qualifying products needed by all regions and all types of projects will not be broadly available
5. Methodology of analysis was not consistently applied across the product categories, resulting in skylights being treated much more harshly than windows without technical justification
6. A significant percentage of applications, though not a majority, will require a triple pane product - this was ignored in the economic analysis
7. Lowering SHGC criteria for skylights below 2012 IECC prescriptive levels violates Guiding Principle #2, and reflects an inconsistency between how EPA treats the different fenestration categories

EPA's responses to many Draft 1 comments were confusing, inadequate, and lacking in explanatory details and rationale – we had expected EPA would recognize the need to take a deeper look into their skylight feasibility and cost effectiveness analysis, while factoring in the more recent and detailed market knowledge we furnished confidentially. In the detailed sections that follow, we have made specific reference to certain responses that give us the most pause, and in some cases we make specific requests for the type of response we think the matter might deserve.

In addition to the above criteria related issues, VELUX supports moving the implementation date for the new criteria to January 1, 2015, in order to provide the alignment we need with energy code revision cycles and programs such as Canadian ENERGY STAR (which has already announced its next revision will take effect on that date).

Detailed Explanations:

Item 1 – Incremental Cost Assumptions

- A. For **new construction**, the most commonly available skylight is fixed curb mounted. It currently qualifies in the Northern zone, but under the proposed Version 6.0 revision will no longer qualify. The skylight that would be the next best substitute from VELUX (fixed deck mounted) would be able to meet the proposed criteria, but it carries a cost premium of \$92. Deck mounted skylights typically are only possible on slopes of 14 degrees or more from horizontal. For lower slopes, the consumer would need to go to a triple pane solution in a curb mounted configuration, for which most NFRC certified manufacturers currently have no offering due

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to the very high incremental cost and unknown reliability. Even a simple improvement, such as a second low-e coating, will add \$48 or more to the price of a currently qualified double pane skylight, although we think such a change is too detrimental to the main function of the skylight to be justified.

VELUX previously submitted confidential documents to EPA during the Draft 1 comment period that showed significant pricing increases for triple pane 2' x 4' skylights compared with their double pane counterparts from the same manufacturer. The increase in price ranged from \$98 to \$358 for three of the five manufacturers with NFRC-certified triple pane options. It is also likely that the availability of these triple pane options will be limited, and their production lead times quite long.

EPA's analysis report and their responses to Draft 1 comments did not offer any details regarding the role triple pane products were assumed to play in the calculated cost ranges used in the economic analysis. We assumed that EPA took the same approach as in the window analysis, and excluded triple panes from the analysis. If this is the case, we strongly urge EPA to evaluate cost-effectiveness with appropriate assumptions regarding the likely need to use triple panes in some zones and applications. This analysis needs to include recognition that the above higher cost levels are assumed to occur with some estimated frequency. EPA should develop a more reasonable, average cost differential between currently qualified products and the array of higher cost options that will be employed to meet proposed criteria.

At the very least, in the interest of meaningful collaboration, EPA should use the best available credible information from Partner organizations and other trusted sources and be more transparent. To us, this means sharing details of the calculation methods and assumptions used to derive the inputs to their models, instead of general philosophical belief statements in their responses.

- B. For **reroofing projects** where there are existing skylights, in most cases curb mounted, aluminum-frame, plastic-glazed skylights will be replaced. The most economical and efficient replacement skylight is a fixed glass curb mounted skylight that fits the existing curb and leaves interior trim intact. The average u-factor improvement for the currently ENERGY STAR qualified replacement is about 50% (U-factor of 1.00+ for the old unit, and 0.50 for the direct replacement). That same replacement unit typically improves SHGC by one-half to two-thirds, which is a major benefit in the warmer zones.

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- C. Our dealers indicate that consumers are much more likely to choose a replacement skylight that is not ENERGY STAR qualified if the price of ENERGY STAR qualified skylights increases by as little as \$20 (more about this later.) Since there are an estimated 10 million plastic skylights still in use on U.S. homes, and with replacement skylight sales currently representing the majority of total skylight sales, VELUX is concerned that the unintended consequence of a decision by EPA to finalize its stringent proposed specifications will be higher energy use and greenhouse gas emissions for the majority of skylights installed over the next few years. This result is counterproductive to the objectives in EPA's Vision and Guiding Principles document.

Item 2 – Payback Analysis

Even using the unreasonably low cost estimates developed by EPA, the Agency's cost-effectiveness analysis demonstrates that there is no justifiable payback period for the proposed changes in the Southern, South-Central and North-Central zones. Many of our independent stocking retail dealer network managers have looked at the analysis and concluded that not enough of their customers would overlook the poor value proposition to justify continuing to stock ENERGY STAR in most of their outlets. This will reduce the availability of qualifying products nationwide in a major way.

VELUX is concerned about this potential loss of relevance of ENERGY STAR to the skylight category, and how it could affect the competitiveness of the category over the longer term. We strongly encourage EPA to set criteria that result in more realistic payback periods that consider the steep skylight price-elasticity curve that we know exists. Most skylight consumers will deem the lower simple payback on a \$20 premium (ranging from a low of 22 years to a high of 86 years), as displayed for the Southern and South-Central zones, to be unrealistic. We urge EPA to seriously consider the damage displaying such unrealistic payback pronouncements will do, in the "eyes of the consumer", to the credibility of the overall ENERGY STAR program.

By the way, the EPA response to Draft 1 Comment 76 points out that there is little to be gained in energy savings by adjusting the SHGC in the two southern zones; however it provides no rationale or data showing why they feel a consumer would ever knowingly accept minimum payback periods ranging from 22 years to 86 years for such small savings. Considering that EPA's Strategic Vision and Guiding Principles document has the right to expect recovery of their investment in a reasonable period of time generally between 2 and 5 years, EPA is at best overreaching when these lengthy payback periods result from the

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proposed changes to the SHGC in the two southern climate zones, even using the unjustified low cost increases to the consumer. Incremental energy savings must be weighed against true cost to the consumer, contrary to what EPA's response to Comment 75 seems to indicate.

Item 3 – Affordability Concern

As we have noted in previous criteria revisions, skylights (unlike windows and doors) are discretionary purchases for new residential buildings. This means that as the purchase price increases, the pool of potential buyers for the product decreases. Since we now know that the inclusion of skylights when designing for adequate daylight is more energy efficient than using only windows for that purpose (based on the Group14 studies we have previously provided to EPA), we believe that the Agency should avoid setting criteria that reduces the pool of potential buyers through excessively expensive enhancements. Doing so will forgo the benefits to be derived from good daylight design and the glazing efficiency optimization which that design approach enables.

Also, for replacement projects, Item 1.B touches on the negative effect of decreased affordability on aggregate energy savings.

Item 4 – Product Availability Concerns

- A. Based on a careful review of the NFRC Certified Products Database (CPD) we have concluded that EPA's proposed Northern zone criteria will prevent 73% of all residential skylight listings in the CPD from qualifying in that zone - a significant increase compared to the 38% that do not meet current Northern zone criteria. We have also determined that, the EPA's proposed Northern zone criteria will result in a dramatic decline in the proportion of double pane residential skylight listings (plummeting to less than 2% of the CPD listings, down from 28% of the double pane skylight listings qualifying under current criteria for the Northern zone).

Regarding double pane fixed curb mounted skylight listings, our review found that 47% currently qualify in the Northern zone. The EPA proposal for this zone lowers this to an anemic 0.7%, essentially decimating this popular product. Since this sub-type is frequently the only type under consideration for many projects and regions in this zone, the "broad availability" preference expressed in the Guiding Principles will not be realized.

Relative to this sub-type, EPA response Comment 77, "EPA suggests that industry work to improve curbs and the corresponding test procedures so the products perform better

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overall”, merits specific rebuttal because it implies: 1) skylight manufacturers have some control over the site-built curbs (which we do not), and 2) the skylight manufacturers have not attempted to have the NFRC/LBNL procedures/programs revised to accommodate more efficient curb designs that can be installed by the general contractor (which NFRC records will show we certainly have tried to do, without success).

To illustrate this concern more specifically, the Pacific Northwest skylight market is dominated by curb mounted skylights, as evidenced by the fact that half of the manufacturers with currently qualifying listings of these products are headquartered, and concentrate their sales efforts, in that region. If the proposed criteria go into effect, the availability of qualifying curb mounted skylights meeting EPA’s assumed cost premium in the Northern zone will be virtually zero in this region.

Based on these predictable consequences, we urge EPA to revise the proposed criteria and avoid this outcome. As currently proposed, we have no doubt that these criteria will drive consumers to triple pane skylights in the north, even though EPA has not acknowledged this result or reflected it in the economic analysis.

- B. Beyond the Northern zone issue detailed above, VELUX has consulted with most of the leading skylight retailers across the US to determine their position on the new criteria proposal. They have stated to us that consumers will not perceive enough energy saving value in ENERGY STAR-labeled skylights that cost as little as \$20 more than qualifying products they carry presently. If the proposed criteria take effect, these leading retailers indicated they will reduce, or in many cases eliminate, ENERGY STAR skylights from their stocking inventory. In an effort to ensure EPA gets a more complete picture of the impact of the added skylight cost burdens the new criteria carry, we at VELUX have recommended that these leading retailers also provide comments to EPA specific to how their business will respond.

The end result will be a significant decrease in product availability in many regions for all skylight types, creating a higher hurdle for interested buyers that want to use ENERGY STAR products. We are concerned that this hurdle will undermine the relevance of the ENERGY STAR program to the skylight market.

Item 5 – Inconsistent Methodology Across Categories

For the windows criteria development process, EPA focused on a sub-type which is low on the performance scale and high on the availability scale applicable to all window sub-types. This resulted in criteria that was somewhat challenging for double-hung products, but much less so for most other window types. In EPA's analysis document, Figure 10 of the report shows at least 60% of double-pane double-hung window listings would qualify under EPA's proposed criteria for windows.

That figure contrasts sharply with the very limited qualifying double pane skylight listings mentioned earlier. To be equitable and avoid being perceived as biased against skylights, we request that EPA develop criteria specific to double pane fixed curb mounted skylights that should be applied to all skylight sub-types. This is technically justified, since not all skylight sub-types are eligible for every application, and since the fixed curb mounted type is so frequently requested and so frequently the type in most need of replacement on existing homes. If EPA needs additional input on how to do this, we are willing to assist.

Item 6 – Moving to Triple Pane Too Quickly

In order for there to be a wide array of qualifying skylight options, the percentage of projects where triple pane products are the only option will necessarily have to increase significantly beyond what is currently being sold. This can be avoided if EPA performs a "sanity check" to verify that final criteria for skylights can be met by several fixed curb mounted products made with components of the same combination of materials as qualifying double-hung windows: double pane, argon-filled, triple low-e IGU supported on aluminum-clad wood or vinyl frames. Refer to Items 1 and 4 for details of the cost and market impacts to be expected under the proposed criteria.

An uninformed review of the NFRC CPD listings might lead one to believe there are plenty of triple pane options to be had. However, a small percentage of those listings actually represent real products available for sale, and very few of those can be obtained "off-the-shelf". It is simply too early for EPA to drive the category to triple pane as rapidly as the proposed criteria would do, especially when EPA explicitly tried to avoid doing the very same thing to the windows category.

Item 7 – Unjustified SHGC Reductions Beyond Code

- A. Reduction of SHGC beyond what can be achieved with a triple silver low-e coating will also reduce available light. Since providing ample light in the occupied portion of spaces is the primary reason people want skylights, loss of this benefit represents a violation of Guiding Principle #2. Quoting from that text:

“The Agency would expect few consumers to choose more efficient products if it required sacrificing performance, features or functionality.”

Going from 0.30 to 0.25 SHGC will sacrifice about 15% of the lighting efficacy. This degradation of functionality must be avoided if skylights are to remain a viable option for tomorrow’s home designs.

EPA’s responses to Draft 1 comments indicate that they expect skylights to perform at a higher SHGC due to the direct sunlight they receive. Skylights are used in homes primarily to admit natural light, with all of its known benefits, and as EPA has recognized in the analysis document, typically represent a very small portion of the overall fenestration area in a home (an average of only 10 square feet). Lower SHGC values lead to decreased light output from skylights. This fact, combined with the small area occupied by installed skylights, explains why the IECC has established higher skylight SHGC limits than those for vertical windows in its southern climate zones. We would appreciate a more detailed rationale explaining the basis of EPA’s arbitrary conclusion that the primary function of these products can be unjustifiably compromised for minimal energy savings.

EPA’s response to Comment 75 in Draft 1 states EPA seeks to exceed 2012 IECC SHGC requirements for skylights. We would like for EPA to support technically their assertion that skylights need to be treated differently than vertical windows on this performance attribute. Windows SHGC criteria are proposed to be the same as the 2012 IECC limits, but the proposed criteria for skylights is far below the 2012 IECC SHGC limits.

In the interest of occupant comfort and the spirit of compromise, VELUX has proposed a maximum SHGC in the Southern zone slightly below the 2012 IECC SHGC limits. We still believe, however, that SHGC can be better managed through the use of internal shading, such that higher light levels are available during times when solar gain is less of a concern. We would hope EPA can help us understand the differences between their approach and that of other astute energy experts in the code community.

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- B. We assert that setting a maximum SHGC for skylights in the Northern zone is technically unjustified. All EPA needs to do is look at what was specified for windows in the Northern zone of their Most Efficient Windows specification, and apply the same logic to skylights in Version 6.0. EPA obviously values passive heat gain in this zone, and skylights can provide even more heat per area than windows, thus allowing the user to lower the total envelope glazing area for the same free heat input. They provide double or triple the daylighting and enhance natural ventilation performance to boot.

Concluding Remarks

Balanced adherence to the EPA's Vision and Guiding Principles, and fair treatment in comparison to how EPA selected the windows criteria, is more fully achieved under the VELUX proposed criteria. In the attached summary chart, we have attempted to make it clear that a new analysis, hopefully leading to a more rational and brand-protecting criteria proposal, is warranted. This time, however, we ask that it be focused on the proposed VELUX criteria. Once a well-intentioned and thoughtful alternative is better understood, EPA can make a more informed decision.

In our efforts to provide products that deliver energy savings, we should not lose sight that these products also have to be cost effective to the consumer. VELUX is committed to delivering energy efficient skylights that are cost-effective to the consumer. We remind the Agency that their own Vision and Guiding Principles states that the "Agency remains committed to delivering overall energy savings that are cost-effective to the consumer".

We repeat our offer to work further with EPA and D&R as they continue the development process, and continue to stand ready to help them assess the validity and potential impact of their decisions. If they conclude after further collaboration that many of our positions are credible, we would hope there is some middle ground where balance is improved to some degree.

Thank you again for the opportunities to collaborate. We want ENERGY STAR to stay as relevant and as productive in reducing pollution as always.

Submitted by:

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Summary of Proposals and Impacts

Item	ENERGY STAR Today	ENERGY STAR 6.0 VELUX Proposal	ENERGY STAR 6.0 EPA Draft 2
Max. U-Factor			
Northern Zone	0.55	0.50	0.45
North-Central Zone	0.55	0.53	0.47
South-Central Zone	0.57	0.55	0.50
Southern Zone	0.70	0.60	0.60
Max. SHGC			
Northern Zone	Any	Any	0.35
North-Central Zone	0.40	0.35	0.30
South-Central Zone	0.30	0.30	0.25
Southern Zone	0.30	0.28	0.25
Cost adder to implement	0	\$0-\$5	\$48 -\$150
Payback Period	N/A	2 years max (est)	22 - 86 years
Triple Pane Necessary?	No	No	up to 1/3 of market
VT (glass)	66	66	56
Broadly available at largest retailers?			
The Home Depot	yes	yes	no
Lowe's	yes	yes	no
ABC Supply (largest roofing supply co.)	yes	yes	no
Lumbermens (Largest building supply co.)	yes	yes	no
American Wholesale (large building material group)	yes	yes	no
Skylight CPD Listings qualifying in Northern Zone:			
All Fixed Curb mounted (largest sub-type)	40%	28%	16%
Double Pane Curb mounted	984	854	25
Triple Pane Curb mounted	1387	1369	1238
All skylight types	62%	47%	27%
All Double Pane	2243	1120	106
All Triple Pane	2628	2610	2052
Best Balance of Principles	No	Yes	No