WINDOW & DOOR MANUFACTURERS ASSOCIATION
WDMA

September 2, 2021

Mr. Doug Anderson
ENERGY STAR Program
U.S. Environmental Protection
Agency1200 Pennsylvania Avenue,
NW Washington, DC 20460-0001

Subject: ENERGY STAR Version 7.0 Residential Window, Door, and Skylight Draft 1 Specification and Draft 1 Criteria and Analysis Report.

Dear Mr. Anderson:

The Window and Door Manufacturers Association (WDMA) appreciates the opportunity to comment on EPA's ENERGY STAR Version 7.0 Residential Window, Door, and Skylight Draft 1 Specification (Draft 1 Specification) and Draft 1 Criteria and Analysis Report (Draft 1 Analysis). As EPA knows, WDMA members are leading producers of commercial and residential doors, windows, and skylights for domestic and export markets and have been committed supporters of the ENERGY STAR window, door and skylight program since its inception. Our members have contributed greatly in growing the ENERGY STAR brand in the window, door and skylight sector because of the great benefit it has been to consumers and energy savings.

We and our members have carefully reviewed the Draft 1 Specification, Draft 1 Analysis and the four data packages EPA has provided. We appreciate the effort EPA has made to date in developing Version 7.0 and providing those documents. However, after our review and based on feedback from our members we have a number of significant concerns with EPA's analysis that we believe call into question the basis for what EPA is proposing in the Draft 1 Specification. Chiefly among them are:

- potentially flawed modeling leading to inaccurate energy and cost savings findings and lacking explanation to enable a full understanding of how the analysis was performed;
- questionable ENERGY STAR market penetration rate for windows in the Northern Zone and lacking explanation for how that was determined;
- basing the overall analysis on vinyl-framed products only;
- validity of window equivalency criteria for windows in the Northern Zone;
- cost research and incremental cost model and relying on lowest cost products;
- relevance of the two different baselines EPA used for its analysis and how they skew actual energy and cost savings and resulting payback periods;
- payback periods based on length of time a home is owned;
- lacking substantiation for the proposed minimum SHGC for windows in the Northern Zone and proposed maximum for the South Central and Southern Zones;
- moving sliding patio doors into the window category;
- lacking substantiation for proposed skylight criteria for the Northern Zone; and,
- maintaining IECC Climate Zone 5 in the Northern Zone and establishing Northern Zone islands:

We believe these concerns need to be addressed and a reanalysis performed accordingly before a truly sound determination can be made by EPA for proposing reasonable Version 7.0 specification criteria that is in-line with EPA's ENERGY STAR Products Program Strategic Vision and Guiding Principles. We believe this course is in the best interest of the ENERGY STAR window, door and skylight program and critical to ensuring that ENERGY STAR qualified window, door and skylight products are cost-effective, affordable, and sufficiently available for consumers.

Concerns

Potentially flawed modeling resulting in inaccurate energy and cost savings findings:

WDMA supports the use of EnergyPlus™ by Lawrence the Berkeley National Laboratories(LBNL) in their energy and cost savings analysis. However, we are concerned that the version of EnergyPlus™ (8.9) used by LBNL for the analysis has a major glitch -- a mathematical error in calculating the angular properties of glass that was discovered after LBNL performed their analysis -- resulting in incorrect findings of heating and cooling loads and in turn, potentially inaccurate energy and cost savings findings. More specifically, we understand that the glitch results in over predicting heating loads by 2% and under predicting cooling loads by 10-12% which of course has a significant impact on overall energy and cost savings and payback periods for consumers. We also understand that this glitch was corrected as of EnergyPlus™ 9.4. However, EPA has not addressed that issue in the Draft 1 Analysis and we believe that the energy and cost savings need to be reanalyzed using the latest 9.5 edition of EnergyPlus™, which could have a meaningful impact on what EPA can reasonably propose for Version 7.0. If EPA chooses not to do that, it should provide an explanation of why and demonstrate that doing so would not result in any significant difference in the predicted energy and cost savings.

It is also appears from the relative proportions of heating and cooling loads projected by the analysis that the analysis is based on site energy not source energy. If that is the case, it is unclear as to why site energy was used for determining energy savings when EPA's ENERGY STAR Portfolio Manager states that source energy is the most equitable unit of evaluation and enables a complete assessment of energy efficiency. This is especially true for windows, doors and skylights because of their unique impact on heating, cooling and lighting loads. The only accurate way for assessing them accurately in that regard is to use source energy when performing modeling analysis. Our concern is that if site energy was used the actual energy and possibly cost savings may be lower than what the analysis projects, which again, could have a significant impact on what EPA can reasonably propose for Version 7.0. If site energy was used, we request EPA to explain why.

Finally, we have another concern that the population proportioning used in the modeling and analysis does not appear to be based on the latest census data and, more concerning, appears to be a modification of actual regional populations. This too leads to inaccurate energy and cost savings findings, and in this case, overstating them.

Questions about the accuracy of ENERGY STAR market share data for windows in the Northern Zone and lacking explanation for how that was determined:

We continue to question the accuracy of EPA's assertion that the market share of ENERGY STAR windows in the Northern Zone is nearly 90% as reported in the July 27, stakeholder meeting. Based on feedback from our members, that reported market share is likely not correct and potentially highly overstated. Though that may be anecdotal, there are other factors that lead us to question the accuracy of that number.

First, in the Draft 1 Analysis, EPA states it found that market share for ENERGY STAR certified WDS remained high yet has provided no explanation of how EPA was able to make that determination or why EPA is confident it is correct other than simply citing DuckerFrontier 2020. We do know, of course,

DuckerFrontier collects that data from manufacturers that produce ENERGY STAR certified products but only from a limited number. Since EPA is relying on that data to influence its decisions regarding the development of Version 7.0, it should explain how that data research was conducted and how the determination was made, e.g., from how many window manufacturers that produce ENERGY STAR certified products was data collected, how was it collected, from what other sources was relevant data collected and how was the data assessed so that all stakeholders can have the same level of confidence.

Basing the overall window analysis only on vinyl-framed products is too limiting and inappropriate:

We support EPA focusing its analysis on vertical sliding windows (single-hung and double-hung). We agree this operator type is popular in the U.S. market and performs worse than other operator types for the same set of components. However, we do not support or find appropriate EPA focusing its entire analysis only on vinyl-framed windows and subsequently proposing a specification tailored to vinyl-framed products while disregarding windows made from all other materials. The only explanation EPA has provided for doing so is that according to a FGIA/DuckerFrontier report, vinyl-framed products make up 73% of U.S. window sales.

We don't dispute vinyl-framed products are the most common in the marketplace, but wood, wood-clad, composite and fiberglass framed products still make up over a quarter of the market and as such, while not the most common, they are nonetheless still common products desired by consumers. EPA is simply disregarding over a quarter of the market in its analysis without adequate explanation as to why it believes that non-vinyl windows are irrelevant to its analysis. EPA has not acknowledged what the impact of including all common window frame types would have on its analysis and its findings about incremental cost increases and payback periods for consumers.

In addition to EPA reanalyzing proposed Version 7.0 criteria based on EnergyPlus 9.5, we ask that EPA include all common frame type products in an updated analysis. We request that the updated analysis include cost of product types beyond vinyl and across more premium upcharges estimated to meet the proposed Version 7.0 targets. At a minimum, EPA should also include the mid-range (average or median) costs to see how that effects the cost savings and payback periods.

Validity of window equivalency criteria for windows in the Northern Zone:

Like with Version 6.0, WDMA is opposed to the inclusion of trade-offs in the Northern Zone especially as proposed for Version 7.0 for several reasons. We believe that the evaluation of potential equivalencies, if they are to be considered, needs to be based on energy and cost savings analysis performed using source and not site energy. As noted above, from what we currently understand that is not the case here and we believe a source energy based analysis would show different potential equivalencies.

Regardless, given the ENERGY STAR program is consumer-oriented, equivalencies should be based on cost savings and not what energy modeling shows to be equivalent or nominally equivalent. Based on EPA's assessment for 7.0, the cost savings are not equivalent when, for example there is an over 30% difference in cost savings for consumers in the highly populated IECC Climate Zone 5. Cost savings is the dominant incentive for the typical consumer and again, as a consumer-oriented program, if there are to be equivalencies, they need to be based on cost savings.

Inequivalent cost savings aside, Version 7.0 does not give consideration to the negative impact higher SHGC's can have on occupant comfort, even in the winter, and the resulting impact that can also have on their behavior with respect to operating air-cooling systems. Consumers will adjust their thermostats to align with their desired comfort. We realize that can occur anyway without the trade-offs but by including them, it is increasing the likelihood of unintended negative impacts.

Another concern with the equivalencies as proposed is that the trade-offs using U-factors of 0.24, 0.25 and 0.26 are in conflict with the 2021 IECC SHGC requirements for IECC Climate Zone 5 which is now an

SHGC of 0.40 or less. This is in direct conflict with code mandated requirements in the 2021 IECC. The conflict is another example of why it is time to move IECC Climate Zone 5 into the ENERGY STAR North Central Zone.

Finally, EPA also states that another reason for including trade-offs is that it gives consumers an option to use high solar gain products and save the same amount of energy (which isn't necessarily true as pointed out above). In reality however, current ENERGY STAR Version 6.0 windows are not marketed by trade-off options and consumers do not shop for them that way. The product either has the Northern Zone shaded or not. It is left to the consumer to know or understand whether the product meets the Northern Zone with a U-factor of 0.27 or lower versus one of the equivalent energy performance options. That will not change for Version 7.0, and will be made worse with an additional option.

Furthermore, very few consumers and builders know of or will know the trade-offs even exist let alone understand what they really mean. While those who may be aware of them and that may have an understanding of the concept of equivalency in terms of energy efficiency, they will still not know that they are not equivalent when it comes to cost savings unless they dive into the analysis the trade-offs are based on. In effect, consumers in the Northern Zone or anyone purchasing a window qualified for the Northern Zone will not really know what ENERGY STAR Northern Zone product they are actually getting (and the associated trade-offs) unless they understand the complexities of EPA's trade-off approach.

For these reasons, we believe that there should be no trade-offs for the Northern Zone window requirements.

Cost Research, Incremental Cost Model, Consumer Prices and Cost-Effectiveness:

Based on feedback from our members we believe the incremental costs are significantly understated and it is unclear from the Draft 1 Analysis exactly how the incremental cost assumptions presented in Table 7, as well as the premium cost increases for room-side low-e and, triple pane and with low SHGC coatings were derived. EPA has also not provided a reasonable explanation of why the incremental cost increases that can be assumed based on the actual product cost data EPA collected and presented in Data Package 1, are many times higher than what EPA has determined to be reasonable assumptions as presented in Table 7.

That aside, and as we have stated in the past, we believe a more accurate determination of actual cost increases consumers will incur is derived from product costs consumers are currently paying on average for products at various performance levels. To that end, we appreciate the product cost data EPA gathered thus-far and while consumer price data on 138 different windows from 60 product lines and 39 manufacturers is significant, it is still only a snapshot of the market and primarily the vinyl market at that. We believe a larger, more comprehensive data set representative of all common framing types is needed to more accurately determine actual cost increases that manufacturers and consumers will incur at various proposed increases in stringency.

Regarding the cost data collection efforts EPA has made so far, there appears to have been two independent data collection efforts yet only one data set has been provided. Specifically, based on the discussion presented in the Draft 1 Analysis under Cost Research and Incremental Cost Model and under Consumer Prices there appears to have been two independent cost data collection efforts. The first being the mystery shopping at retailers, installers, distributors and manufacturers and the second, contacting window installers and wholesalers to get price quotes for a window replacement project without installation. However, EPA has provided only one cost data set - *Draft 1 Data Package 1 – Product Cost* data spreadsheet. *Draft 1 Data Package 1* is presumably the data collected from the second effort. Is there a comparable data set for the first effort? It is also unclear how that data was used and we would like a better explanation of that as well.

In addition, we would appreciate a more detailed explanation of how the mystery shopping and any other cost data collection efforts were conducted on the whole, e.g. more specific detail on the number and size of manufacturers that provided data, the number and types of retailers, what the breakdown by region is, what questions were asked, etc. That information is important to gain a better understanding of the research and the results.

Given the importance of understanding actual market pricing upcharges across multiple product sizes (small, medium, large) and material types in order to hit the proposed Version 7.0 targets, we strongly recommend that EPA provide the details to support the product pricing presented in the analysis, and to gather additional cost data unless EPA can explain why it believes the data to be an accurate representation of cost increases and consumer pricing.

Regarding cost-effectiveness, we do not support the lowest-cost approach when evaluating cost-effectiveness as it is not a true representation of actual incremental cost increases manufacturers incur or cost increases typical consumers or homeowners are most likely to incur as a result. We also find EPA's statement that thermal performance "was not the primary driver of cost" to be misleading because thermal performance is a primary driver of cost. Furthermore, as EPA notes, quality, among other factors (warranty, style, etc.) contribute to the final cost to consumers and quality is generally the greatest driver along with thermal performance. Lowest cost therefore generally means lower or lowest quality. The typical consumer is not likely to desire or purchase the lowest cost ENERGY STAR product and that is not what ENERGY STAR ratings should be based upon.

The lowest cost approach also conflicts with EPA's statement in the *Response to Comments on the Specification Discussion Guide Part 2*, on how it evaluates cost-effectiveness. In the Part 2 response, EPA states the ENERGY STAR program focuses on the incremental cost between non-ENERGY STAR products and better performing low-cost products and best sellers. However, in the Draft 1 Analysis, EPA states it focuses on the lowest-cost options only. They are not one and the same.

Lowest cost is also not the approach EPA took in the development of Version 6.0. For Version 6.0 EPA evaluated cost-effectiveness based on costs derived from average incremental costs between manufacturers' best-selling Version 5.0 ENERGY STAR window and windows qualifying under the proposed Draft 1 Version 6.0 specification, as well as marginal cost between manufacturers' best-selling Version 5.0 ENERGY STAR window and a code baseline window. The two tables below illustrate the significant difference this approach makes with respect to cost-effectiveness and payback.

Lowest-Cost Payback vs Average Cost Payback - Market Baseline			
Climate Zone	**Market Baseline Annual Energy Cost Savings**	**Payback in Years Using Lowest Cost**	**Payback in Years Using Average Cost**
Northern Zone	$113.99	11.3	17
North Central Zone	$80.75	8.5	19.9

Lowest-Cost Payback vs Average Cost Payback - Code Baseline			
Climate Zone	**Code Baseline Annual Energy Cost Savings**	**Payback in Years Using Lowest Cost**	**Payback in Years Using Lowest Cost**
Northern Zone	$70.69	16.2	27.4
North Central Zone	$43.15	12.7	37

Baselines aside, we urge EPA take the same or at the very least a more similar approach for Version 7.0 as it did for Version 6.0. This step alone will show a less aggressive revision than what EPA is proposing for the Northern and North-Central Zones is more reasonable. We further substantiate this in our comments on the relevance of the Market and Code Baselines.

Other Draft 1 Analysis observations regarding cost data and assumptions:

- EPA's analysis is inconsistent in the way it treats the relevance of the "typical" homeowner/consumer as a factor in its analysis. On one hand, EPA cites how long a "typical homeowner" is likely to remain in a home as the basis for determining a reasonable payback period, and cites what a "typical consumer" is likely to encounter in the way of worst-case performance when purchasing a replacement window as the basis for the Market Baseline. On the other hand, however, what the "typical" consumer/homeowner is likely to incur in the way increased cost of the products they commonly desire appears to be irrelevant when determining incremental cost increases and resulting payback. We believe that what a typical consumer is likely to more commonly encounter in the market in that regard when shopping for ENERGY STAR window, door and skylight products is what should be cost-effective, not just the least expensive option. That approach still leaves ample room for product differentiation in line with the ENERGY STAR Strategic Vision and Guiding Principles.

- EPA has also stated that the cost data gathered did not include installation costs since installation would be the same between an ENERGY STAR and a non-ENERGY STAR product. However, anecdotally we know that there can be additional installation costs for triple-pane products when structural modifications need to be made to accommodate the added weight, especially for replacement projects in existing homes. The added weight may also require additional labor when it comes to handling the heavier, bulkier products. EPA should have at least asked the question of whether there can be additional installation costs for triple-pane products because of their increased size and weight, particularly when triple-pane products would be the dominant means for manufacturers to achieve what EPA is proposing for the Northern Zone. EPA should not summarily dismiss that concern because what is being proposed for the Northern and possibly North-Central Zones could result in increased installation costs that would not occur with a less aggressive approach.

Relevance of the two different baselines EPA used for its analysis and how they skew actual energy and cost savings and resulting payback periods:

We believe both the Market Baseline and Code Baseline EPA has used for the Draft 1 Analysis are not valid for accurately evaluating energy savings and cost-effectiveness of the proposed Version 7.0 criteria. Given the high market share EPA asserts for all ENERGY STAR window, door and skylight products and in particular for windows in the Northern and North Central Zones, ENERGY STAR Version 6.0 criteria is the baseline EPA should be using for evaluating the potential energy savings and cost effectiveness of the proposed criteria for Version 7.0. Even if the market share were far less, EPA should still be evaluating potential energy savings and cost-effectiveness of Version 7.0 based on Version 6.0 to provide a more accurate estimation of the actual energy and energy cost savings consumers can reasonably expect and if the proposed Version 7.0 would be a benefit in the eyes of the consumer. EPA made this type of comparison when proposing Version 6.0.

Regarding the Market Baseline, EPA states it is based on the worst-case performance a typical consumer will encounter when purchasing a replacement window. How can that possibly be true especially in the Northern and North Central Zones if market share of ENERGY STAR windows is nearly 90% in both of those zones? When reviewing the U.S. Department of Energy, Building Energy Codes Program Energy Efficiency Field Studies EPA which cites as the basis for that claim for the Market Baseline, it needs to be noted that those studies are from 2015 and show that only a very few of the over 1500 homes evaluated had windows installed with U-factor of 0.35. Furthermore, there were virtually none used in the homes in the Northern and North Central Zones.

To further substantiate our concern over the validity of the Market Baseline, in looking at the U-factor characteristics in the *Draft 1 Data Package 1 – Product Cost* data spreadsheet, of the 139 windows, none have a U-factor of 0.35 and only eight have a U-factor above 0.30 -- one with a U-factor of 0.31 and seven with a U-factor of 0.33, five of which are from a single manufacturer. Nonetheless, why is EPA using a baseline for which it didn't or can't find any products on the market to represent it in the analysis? At least some cost data must be readily available since EPA states under the Baseline Performance discussion in the Draft 1 Analysis that a U-factor of 0.35 represents the worst-case product sold at big-box retailers.

More importantly, we believe the Market Baseline is invalid because it results in significantly overstating the actual energy savings and cost effectiveness a typical consumer will realize. Using Version 6.0 as the baseline, which is the best representation of the market, and the annual energy cost savings and incremental costs reported in the Draft 1 Analysis, the results are far different. Specifically, for the Northern and North Central Zones those differences are shown in the two tables below which are presented in the first table using lowest cost and in the second table using average cost.

Market Baseline vs ENERGY STAR Version 6.0 Baseline - Lowest Cost				
Climate Zone	**Market Baseline Annual Energy Cost Savings**	**ENERGY STAR Version 6.0 Baseline Annual Energy Cost Savings**	**Market Baseline Payback in Years**	**ENERGY STAR Version 6.0 Baseline Payback in Years**
Northern Zone	$113.99	$43.13	11.3	19.9
North Central Zone	$80.75	$45.76	8.5	12

Market Baseline vs ENERGY STAR Version 6.0 Baseline - Average Cost Differences				
Climate Zone	**Market Baseline Annual Energy Cost Savings**	**ENERGY STAR Version 6.0 Baseline Annual Energy Cost Savings**	**Market Baseline Payback in Years**	**ENERGY STAR Version 6.0 Baseline Payback in Years**
Northern Zone	$113.99	$43.13	17	44.9
North Central Zone	$80.75	$45.76	19.9	35.2

Regarding the Code Baseline, while using the 2021 IECC is far more reasoned, it too is not an appropriate baseline for accurately evaluating the energy savings and cost effectiveness a typical consumer will encounter when purchasing a proposed Version 7.0 (new construction or replacement) based on the prevalence of ENERGY STAR Version 6.0 windows in the market. Like with the Market Baseline, the Code Baseline also overstates the actual savings a typical consumer will realize since they are not purchasing Market Baseline or Code Baseline products on the whole based on EPA's market penetration data. Specifically, for the Northern and North Central Zones those differences are likewise shown in the two tables on the next page (also presented in the first table using lowest cost and in the second table using average cost).

Code Baseline vs ENERGY STAR Version 6.0 Baseline - Lowest Cost				
Climate Zone	**Code Baseline Annual Energy Cost Savings**	**ENERGY STAR Version 6.0 Baseline Annual Energy Cost Savings**	**Code Baseline Payback in Years**	**ENERGY STAR Version 6.0 Baseline Payback in Years**
Northern Zone	$70.69	$43.13	16.2	19.9
North Central Zone	$43.15	$45.76	12.7	12

Code Baseline vs ENERGY STAR Version 6.0 Baseline - Average Cost				
Climate Zone	**Code Baseline Annual Energy Cost Savings**	**ENERGY STAR Version 6.0 Baseline Annual Energy Cost Savings**	**Code Baseline Payback in Years**	**ENERGY STAR Version 6.0 Baseline Payback in Years**
Northern Zone	$70.69	$43.13	27.4	44.9
North Central Zone	$43.45	$45.46	37	35.4

For these reasons, we believe EPA needs to (and we strongly urge EPA to) reevaluate the energy savings and cost effectiveness of the proposed Version 7.0 criteria using ENERGY STAR Version 6.0 as the baseline.

Using ENERGY STAR Version 6.0 would result in a sounder proposal for Northern and North Central Zone windows.

Using Version 6.0 as the baseline, which is the most appropriate baseline for the reasons discussed above, we believe the proposed Version 7.0 criteria for windows is unduly aggressive for the Northern and North-Central Zones and not in-line with ENERGY STAR's Strategic Vision and Guiding Principles, therefore not in the best interest of consumers.

A re-evaluation using Version 6.0 as the baseline would show a less aggressive approach is actually more sound. For example, using the incremental product cost, annual energy savings and energy cost savings reported in the Draft 1 Analysis, a Northern Zone U-factor of 0.25 and SHGC of 0.30 saves 79% of the energy saved by a U-factor of 0.22 and the same SHGC (*Draft 1 Analysis Table 12),* and 76% of the annual energy cost savings, but, at roughly half, conservatively speaking and likely more, of the cost consumers will need to pay (based on the incremental cost data *Draft 1 Analysis Table 7*) and with a shorter payback period.

While consumers would still incur a significant cost increase with a Northern Zone U-factor requirement of 0.25, it would be far more acceptable. We don't believe the typical consumer will be willing to pay two or three times as much for windows that will only deliver an additional 20% improvement in efficiency. An acceptable return on investment simply isn't there. A less aggressive approach would also alleviate any need for Northern Zone equivalencies, which again we believe, are in the best interests of the consumer.

Similarly, regarding the North Central Zone, a North Central U-factor of 0.27 and SHGC of 0.40 also saves 79% of the energy saved by a U-factor of 0.24 and the same SHGC and 72% of the annual energy cost savings, but at a substantially lower cost to consumers. Based on the cost data provided by EPA in Data Package 1, the incremental cost of a window meeting a U-factor of 0.24 and an SHGC of 0.40 is nearly 50% more than a window with a U-factor 0.27 and SHGC of 0.40 or less, again, conservatively speaking. Likewise, while consumers will still incur a notable cost increase with a North-Central Zone U-factor of 0.27 and SHGC of 0.30, we don't believe the typical consumer in the North Central Zone will be willing to pay significantly more for only a 30% additional improvement in efficiency. Again, an acceptable return on investment isn't there.

The table below illustrates that example and while payback periods are still high, they are far better than what is currently being proposed and again, at a significantly lower up-front cost to consumers which alleviates to some extent, the lengthy payback periods.

Example of Alternative Version 7.0 Specifications for the Northern and North Central Zones						
Climate Zone	**Market Baseline Annual Energy Cost Savings**	**Code Baseline Annual Energy Cost Savings**	**ENERGY STAR Version 6.0 Baseline Annual Energy Cost Savings**	**Market Baseline Payback in Years**	**Code Baseline Payback in Years**	**ENERGY STAR Proposed Version 7.0 Payback in Years**
Northern Zone U-0.25 | SHGC 0.30	$87.40	$44.10	$16.54	7.9	4.2	16.9
North Central Zone U-0.27 | SHGC 0.40	$57.65	$20.35	$22.66	7.4	14.0	12.5

Proposed minimum SHGC for the Northern Zone and proposed maximum for the South Central and Southern Zones:

Regardless of what baseline is used for energy and cost savings analysis, WDMA is opposed to setting any minimum SHGC for the Northern Zone and setting an SHGC for the Southern Zone that is below 0.25.

Regarding the Northern Zone, EPA has provided no data to support such a minimum other than potential concerns about dark glass which is not substantiated and there is no data otherwise to support such a move. We believe the proposed minimum of 0.17 is more subjective than scientific and is related to EPA's apparent assertion that a minimum VT threshold of 0.40 must be provided, yet there is no reasoning for that. It is not uncommon for SHGC's to dip below 0.17 depending on the configuration of the window and its components, especially as a result of configurations necessary to achieve the lower U-factors EPA is currently proposing. VT's lower and significantly lower than 0.40 have not been a significant issue with consumers and manufacturers will not produce them if they are.

If EPA is able to justify the 0.22 U-factor currently being proposed for the Northern Zone and ultimately maintain it for Version 7.0, setting a minimum SHGC will further exacerbate the challenges manufacturers will face in producing Northern Zone qualified products. EPA will also be pulling the rug out from under manufacturers with respect to new configurations and technologies they could employ to meet what EPA is proposing and without any demonstration that setting a minimum SHGC in the Northern Zone will have a significant impact on energy savings one way or another.

Regarding the maximum SHGC's EPA is proposing for the South Central and Southern Zones, we are opposed to any SHGC lower than a 0.25 because conversely, it is difficult for many typical narrow framed fixed and operable window styles and sizes common and desired by consumers in those regions to achieve an SHGC below 0.25. Because of the framing and frame-to-glazing characteristics of them (e.g., narrow framed products) a 0.23 SHGC is extremely difficult to achieve, and many will be eliminated from ENERGY STAR eligibility even though they are still highly efficient, and even more efficient than sliding windows in terms of air infiltration. Furthermore, while EPA points out this SHGC is now required in California, however, California allows area weighted averaging to meet the requirement which allows windows with SHGC's higher than 0.23 to be used. It's an SHGC maximum with the availability of a performance path option to be used. There is nothing equivalent in the ENERGY STAR window, door and skylight program.

While we agree the proposed reduction by 0.02 would result in additional energy savings it is still minimal and not substantial enough to justify the negative impact on product availability. We therefore urge EPA to maintain the current SHGC of 0.25 for both zones.

Payback periods based on length of time a home is owned are not what consumers consider acceptable:

We do not support EPA's assumption that the length of time a typical homeowner owns a home represents a reasonable payback period that will be acceptable to consumers. EPA has only provided data on years of homeownership and no data or studies to support its assertion that a reasonable payback period is 10-13 years. Evaluation of what a reasonable payback period is for building materials like ENERGY STAR windows, doors and skylights must be based on sound data demonstrating what consumers consider to be a reasonable payback period.

In our feedback to EPA on the Discussion Guide, we recommended EPA consult with the National Association of Home Builders (NAHB), the NAHB Remodelers Council, the National Association of the Remodeling Industry (NARI), and the Home Innovation Research Labs (HIRL) to better understand what consumers consider to be an acceptable payback period. We continue to urge EPA to get this feedback to obtain a realistic view of an acceptable payback period for consumers. We also recommended EPA review NAHB's annual *What Home Buyers Really Want* market report in that regard. EPA apparently did review the document to show that ENERGY STAR windows are highly desired by home buyers in the July 27, stakeholder meeting, but it has overlooked the fact that the report also indicated home buyers need a 7-year or less payback for investments that will reduce their utility bill. Consumers desire ENERGY STAR windows but not at any cost.

We believe that EPA needs to use a 7-10 year payback period as the benchmark, together with a reanalysis as discussed in these comments, when considering criteria options for Version 7.0.

Moving sliding patio doors into the window category:

WDMA is not supportive of including full-lite sliding patio doors in with the ENERGY STAR windows category. While some full-lite sliding patio doors may share more components and features with windows than with swinging doors they are still different products, serve different purposes and requirements for them should therefore be maintained separately. What EPA is proposing will require triple pane patio doors in the Northern and North Central Zones adding significant weight, installation challenges and operability concerns in addition to the significant cost increase, not to mention the impact the move will have on product availability.

We are also not supportive of EPA's conclusion that the increased cost increments and payback periods applicable to windows are also applicable to sliding glass doors. EPA needs to perform the same energy

savings and cost analysis for sliding glass doors that it has for windows, including comparing proposed Version 7.0 product costs to Version 6.0, before it can reasonably make that assumption.

In addition, based on feedback from our members, customers will typically choose the same glass low-e coating for glazed patio doors, regardless of type, as selected for the windows even if the doors are not ENERGY STAR compliant and the windows are ENERGY STAR compliant. There is no need to use the same ENERGY STAR criteria for both. Similarly, the fact that sliding glass doors have been added to the same criteria as windows in the Most Efficient category is not a good reason to require the same treatment under the main program.

Lacking substantiation for proposed skylight and TDD U-factor for the Northern Zone and SHGC for the North-Central Zone:

First, we support maintaining skylights and TDD's in the ENEGY STAR program as there does remain opportunity for reasonable incremental improvements in the criteria in line the with ENERGY STAR Strategic Vision and Guiding Principles. We also support simplifying the skylight and TDD criteria by having only two specification sets as proposed by EPA, and maintaining no SHGC requirement for the Northern Zone. In addition, based on our own review of the Draft 1 Analysis and member feedback we've received, we can support the proposed U-factor of 0.50 for the North-Central, South-Central and Southern Zones. However, we cannot support the proposed U-factor of 0.45 for the Northern Zone or SHGC of 0.25 or less for the North-Central Zone as we do not believe they have been adequately justified by EPA.

We note EPA cites analysis data presented in the Discussion Guide, but based on what EPA states in the Draft 1 Analysis regarding the Discussion Guide analysis, it appears to be inconclusive. EPA also states its recognition that mounting type for skylights—curb-mounted versus deck-mounted—has a significant impact on performance, which we appreciate, but there is no discussion about what additional performance improvements need to be made to curb-mounted skylights and what the impact that will have on affordability and cost effectiveness.

EPA also points out that the current Canadian ENERGY STAR criteria for skylights is set at a U-factor of 0.40 in relation to what EPA is proposing for the Northern Zone. That fact has little relevance in determining what's appropriate for the U.S. Northern Zone. Canada is a different market and the factors contributing to the Canadian specification were also different, e.g., the Canadian desire to have a single criteria for the entire country based on their more extreme cold climate conditions.

Regarding the proposed SHGC of less than 0.25 for the Northern Zone, again, EPA has not provided an analysis to show what the actual energy and cost savings may be and therefore is lacking a reasonable basis for what it is proposing. An SHGC of 0.25 or less is very aggressive and particularly onerous for skylights to achieve if reasonable visual transmittance is to be retained.

Furthermore, while we know the LBNL model was not configured to model skylight energy and therefore no energy savings or cost-effectiveness analysis was performed, EPA nonetheless made cost-effectiveness assumptions based on findings in its windows analysis that performance improvements with the same or similar components used to meet the skylights criteria were cost-effective. EPA should fully explain how it conducted this evaluation and how it supports EPA's conclusions.

With those points in mind, again, we believe there does remain opportunity for reasonable incremental improvements in the skylight and TDD criteria in line the with ENERGY STAR Strategic Vision and Guiding Principles. To that end, in addition to our support of a U-factor criteria of 0.50 for the North-Central, South-Central and Southern Zones, we recommend EPA set the U-factor for the Northern Zone at no lower than 0.48 and the maximum SHGC for the remaining zones at no lower 0.28. Those recommendations are likewise based on our own review the Draft 1 Analysis and member feedback we've received.

Move IECC Climate Zone 5 into the ENERGY STAR North-Central climate zone and eliminate isolated climate zone islands:

As we stated in our comments in the discussion guide WDMA is supportive of moving IECC Climate Zone 5 out of the ENERGY STAR Northern Zone and into the ENERGY STAR North-Central Zone as IECC Climate Zone 5 has the largest population concentration in the U.S., and weather data shows that the climate characteristics of IECC Climate Zone 5 are more in-line with the ENERGY STAR North-Central Zone. It is clear EPA has chosen not to do so but only notes one energy savings analysis as the reason without a detailed explanation as to why. EPA should provide a more in-depth explanation of why maintaining IECC Climate Zone 5 in the Northern Zone is appropriate.

With respect to the Northern Zone climate islands that EPA is proposing for California and North Carolina, while we appreciate EPA's intent to fully align IECC climate zones with ENERGY STAR climate zones, we do not believe these islands are practical or necessary for the ENERGY STAR window, door and skylight program. It would add needless complexity to the specification and logistical and distribution challenges for manufacturers and given the demographic characteristics of the geographical locations, returning them to the North-Central Zone will only have a very negligible impact on overall national energy savings at most. For those reasons we recommend EPA return them to the North Central Zone.

Additional Comments

Implementation Date:

WDMA strongly recommends that EPA set an effective date of no earlier than January 1, 2024, in order to give manufacturers time to make necessary changes in product design, testing, certification, etc., as well as time necessary for marketing and other operational changes that need to made with any revision to the criteria. Manufacturing equipment modifications and component supplier timelines are also continually lengthening due to the on-going impacts of COVID.

Appropriate EPA promotion of ENERGY STAR Version 7.0 products:

In the July 27 stakeholder meeting, EPA indicated it plans to ramp up their marketing and promotion efforts for ENERGY STAR windows, doors and skylights. We do appreciate that but at the same time wish to emphasize that those efforts should remain squarely focused on promoting ENERGY STAR products as a voluntary program. EPA should be careful not to inadvertently imply or otherwise advocate for the adoption of ENERGY STAR window, door and skylight criteria by state and local jurisdictions as minimum energy code requirements for fenestration.

Summary

In summary review of our comments, we respectfully request EPA do the following and propose a revised Version Specification Draft 2 Specification accordingly for further review and comment before finalizing the revised Version 7.0 Specification:

- re-conduct the energy savings analysis using EnergyPlus 9.5, based on source versus site energy and together with more accurate population distributions based on the latest census data;
- base the cost-effective analysis on lower-cost and best-selling ENERGY STAR products and not solely on the lowest incremental cost increases;
- include all common framing types in the cost-effectiveness analysis;
- re-assess potential specification revisions based on that analysis;
- use ENERGY STAR Version 6.0 as the baseline for proposing Version 7.0 specification revisions;

- move IECC Climate Zone 5 into the ENERGY STAR North-Central;
- propose less aggressive criteria for the Northern and North Central Zones and eliminate equivalency options for the Northern Zone;
- set no minimum SHGC for windows for the Northern Zone;
- set the window SHGC for windows in the South-Central and Southern Zones at no less 0.25;
- retain sliding glass doors in the door criteria table;
- maintain an SHGC window and ½ lite door criteria in the South-Central and Southern Zones no lower than 0.25;
- set the skylight U-factor for the Northern Zone at no lower than 0.48 and the maximum skylight SHGC for the remaining zones at no lower 0.28; and,
- regardless of the final specification criteria, set the effective date for Version 7.0 for no earlier than the beginning of the 2024 calendar year.

Again, we appreciate this opportunity to provide WDMA's comments on EPA's Version 7.0 Draft 1 Specification and supporting Draft 1 Analysis. We understand that the actions we are requesting EPA to take in response are substantial, but they are based on over 20 years of industry experience with the ENERGY STAR program and manufacturers efforts to make the program the success that it is for ensuring significant national energy savings and energy cost savings for consumers. We believe that the actions we are requesting EPA to take will result in a more sound Version 7.0 Specification, and one that is more in-line with ENERGY STAR's Strategic Vision and Guiding Principles.

Please let me know if you would clarification on any comment we have provided or if there is additional information we may be able to provide as EPA moves forward with the development of the Version 7.0 Specification.

Sincerely,

Jeffrey T. Inks
Vice President - Advocacy