

March 28, 2022

Douglas W. Anderson
Product Manager for Windows, Doors, and Skylights ENERGY STAR® Labeled Products
Anderson.doug@epa.gov
windows@energystar.gov

Dear Doug and others responsible for the U.S. ENERGY STAR program:

On behalf of the Fenestration and Glazing Industry Alliance (FGIA), we are providing feedback on the proposed ENERGY STAR 7.0 Draft 2 Residential Windows, Doors, and Skylights Specification requirements. FGIA represents more than 350 member companies who manufacture and market windows, doors and skylights and the components that go into them for residential and commercial applications — many of whom are ENERGY STAR partners who label millions of products every year with the ENERGY STAR label.

As requested, FGIA members appreciate the revised recalculations of data to better inform the Draft 2 specification. We also appreciate EPA's recommendation to eliminate Climate Zone "islands" by reverting portions of California, North Carolina and Virginia that had been separated out in Draft 1, to instead, be realigned with their state for ease of use and understanding.

However, FGIA believes the following items remain unresolved in Draft 2. Therefore, we appreciate your consideration in revising the specification before it is finalized as follows.

FGIA encourages EPA to:

- 1) Time the specification launch at the start of the year, January 1, 2024, rather than mid-year, for greater acceptance by consumers, and to allow adequate implementation time for manufacturers.**
Supply chain challenges still affect the ability of manufacturers to consistently procure the many components that go into windows doors and skylights, with no end in sight for easing of building material and manufacturing labor shortages. In fact, the latest COVID-19 variant strain identified in China, and recurrence in Europe is shutting down manufacturing operations, further delaying essential components necessary to manufacture products. In addition, it's important to recognize the considerable time and multi-million dollar investment manufacturers must make to place store point-of-purchase displays, and to update labels, sales and marketing materials, training programs and customer service content so they are current and accurate. For example, since there are changes to Climate Zone boundaries, time must be allowed to update all materials in which climate zone maps are featured.

Additionally, the ENERGY STAR program for Windows, Doors, and Skylights is far more complex than any of the more than 40 other ENERGY STAR programs like Appliances, Lighting, Electronics, and even other building products. Millions of fenestration product configurations exist, each with performance measures that need to be solidified by hundreds of manufacturers to meet Climate Zone requirements for U-factor and SHGC updates proposed by the Version 7.0 specification.

Fenestration manufacturers are investing in significant product re-designs and the associated testing to meet the next version of ENERGY STAR. If fenestration performance numbers are off by as little as 0.01 for either U-factor or SHGC, it could mean compliance in one climate zone versus another or could result in a product that fails to comply with ENERGY STAR Version 7.0 altogether.

The proposed mid-year 2023 rollout would occur at the busiest time of year for manufacturers, and at a time when the vast majority of consumers have already made choices for new construction projects and replacement applications to be completed in 2023.

Window, door, and skylight showroom and in-store displays take considerable time to manufacture, ship and transport. It's important to note that EPA fines those who don't keep their consumer-facing ENERGY STAR materials current. Therefore, delaying the launch until January 1, 2024, will allow the necessary time to ensure manufacturers' materials are updated to help support the new ENERGY STAR program specification and adoption by consumers.

ENERGY STAR Version 7.0 data was compiled in a vibrant, growing economy, with low inflation and low interest rates. For example, the Federal Reserve maintained a near-zero target interest rate since 2019. However, in March of 2022, that changed, as the first of many projected federal funds interest rate hikes went into effect, with plans for the Federal Reserve to continue those well into 2023 to try to slow surging inflation.

The U.S. economy has rapidly declined in recent months, and remains highly volatile today, as many economists predict a housing market recession and or full economic recession is near. Even U.S. [Federal Reserve Chairman Jerome Powell now predicts it may take three years — until to March of 2025 — to get inflation under control, and down to near two percent in the U.S.](#), as he stated March 21, 2022, in a speech delivered to the National Association for Business Economics.

With 40-year high inflation still rapidly on the rise, numerous interest rate hikes projected for multiple years, and continued supply chain shortages — all with no end in sight, now is not the time to rush a new ENERGY STAR specification to market.

American consumers have dramatically less buying power and far less disposable income to invest in energy-efficient home improvements today than when this ENERGY STAR specification started. For example, when inflation and building material price increases are factored in along with rising interest rates, year-over-year housing costs for American consumers have shot up 28 percent over the prior year alone.

Instead, FGIA recommends delaying the ENERGY STAR Version 7.0 implementation to no sooner than January 1, 2024, to allow more time for the housing economy to stabilize.

2) Implement a 0.28 U-factor for > ½-lite doors for all climate zones, or at least in the two southern climate zones and retain the proposed 0.25 U-factor in the two northern climate zones.

FGIA members also appreciate the recombination of hinged and sliding doors into a single ENERGY STAR category. However, the proposed 0.25 U-factor for > ½-lite doors is particularly problematic in the south.

It doesn't appear that an analysis of doors was contained in the data made available on the latest proposed specification revision. On what data was the latest recommendation for doors based? If any data was analyzed, was it pulled from the NFRC Certified Products Directory (CPD)? If no analysis was conducted, was the recommendation simply a compromise? The 0.25 U-factor for > ½-lite doors across all climate zones does not parallel the 0.28 U-factor for windows in the South-Central zone. In fact, it may require the use of triple-pane glazing in doors or vacuum insulating glazing panels which would significantly extend manufacturing lead times and product delivery times for consumers.

In the south, it is more stringent than the energy code requirements in areas like Miami, Florida.

Therefore, FGIA recommends implementing a 0.28 U-factor for > ½-lite doors (as was proposed in Draft 1) in all climate zones as our first preference. An alternative is to adopt a 0.28 U-factor in the South-Central and Southern Climate Zones, and a 0.25 U-factor in the Northern and North-Central Zones. That approach would follow the way SHGC is split between northern and southern climate zones. Either way, FGIA members would like to see necessary supporting data to justify the proposed recommendation, similar to the analysis provided for windows.

- 3) **Base ENERGY STAR criteria for windows, doors, and skylights on SOURCE energy rather than SITE energy.** EPA's latest claim that the use of SITE energy is an ENERGY STAR policy seems to directly conflict with the ENERGY STAR Portfolio Manager which clearly states that SOURCE energy is the most equitable way to compare building performance. This is particularly relevant for windows, doors, and skylights because they account for mixed energy sources between heating and cooling.

While the revised equivalency options in the Northern Zone based on the analysis (if it is truly based on SITE versus SOURCE energy) resulted in a slight improvement, FGIA members still have concerns. If this recommendation was instead, based on SOURCE energy, it is not as desirable.

While recent comments about the ENERGY STAR Program for windows, doors, and skylights have shifted to interpret it as based on SITE energy, previous work and positioning of the program was based on and should remain as focused on SOURCE energy. When and how did this change occur? And as a result of it, the tradeoff options proposed are questionable, based on SITE energy.

The ENERGY STAR program pertains to pollution control, which can't be accomplished with a focus on SITE energy. Instead, SOURCE energy must be considered, as stated in the ENERGY STAR Portfolio Manager. SITE energy can't be used as an indicator of either energy cost, or carbon.

By its own admission in the [ENERGY STAR Portfolio Manager](#), "EPA Recommends Using Source Energy." EPA further states, "EPA has determined that *source energy* is the most equitable unit of evaluation for comparing buildings to each other" as shown below.

The Difference Between Source and Site Energy

After you've benchmarked your building, you'll see several performance metrics, including source and site EUI (or energy use intensity). What's the difference? And which is used for the 1 – 100 ENERGY STAR score?

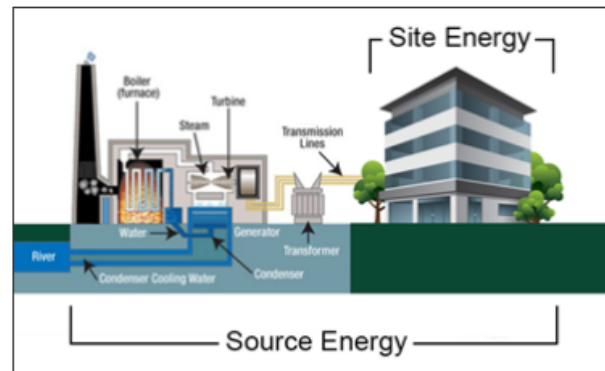
EPA Recommends Using Source Energy

EPA has determined that *source energy* is the most equitable unit of evaluation for comparing different buildings to each other. Source energy represents the total amount of raw fuel that is required to operate the building. It incorporates all transmission, delivery, and production losses. By taking *all* energy use into account, the score provides a complete assessment of energy efficiency in a building.

Source Energy Accounts for Total Energy Use

You're probably already familiar with *site energy*, which is the amount of heat and electricity consumed by a building as reflected in your utility bills. Looking at site energy can help you understand how the energy use for an individual building has changed over time.

Site energy may be delivered to a building in one of two forms: primary or secondary energy. *Primary energy* is the raw fuel that is burned to create heat and electricity, such as natural gas or fuel oil used in onsite generation. *Secondary energy* is the energy product (heat or electricity) created from a raw fuel, such as electricity purchased from the grid or heat received from a district steam system. A unit of primary and a unit of secondary energy consumed at the site are not directly comparable because one represents a raw fuel while the other represents a converted fuel.



Therefore, to assess the relative efficiencies of buildings with varying proportions of primary and secondary energy consumption, it is necessary to convert these two types of energy into equivalent units of raw fuel consumed to generate that one unit of energy consumed on-site. To achieve this equivalency, EPA uses source energy.

When any form of primary or secondary energy is consumed on site, source energy calculations account for the losses that are incurred in the production, transmission, and delivery of that energy to the building. The factors used to restate primary and secondary energy in terms of the total equivalent source energy units are called the *source-site ratios*.

ENERGY STAR program specifications for windows for versions 1-6 all used SOURCE energy. So why was the change made in the Version 7.0 Draft 2 specification to SITE energy? This represents a major, significant, change in program direction and precedence. On what technical basis was the change to SITE instead of SOURCE energy made in this version?

FGIA challenges EPA to resolve the conflict and base the program for windows, doors, and skylights on SOURCE energy.

- 4) **Consider occupant comfort and propose a specification that doesn't create unintended consequences and further energy consumption when homes and occupants overheat** and therefore, need to use fans and air conditioners that consume more energy to cool their homes more often.

Effective passive solar design demands effective building envelope design from the start. To achieve effective passive solar design and meaningful potential energy savings, much more is required than simply installing windows with high SHGC. The performance path is considered in addressing a structure's energy performance in building codes. Orientation of a home or other building also makes a difference in energy consumption and occupant comfort. Were either of those factors considered by EPA in the Draft 2 specification for windows, doors, and skylights?

- 5) **Consider and weigh the options in evaluating how much embodied carbon may increase to help potentially decrease operational carbon.** FGIA members believe it is important for EPA to analyze the increase in embodied carbon versus the expected decrease in operational carbon that will result from this specification, which increasingly will require transitions from double-pane to triple-pane glazing.

Has EPA conducted an analysis to assure that the increase in embodied energy required for triple-pane glazing will be sufficient to justify the increase in embodied carbon? And does that analysis also evaluate whether the increase in embodied carbon will truly reduce greenhouse gas emissions (GHGs)?

- 6) **Revise the SHGC specification to provide more significant and more meaningful savings in energy costs for consumers. Do not implement a minimum SHGC for the Northern Zone.**

FGIA recommends that EPA fully consider all comfort aspects for consumers, particularly for the higher proposed SHGC levels that offer little energy savings. We recommend that EPA lowers SHGC levels to accomplish improved thermal comfort for consumers. FGIA also asks that the SHGC requirement in the Northern Zone be eliminated.

Also, since there is no minimum SHGC for skylights in the proposed specification, FGIA recommends that no minimum SHGC level be established for windows, to maintain some equity between these product categories.

EPA's revised analysis provides some justification for the proposed minimum SHGC in the Northern Zone. However, as stated earlier, since the analysis was based on SITE energy rather than SOURCE energy, FGIA still questions the benefit of this additional restriction.

Consumers care about saving money on their energy bills, especially now, in the midst of 40-year high inflation rates, and rapidly rising double-digit increases in energy costs. In today's volatile economic times, consumers care most about what they save in money on their utility bills, rather than incremental energy savings that may not provide paybacks adequate to justify the added investment.

The difference in a 0.25 versus a 0.35 SHGC is minimal. In fact, it's a difference of only about \$4 a year in a simulated home, which is inconsequential and insignificant to consumers. FGIA recommends the specification be revised to allow lower SHGC products in the Northern Zone, to allow darker tinted windows to be used.

For the Equivalent Energy Performance options for windows in the Northern Zone, FGIA recommends changing the SHGC from 0.35 to 0.30 for U-factors of 0.23 and 0.24, and from 0.40 to 0.35 for U-factors of 0.25 and 0.26, as illustrated below.

0.23 U-factor - 0.30 SHGC

0.24 U-factor - 0.30 SHGC

0.25 U-factor - 0.35 SHGC

0.26 U-factor - 0.35 SHGC

It is our understanding that EPA typically considers the homeowner benefit of cost savings from an older, inefficient window. It must be made clear that to the industry and its retailers it is from ENERGY STAR Version 6. The industry must justify the millions of investment dollars from ENERGY STAR 6 to ENERGY STAR 7.0 Building material costs have risen double-digits in many cases in recent years. Annual energy savings for the ENERGY STAR 7.0 program investment are small compared to the consumer price increases.

EPA's ENERGY STAR Version 7, Draft 2 specification analysis chart shown below illustrates FGIA's point. The annual savings to the homeowner from the proposed change from a 0.35 to a 0.30 SHGC minimum is only \$2, based on the chart below provided in the supporting data for ENERGY STAR 7.0, Draft 2. Consumers will not benefit from this minuscule and only simulated potential cost savings, which discriminates against some glazing options that may be less expensive. EPA should not set restrictive policies using these small justifications for which consumers will receive little value.

Annual Energy Cost Savings (Green shading indicates higher numbers while red shading indicates lower numbers)																		
Energy Star Zone	Northern SHGC																	
	0.13	0.15	0.17	0.19	0.2	0.21	0.23	0.25	0.27	0.3	0.32	0.35	0.37	0.4	0.42	0.45	0.47	0.5
0.2	\$109	\$114	\$118	\$121	\$123	\$124	\$127	\$129	\$132	\$134	\$135	\$136	\$136	\$134	\$133	\$130	\$128	\$123
0.21	\$99	\$104	\$108	\$112	\$113	\$115	\$118	\$120	\$122	\$125	\$126	\$127	\$127	\$126	\$124	\$121	\$119	\$114
0.22	\$90	\$95	\$98	\$102	\$104	\$105	\$108	\$111	\$113	\$115	\$116	\$117	\$117	\$116	\$115	\$112	\$110	\$106
0.23	\$80	\$85	\$89	\$93	\$94	\$96	\$99	\$101	\$104	\$106	\$107	\$108	\$108	\$108	\$106	\$103	\$101	\$97
0.24	\$71	\$76	\$80	\$83	\$85	\$87	\$89	\$92	\$94	\$97	\$98	\$99	\$99	\$99	\$97	\$95	\$93	\$88
0.25	\$61	\$66	\$70	\$74	\$76	\$77	\$80	\$83	\$85	\$88	\$89	\$90	\$91	\$90	\$89	\$86	\$84	\$80
0.26	\$52	\$57	\$61	\$65	\$67	\$68	\$71	\$74	\$76	\$79	\$80	\$81	\$82	\$81	\$80	\$77	\$75	\$71
0.27	\$43	\$48	\$52	\$56	\$57	\$59	\$62	\$65	\$67	\$70	\$71	\$72	\$73	\$72	\$71	\$69	\$67	\$63
0.28	\$33	\$39	\$43	\$47	\$48	\$50	\$53	\$56	\$58	\$61	\$62	\$64	\$64	\$63	\$62	\$60	\$58	\$54
0.29	\$24	\$30	\$34	\$38	\$39	\$41	\$44	\$47	\$49	\$52	\$53	\$55	\$55	\$55	\$54	\$51	\$49	\$46
0.3	\$15	\$21	\$25	\$29	\$30	\$32	\$35	\$38	\$40	\$43	\$45	\$46	\$46	\$46	\$45	\$43	\$41	\$37
0.31	\$6	\$12	\$16	\$20	\$22	\$23	\$26	\$29	\$32	\$34	\$36	\$37	\$38	\$37	\$36	\$34	\$33	\$29
0.32	-\$2	\$3	\$7	\$11	\$13	\$15	\$18	\$21	\$23	\$26	\$27	\$29	\$29	\$29	\$28	\$26	\$24	\$21
0.33	-\$11	-\$6	-\$2	\$2	\$4	\$6	\$9	\$12	\$14	\$17	\$19	\$20	\$21	\$20	\$20	\$18	\$16	\$13
0.34	-\$20	-\$15	-\$11	-\$7	-\$5	-\$3	\$0	\$3	\$6	\$9	\$10	\$12	\$12	\$12	\$11	\$10	\$8	\$4
0.35	-\$29	-\$24	-\$19	-\$15	-\$13	-\$12	-\$8	-\$5	-\$3	\$0	\$2	\$3	\$4	\$4	\$3	\$1	\$0	-\$4

- 7) **Move IECC Climate Zone 5 into the North-Central Zone for a more realistic alignment in climate conditions, and implement a 0.26 U-factor, rather than a 0.24 U-factor for windows in the North-Central Zone. Also implement a 0.24 U-factor, rather than 0.22 U-factor in the Northern Zone.**

IECC Climate Zone 5 is 75 percent of the ENERGY STAR Northern Zone alone, and when it is left in the Northern Zone, it distorts the data.

The proposed Northern Zone criteria will conflict with the 2021 IECC where Climate Zone 5 now has a maximum SHGC of 0.40, where the proposed ENERGY STAR criteria is proposing minimums and SHGCs higher than the IECC SHGC of 0.40. This sends a conflicting message to consumers. The proposed

specification now presents greater challenges for the North-Central Zone to achieve, depending on the glazing and window package chosen.

Conflicts in equivalency options also now exist between the Northern and North-Central Zones, creating further confusion for consumers. Adding to that confusion by projecting only about \$8 in annual energy savings for consumers will further decrease the potential purchase of ENERGY STAR certified products.

The chart shown below illustrates FGIA's point. In the Draft 2 specification, there is little difference in the numbers recommended, and even more concerning, very little difference in potential savings or paybacks for consumers who invest in ENERGY STAR 7.0 products.

Energy Star Zone	Northern																	
	SHGC																	
U-Factor	0.13	0.15	0.17	0.19	0.2	0.21	0.23	0.25	0.27	0.3	0.32	0.35	0.37	0.4	0.42	0.45	0.47	0.5
0.2	\$109	\$114	\$118	\$121	\$123	\$124	\$127	\$129	\$132	\$134	\$135	\$136	\$136	\$134	\$133	\$130	\$128	\$123
0.21	\$99	\$104	\$108	\$112	\$113	\$115	\$118	\$120	\$122	\$125	\$126	\$127	\$127	\$126	\$124	\$121	\$119	\$114
0.22	\$90	\$95	\$98	\$102	\$104	\$105	\$108	\$111	\$113	\$115	\$116	\$117	\$117	\$116	\$115	\$112	\$110	\$105
0.23	\$80	\$85	\$89	\$93	\$94	\$96	\$99	\$101	\$104	\$106	\$107	\$108	\$108	\$108	\$106	\$103	\$101	\$97
0.24	\$71	\$76	\$80	\$83	\$85	\$87	\$89	\$92	\$94	\$97	\$98	\$99	\$99	\$99	\$97	\$95	\$93	\$88
0.25	\$61	\$66	\$70	\$74	\$76	\$77	\$80	\$83	\$85	\$88	\$89	\$90	\$91	\$90	\$89	\$86	\$84	\$80
0.26	\$52	\$57	\$61	\$65	\$67	\$68	\$71	\$74	\$76	\$79	\$80	\$81	\$82	\$81	\$80	\$77	\$75	\$71
0.27	\$43	\$48	\$52	\$56	\$57	\$59	\$62	\$65	\$67	\$70	\$71	\$72	\$73	\$72	\$71	\$69	\$67	\$63
0.28	\$33	\$39	\$43	\$47	\$48	\$50	\$53	\$56	\$58	\$61	\$62	\$64	\$64	\$63	\$62	\$60	\$58	\$54
0.29	\$24	\$30	\$34	\$38	\$39	\$41	\$44	\$47	\$49	\$52	\$53	\$55	\$55	\$55	\$54	\$51	\$49	\$46
0.3	\$15	\$21	\$25	\$29	\$30	\$32	\$35	\$38	\$40	\$43	\$45	\$46	\$46	\$46	\$45	\$43	\$41	\$37
0.31	\$6	\$12	\$16	\$20	\$22	\$23	\$26	\$29	\$32	\$34	\$36	\$37	\$38	\$37	\$36	\$34	\$33	\$29
0.32	-\$2	\$3	\$7	\$11	\$13	\$15	\$18	\$21	\$23	\$26	\$27	\$29	\$29	\$29	\$28	\$26	\$24	\$21
0.33	-\$11	-\$6	-\$2	\$2	\$4	\$6	\$9	\$12	\$14	\$17	\$19	\$20	\$21	\$20	\$20	\$18	\$16	\$13
0.34	-\$20	-\$15	-\$11	-\$7	-\$5	-\$3	\$0	\$3	\$6	\$9	\$10	\$12	\$12	\$12	\$11	\$10	\$8	\$4
0.35	-\$29	-\$24	-\$19	-\$15	-\$13	-\$12	-\$8	-\$5	-\$3	\$0	\$2	\$3	\$4	\$4	\$3	\$1	\$0	-\$4

For example, consumers who go from the 0.23 or 0.24 categories in U-factor, may only save a few dollars per year, which is not enough to justify their added costs of investing in ENERGY STAR 7.0 certified products. Consumers will find it hard to justify only a \$3.83 per month potential projected savings from ENERGY STAR Version 6 to Version 7.

The benefit of implementing FGIA's recommendations as noted above is better alignment with equivalency options in the Northern Zone, and broader alignment between glazing packages offered by manufacturers to provide consumers with expanded options for selecting energy efficient products across the United States.

8) Simplify ENERGY STAR skylight criteria, set the U-factor at 0.53, maintain SHGC at no less than 0.28.

When it comes to skylights, we question why there were no changes between Draft 1 and Draft 2. FGIA reasserts the comments we filed on Draft 1, and we still consider them unresolved.

9) Require North American Fenestration Standard (NAFS) certification for greater product quality assurance and safety in ENERGY STAR Version 7.0, as it is for the ENERGY STAR Most Efficient Program.

The North American Fenestration Standard AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS) certification is required for the ENERGY STAR Most Efficient Program for windows and sliding doors, and therefore should also be required for ENERGY STAR Version 7.0.

10) Reassert and proactively communicate that ENERGY STAR is intended to be a voluntary, aspirational, above code program that is not intended to be a model for state or local energy codes.

EPA's intent is for ENERGY STAR to be **better** than typical energy codes. As EPA expands its promotion of the program, EPA and others need to reassert that ENERGY STAR is a voluntary program that's designed to be **above** code. Therefore, ENERGY STAR should not be adopted as local energy code requirements.

It's worth noting that there is currently a proposal before the International Code Council (ICC) (REPI-31-21 from the Northwest Energy Efficiency Alliance (NEEA) that would largely align the 2024 International Energy Conservation Code (IECC) with the proposed ENERGY STAR Version 7.0 criteria. While we understand that EPA technically has no authority over code jurisdictions, EPA and the Federal government must acknowledge the reality of their considerable influence over these matters. Reassertion of this fundamental message from EPA seems appropriate.

FGIA members recognize that millions of inefficient (single- and double-pane clear) windows, doors, and skylights in existing U.S. housing stock need to be replaced with more energy-efficient options to help America achieve energy savings, net-zero energy, and reduced greenhouse gas emissions (GHGs) goals.

As longtime industry leaders providing the millions of finished windows, doors, and skylights, along with the components and expertise that has helped stimulate demand for the ENERGY STAR brand across all markets, FGIA members look forward to our continued partnership with EPA and ENERGY STAR to help advance the program and its adoption by Americans.

If you have questions about the information provided by FGIA, or to discuss it further with our stakeholders, please email me at kkrafka@fgiaonline.org.

Sincerely,



Kathy Krafa Harkema
U.S. Technical Operations Director
Fenestration and Glazing Industry Alliance (FGIA)
kkrafka@fgiaonline.org