RESIDENTIAL FENESTRATION COVERAGE, FROM SOURCE TO SALE // WINDOWANDDOOR.COM

# WINDOW+ DOOR

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Benefiting from eCommerce Software By Chris Kammer



Use Winter Downtime to Develop Your Pipeline By Gregg Hicks



Women in Glass: In Her Words By Lindsey Rowe Parker

\*\* Something that I have noticed over and over in my professional experience is that the old, outdated narrative that women do not help other women is not true. My most meaningful and impactful professional relationships have been with women.\*\*

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**Companies Expand, Partner** 

The Earthwise Group, a national manufacturing network that produces energy-efficient vinyl windows and doors, has accepted East Windsor, Connecticut-based, Mercury Excelum as a new member. Mercury Excelum is a fourth-generation family business that has produced windows and doors for more than 70 years.

"Mercury Excelum is excited to be a part of the Earthwise Group and strengthen its network in the Northeast region," says Doug Meyerson, president of Mercury Excelum. "We've built a solid reputation delivering great products, and I believe that being a part of the Earthwise Group will strengthen our reputation and expand our capabilities."

Thompson Creek Window Company is expanding as well, with a new office location opening in Norristown, Pennsylvania, that will serve the Philadelphia area.

The Frameless Hardware Company LLC has entered into a strategic partnership with Prime-Line Products. As part of the new partnership, the companies anticipate FHC will offer increased service to targeted segments of Prime-Line's existing wholesale customers through complementary products. With this, FHC now occupies manufacturing and distribution supercenters on both coasts servicing all of the U.S. Prime-Line's product offerings, including window and screen repair, interior hardware, repair springs, and exterior window and door hardware.

The Window & Door Manufacturers Association and Fenestration Canada announced a formal agreement to cooperate in a number of areas for the mutual benefit of WDMA and FenCan members. The associations believe the agreement will further both associations' goals of promoting, protecting and advancing the window, door and skylight industry in North America.

IN THE KNOW

Under the agreement, both associations are pledging to work closely on cross-border policy issues to achieve a mutually beneficial outcome for their members. By teaming up on these issues, WDMA and FenCan believe they can achieve better and greater results. Also, under the agreement, WDMA and Fen-Can members will have more opportunities to participate in each other's events and the associations.

Roto Frank of America Inc. has partnered with the Transition Academy to provide local internships to students with intellectual and developmental differences. The Transition Academy community program helps young adults experience hands-on training in various positions and job sites to prepare them for a brighter future, according to a release.

### 2022 NAFS Published

The 2022 edition of AAMA/WDMA/ CSA 101/I.S.2/A440, "North American Fenestration Standard/Specification for windows, doors and skylights" has been updated, replacing the 2017 edition. The standard is the result of a multi-year effort by CSA Group, Fenestration and Glazing Industry Alliance, and Window & Door Manufacturers Association.

The 2017 NAFS standard is referenced in the 2021 editions of the International Building and Residential Codes, with the recently released standard proposed to be included in the 2024 editions of these codes. The 2017 NAFS standard is also referenced in the 2020 edition of the National Building Code of Canada, with the recently released standard proposed to be included in the 2025 edition.

Highlights of the updated standard include operating force, door requirements, material and components, concise clauses, Canada/U.S. harmonization, and mulled products.

### Industry Companies Garner Awards

Magid Glove & Safety has been named to the Top Workplaces USA list in the 500-999 employee company size category for the second consecutive year. This award celebrates companies that prioritize a people-centered culture to create an exceptional place to work. Magid employs more than 1,000 people worldwide and offers walking tracks, game courts, a subsidized café and a flexible work-life balance with a hybrid schedule of three days a week in the office and two days of remote work.

PGT Innovations was one of Forbes' 2023 Best Small Companies for the third year in a row. One of nine firms in the construction classification, the company improved its ranking this year by 32 spots, moving from number 79 in 2022 to number 47. PGTI employs approximately 5,500 team members across the U.S. and operates 10 manufacturing facilities and a glass processing plant.

Pella Corp. was recognized for the second consecutive year on Fast Company's list of World's Most Innovative Companies for 2023. Last year, the company introduced innovations in robotics, voice-directed work, and began testing flexible scheduling to improve consistency in overtime requirements, time off and a better work-life balance. The change improved employee

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#### News

retention by over 50 percent and allowed long-serving employees to scale back their hours while retaining full benefits. The addition of flexible schedules also attracted more talent; Pella increased its manufacturing workforce by 45 percent over the last two years, according to the company.

And, Window World ranked No. 439 this year on the Entrepreneur Franchise 500 for its performance in areas, including unit growth, financial strength and stability, and brand power.

### Masonite to Close Stockton, California, Facility

A representative for Masonite confirms that the company will be closing its Stockton, California, facility as of May 5.

"We remain committed to supporting our Stockton employees and providing a seamless experience for our customers through the transition," says Masonite Director of External Communications Lori Conrad.

According to a WARN report filed with the Employment Development Department for California, the facility employs 59 people. It is located at 3632 Petersen Road in Stockton, California.

### Marvin to Make Large Investment in Automation

Marvin intends to make huge investments in automation, according to a report from TCB. Paul Marvin, CEO and chair of Marvin, explains that nobody is going to lose a job because of automation.

"We are not going to build a factory of robots. That's not appropriate," says Marvin in an interview with TCB. "Automation is simplifying processes with technology and data."

Automation and technology upgrades are central to a five-year business strategy that Marvin has begun to unveil to his employees. Marvin says the company wants to deploy automation to reduce redundant or busy work, so it can make faster and better decisions.

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### Pushing the Boundaries of Sustainability and Materials Science

*Research is underway to create windows that meet today's environmental and performance objectives* 

By the Deceuninck North America team

Below: SunShield is a high-performance vinyl compound material developed by scientists to ensure color retention and protect against rotting, cracking, pitting, corroding and peeling. A global push to live more sustainably and reduce our collective carbon footprint is compelling manufacturers to rethink how products are created.

Consider these three phases of window and door products' lifecycle: Manufacturing, the life of the product in a structure, and end-of-life recyclability.

Paul Adams, who has been with Deceuninck North America for more than 15 years and currently serves as the global vice president of materials innovation, discussed the importance of creating formulas that meet multiple industry and sustainability criteria, remain respectful of the environment, and are recyclable at the end of their lifecycle.

#### **Climate change considerations**

During the Massachusetts Institute of Technology's 2021 Materials Day symposium, research scientist and professor Elsa Olivetti began her opening remarks with, "Materials play a central role in all aspects of the new technologies needed to achieve



sustainability goals and address climate change."

The focus on designing sustainable materials pervades all industries, but it is particularly relevant to the building, design and construction space since it is estimated that it creates a third of the world's waste.

The climate crisis and ever-increasing global temperatures have placed a greater demand on the research that goes into advancing polyvinyl chloride, or PVC, formulas that the window and door industry uses. The ones previously relied upon are not as effective as they once were. The environment is changing, which mandates higherperforming, longer-lasting windows.

"We must create windows for today, not for an environment that existed 20 years ago," Adams stresses. "These new products must endure for 25 or 30 years, in addition to remaining recyclable and maintaining 90 percent of their original physical properties at the end of their lifecycle."

Because higher outside temperatures cause window systems to degrade, materials science teams worldwide are emphasizing the development of new chemistries. "Much of what we do is in response to climate change and is in line with the overall sustainability model of our organization," Adams notes.

### A closer look at chemistry

Where there's color, there must be the right chemistry in place to allow it to shine over the long haul.

Color plays a big role in the increased homeowner and architect demand for aesthetic options, and the demand for new pigments and properties has required manufacturers in the window and door industry to spend more research and development hours on pigment chemistry.

To move the needle, organizations are even tapping into what works in other sectors. "We explored paints and coatings used specifically for military vehicles that are designed to reflect heat. We then



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### In the Trenches

applied that technology to building materials such as PVC extrusions to reduce heat gain in windows," explains Adams.

Material chemistry also plays a key role in creating products that contribute to a more sustainable built environment. Using plant-based additives is an excellent place to start. Utilizing natural materials creates a cleaner final product that is more recyclable at the end of its lifecycle.

These sustainable, organic materials can be used as lubricants and serve other important functions in the production of PVC windows and doors.

Looking at material chemistry can also help manufacturers identify methods to reduce other common concerns for window and door profiles, including fading.

#### Helping the homeowner

Eco-conscious consumers are paying attention to the environment and want to live in homes that save energy and

minimize harmful effects on the planet. Today's window and door extrusions are comprised of more eco-friendly materials compared to those of the past. This starts at stage one: the composition of the materials used to create the window systems from the start.

Manufacturers need to anticipate what homeowners will need. Energyefficiency requirements for windows vary by jurisdiction and by climate, but regardless of region, by reducing the amount of thermal loss through a window frame, less energy is required to heat or cool a home. This has a positive impact on the environment, can decrease annual energy costs for homeowners, and create a more comfortable living environment.

### **Challenges creating opportunity**

Supply chain constraints over the past couple of years resulted in the need for manufacturers to shift toward alternative raw material options and, in some cases, complete reformulation. Teams had to adjust and find new ways to create while maintaining or improving upon the properties of materials. This highlights the importance of remaining on the cutting edge of innovation.

As it specifically relates to materials science, Adams shares his organization's plans for moving forward. "Deceuninck is always striving for better-performing products that protect our environment and make use of natural materials," Adams says. "If we're not pushing the boundaries on innovation and keeping the promise of sustainability at the forefront of product development, we're not doing our part."

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## **Implementing Innovation**

These under-utilized products can help meet high demands for increased thermal performance



By Stephen Aki

*Editor's note:* Technology such as that discussed in this article can help products meet today's increasingly stringent energy codes.

Window and door products are constantly being redesigned to meet ever-increasing thermal performance requirements and yet, there are many under-utilized products in existence today that could help meet high demands. Utilizing and leveraging these innovative solutions could reduce residential energy consumption while increasing homeowners' thermal comfort.

#### Polyamide thermal barrier technology

Polyamide (PA) thermal barriers is one technology that can have a major impact on the thermal performance of doors and windows. First introduced in the mid-1970s, PA thermal barrier technology for aluminum-framed window and door systems has evolved greatly; initial barrier widths started at 10 mm and have now grown to see shapes as large as 100 mm.

Along with increasing barrier widths, PA profiles have become increasingly more complex. PA thermal barriers with legs were developed to break up interior cavities to reduce convective heat transfer. Later options applied foam to fill these cavities. New PA products also help reduce the effect of thermal bow experienced by large aluminum-framed doors using shearless PA profiles. More recently, low-emissivity foil has been used on PA barriers to reduce the smallest component of heat transfer—radiation—further improving thermal performance.

The latest technology involves a reduction in the thermal conductivity of the PA itself. This lower conductivity PA, referred to as "low lambda," allows fabricators to achieve lower assembly U-factors in a given frame design without widening the barrier.

### Availability and adoption

The low-lambda material is already available and can be implemented in North American systems

today. Many North American fabricators offer "R5" aluminum-framed windows (U=0.20 btu/°F. hr.ft<sup>2</sup>). High-performance, aluminum-framed windows utilizing 44-mm-wide PA thermal barriers and foam cavity fillers, achieving a U-factor as low as 0.16 btu/°F.hr.ft<sup>2</sup>, have been commercially available in the U.S. for at least five years.

Although fenestration systems with high-performance thermal barrier technology are available from many fabricators in the U.S., they are still not as prevalent as they are in Europe. Fenestration systems being used in typical U.S. homes still rely on PA barrier widths and designs first introduced 30 years ago.

While the lower conductivity PA material has lower mechanical strength than regular PA, it typically doesn't impact the fenestration design. The connection between the thermal barrier and the aluminum extrusion is often the limiting factor for structural performance. As a result, it may be possible to improve the performance of an existing design without changing extrusions, just by substituting the existing barrier with one made with lower conductivity PA.

More fabricators are adopting this thermal barrier technology to help meet high thermal performance requirements. Fabricators need a variety of tools to deliver lower U-factors across many different product types. Low-lambda PA provides another option to deliver the needed improvements in thermal performance while minimizing cost and simplifying manufacturing and supply chain complexity.

Stephen Aki works for Technoform North America and assists window and door designers to help them develop sustainable, energy efficient, high-performance systems. He has over 10 years of experience in the fenestration industry and is a member of NFRC and FGIA. He can be reached at stephen.aki@technoform.com.

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### As America Evolves, So Does the Buy American Act

How to comply with increasing domestic content threshold percentages



By Susan MacKay

In early 2020, I wrote a blog post for Window + Door about the Buy American Act, its newly adopted rules and further anticipated changes. Since then, additional rules have been adopted that are more stringent than expected in early 2020. The Buy American Act only automatically applies in very specific circumstances: where a federal government contract requires compliance with the act. A state or other entity might also include the rules in its procurement requirements. Of course, for where it does apply, it is important to know whether your company's windows and doors comply with the requirements.

### History of the act

To recap, the Buy American Act requires federal public agencies to purchase products manufactured in the U.S. that are "substantially all" made from articles, materials or supplies that are mined, produced or manufactured in the U.S. by offering price preferences when these types of products are procured. (The "substantially all" test in the Buy American Act is different than the "all or virtually all" test for Made in America claims, the latter



of which requires an even higher percentage of domestically sourced components.)

The Buy American Act intends to support American workers and manufacturers by using U.S. services and materials. "Substantially all" was originally interpreted by the Federal Acquisition Regulations to mean that a domestic end product must be manufactured in the U.S. and 50 percent of the components must be of U.S. origin. The percentage of domestic content in an end product, such as a window or door, is determined by the cost of the components.

Signed by former President Trump on July 15, 2019, Executive Order 13381: Maximizing Use of American-Made Goods, Products, and Materials changed the long-standing interpretation in two big ways. First, "components" was split into two categories with different thresholds:

- Iron and steel end products must have components of at least 95 percent U.S. origin, and
- All other end products must have components of at least 55 percent U.S. origin.

This second prong does not apply to items commercially available off-the-shelf. The EO added an exception allowing the government to purchase products not meeting the U.S. origin threshold if using a compliant end product would be unreasonably expensive compared to using a non-compliant end product.

The EO also asked the Federal Acquisiton Regulatory council to determine whether the end component thresholds, now called "domestic content thresholds," for non-iron or steel end components should be raised even higher. And they did just that.

### Changes to the act

Signed by President Biden on Jan. 25, 2021, Executive Order 14005: Ensuring the Future is Made in All of America by All of America's Workers announced big changes to the Buy American Act. The new rules increase the domestic content

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threshold percentages over time:

- Starting Oct. 25, 2022, the threshold was increased to 60 percent.
- Starting Jan. 1, 2024, the threshold will increase to 65 percent.
- Starting Jan. 1, 2029, the threshold will increase to 75 percent.

It is important to understand that the applicable threshold percentage is the threshold required at the time of delivery of the end product, not when the contract was signed. For example, windows sold pursuant to a contract signed in 2023 must meet the domestic content thresholds in place at the time of delivery. The new rules provide for an exception where it is not feasible for a contractor to comply with the changing threshold throughout the life



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of the contract.

Another new exception is a fallback threshold that will allow an end product meeting a 55 percent domestic content threshold to qualify as a domestic product until one year after the 75 percent threshold is implemented in 2029 if certain circumstances are present, including the unavailability of products meeting the required threshold or the unreasonable cost of the products.

### How to comply

Federal contractors undertake most of the work to comply with the Buy American Act, where it applies. However, there are things a window manufacturer can do upfront to increase the chance of getting the order for government projects.

First, make sure your salespeople know to look for references to the Buy American Act when they are seeking business for federal projects. The act may be written into contracts between the government and the manufacturer, or could be referenced in a contract entered into with a builder or distributor.

Second, do the work now to determine the percentage of domestic content in your windows and doors by performing a domestic versus foreign component cost analysis. You may need to enlist the help of your suppliers to complete this task. If the thresholds are comfortably met, document the percentages for future reference and end the review there. If your company sells product that does not or may not meet the applicable threshold, consider whether it would be beneficial to incorporate more domestic components into your windows and doors to increase the domestic content percentage of your product. In other words, play it safe.

Susan MacKay is an attorney with The Gary Law Group, a law firm based in Portland, Oregon, that focuses on legal issues facing manufacturers of windows and doors. She can be reached at 503/620-6615 or susan@ prgarylaw.com.



### Residential Backlogs Sustain Near-Term Homeowner Demand

Despite potential declines, long-term factors may be an industry boon



Residential window and door manufacturer backlogs have remained elevated since late 2021—a consequence of prior strong homeowner demand for window and door replacement confronting supply chain snarls.

Based on recent traffic indicators, window and door demand from homeowners began softening last fall and is expected to cool further following the rapid increases in interest rates and inflation.

### Flat to declining conditions

We anticipate R&R spending on building products to be flat and to decline slightly on a year-overyear basis in 2023, with important differences by product category. Moderating growth comes on the heels of strong year-over-year increases over the past two years.

For 2023, we anticipate the strongest declines in demand from big-ticket remodeling projects as affordability concerns, higher interest rates and economic uncertainty are expected to weigh on homeowners' decisions to undertake larger projects.

Window and door backlogs and lead times remain elevated at this point: our monthly survey of LBM dealers has consistently highlighted windows as being the product primarily responsible for project delays.

Consistent with this, our quarterly survey of remodeling firms and contractors also shows backlogs remaining elevated, with contractors citing projects already booked out to around five months. These remodelers did note a slowing in new project inquiries. The qualitative commentary we hear from contractors and building products dealers indicates new projects tend to be smaller in size, consistent with our thesis of a decline in bigger R&R projects in 2023. We believe these extended project backlogs will insulate R&R activity from short-term dips in demand, which is positive for the industry.

### **Replacement versus discretionary**

We see a clear differentiation in R&R between spending on replacement products and projects versus discretionary projects. During the previous downcycle from 2007 to 2011, homeowner spending per discretionary project fell -32 percent, while spending per replacement project fell only -9 percent. This cycle, the weakening discretionary remodeling project segment makes up 30 percent of aggregate repair and remodeling spending, while the more stable replacement project segment makes up 48 percent.

From an R&R perspective, the majority of window and door projects are replacement projects versus discretionary remodeling. Window and door manufacturers and dealers can capitalize on this opportunity with a targeted focus on areas more susceptible to these repair-type projects.

### A favorable long-term view

Longer-term, we see overall structural strength in the R&R market, underpinned by:

- 24 million homes reaching "prime remodeling years" by 2027, likely leading to increased project activity to repair or upgrade homes. We define homes in these prime remodeling years as homes 20 to 39 years old, which data shows is the sweet spot for window and door replacement projects.
- 87 percent of all mortgage borrowers are "locked in" at rates below 5 percent, discouraging the purchase of a new home.
- The average homeowner has an all-time high of \$348,000 of equity in their home.

Additionally, we estimate a 1.7-million-unit undersupply of homes in the U.S. and that aging millennals will drive 12.7 million net new households between 2020 and 2030.

These longer-term structural factors are tailwinds to the window and door industry following nearterm cyclical declines from affordability concerns this year. ■

Chris Beard is the Director of Building Products Research for John Burns Research and Consulting. He can be reached at 419/215-1881 or chrisbeard@jbrec.com.

**By Chris Beard** 

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## The Right Tool for the Job

Why fenestration manufacturers need fenestration-specific solutions



**By Ron Crowl** 

It is easy to visualize the importance of having the right tools for the job. Just imagine a fire truck rushing through city traffic with its siren blaring. It arrives at the scene of a ferocious fire with the heat of the flames and thickness of the smoke charring the firefighters' faces as they hop off the truck and begin readying their equipment.

But instead of fire hoses connected to reservoir tanks of water, the firefighters begin pulling out garden hoses and buckets. Despite the heroic anticipation that accompanies their approach, it quickly becomes apparent to anyone watching that they are ill-equipped to battle the blaze.

Having the "right tools" for a job is merely a useful metaphor for most industries, but when it comes to fenestration, it's valuable in both a literal and figurative sense.

### WHEN WE SPEAK OF TOOLS IN A MANUFACTURING SETTING, THE IMPULSE IS TO IMAGINE MACHINERY RATHER THAN SOFTWARE, BUT BOTH ARE EQUALLY IMPORTANT.

When we speak of tools in a manufacturing setting, the impulse is to imagine machinery rather than software, but both are equally important. And it's also equally important that both are specialized in the specific needs of fenestration manufacturing.

#### **Increased efficiency**

With rising input costs, fluctuating prices and lingering supply issues, the importance of efficiency in operations has never been greater.

While it might seem fantastic for a manufacturer to simply buy more machinery and feed it an unlimited amount of profile all day, it is not a realistic solution, or even necessarily be the best. More machinery means higher utilities costs and increased maintenance fees. Plus, over-capacity of stock takes up space and creates more opportunities for error and waste.

Managing throughput is not the responsibility of a welder or machining center; rather, it must be done manually or with the right software. With a manual process, a bottleneck on the design processing side can translate to machinery standing idle. An automated process with the right software ensures operations are running as efficiently as possible.

Likewise, proper stock management software specific to fenestration minimizes one of the biggest drains on a window and door manufacturer's capital by limiting the amount of stock that it's housing. Good stock control comes down to a good understanding of demand and workflow, both of which can be better defined and predicted with the right software than even the best production manager on their own.

#### Improved accuracy

Just as efficiency is vital to the operations of a modern fenestration manufacturer, so too is accuracy.

To make the most accurate cuts on a shop floor, no laborer worth their salt is going to "eyeball" it. Likewise, no organization is going to optimize accuracy by manually managing the processes and reporting multiple silos of data.

Integration is vital to accuracy. The best design and manufacturing software specialized for fenestration will provide a reliable integrated system that prioritizes data accuracy. This type of solution will guarantee true cost with accurate and consistent data reporting that provides the ability to make accurate quotes every time.

There are too many variables at play in the modern fenestration manufacturing business for it to be

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### Syour Business Matters

managed without integration. The right fenestration software causes a domino effect of benefits by providing accurate reporting: sales can provide accurate quotes, accurate quotes create happy customers, happy customers become returning customers, and returning customers enhance the reputation of a company.

### **Better bottom line**

To take that domino analogy one tile further, manufacturers with great reputations in the industry are also among the most profitable. We have gone over the benefits of specialized software that tracks, automates and integrates, but the right fenestration solution will also transform manufacturers that are still processing designs manually.

Seamlessly integrated window and door software enables a fenestration manufacturer to work from the design of the end user: an order is electronically sent to the window company, which then puts it into the manufacturing process before the final product is delivered onsite. Not only does the right software speed up this process but it also reduces the possibility of error and the associated costs of remakes and additional deliveries.

Put simply: it improves the bottom line of the manufacturer. And because the right software is specialized in fenestration, it will be built with customizations and add-ons that appeal to the specific needs of individual window and door manufacturers.

This better bottom line can be achieved with a relatively low investment. Fenestration-specific software represents a significantly lower cost than almost any investment a manufacturing business can make—so much so that returns on that initial investment are frequently faster than anticipated.

### The right tool is transformative

This article began by asking you to imagine a fire truck arriving at a fire without the proper tools to extinguish the flames. Now, imagine that same fire truck pulling up to the scene, but it doesn't roll out proper hoses this time. No, the firefighters calmly enter the building where a fire would have been and eliminate the spark that would have caused a fire.

This is the difference that the right tools can provide. Window and door manufacturers using fenestrationspecific software do not spend their time putting out fires because there are no longer fires to put out.

Ron Crowl is general manager, windows, doors and glass, at Cyncly.

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Want to learn more? contact us directly at marketing@aluplast.net gives the window more space, and a flush, closed version that provides a uniform, cohesive look to the room. The system also features the new aludec and woodec decor surfaces with colour combinations that perfectly match the house, indoors as well as outdoors. With one type of profile, you can build many different window profile to match your design. "We are thrilled to offer energeto<sup>®</sup> neo, a window system platform that meets both the aesthetic and energy efficiency needs of our customers" said Babak Golriz, Head of International Sales at aluplast. "With its innovative technologies and resource-efficient production, energeto<sup>®</sup> neo is a smart



and individual windows and doors, making energeto® neo a versatile and cost-effective choice for architects and homeowners alike. Whether you are looking for a modern, minimalist, farmhouse, or industrial style, energeto® neo has the perfect and sustainable choice for anyone looking to upgrade their windows." energeto® neo is now available for purchase through selected dealers and distributors.

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# aluplast

### **Comprehensive, Collaborative Education**

VEKA's new Education Center delivers on its values of helping employees grow and help customers to remain engaged in design trends and code compliance.



By Laurie Cowin EDITOR Through the past year, Window + Door and VEKA have had the opportunity to talk about VEKA's corporate social responsibility and the importance of educating and training the next generation of manufacturing experts. VEKA is in the process of building out a new training and education center at its North American headquarters in Fombell, Pennsylvania. Joe Peilert, president and CEO; Kevin Seiling, vice president, engineering; and Steve Dillon, corporate marketing director, discuss the thought process behind the training center and what the company hopes to achieve with this project.

### Window + Door: What was the impetus behind building this training center?

**Joe Peilert:** As the leading global supplier of PVC window profile systems, our goal is to be a full-service solutions provider to our customers. That is accomplished in many ways: through quality and on-time delivery, but also through a comprehensive services platform we call VEKA Essentials<sup>™</sup>. Part of VEKA Essentials is our training program (VEKA

Academy) and our consultative window design process. The new Engineering Design Center is the perfect place to facilitate a comprehensive and collaborative window design process. The goal is to offer our customers a way to compress the time from design to successful market launch, whether the challenge is to streamline their current product offering or bring a brand-new product to market meeting Energy Star 7.0.

Kevin Seiling: VEKA brings to the table a wealth of vinyl window and door design experience to complement our customers' world-class manufacturing expertise. VEKA Academy teaches Windows 101 and the design center will allow our customers to engineer solutions and designs on the spot. This same VEKA Academy and design center will be extremely useful in training VEKA production, quality and field service personnel to understand the relationship between profiles and window assemblies.

A good example is a seemingly innocuous profile, such as a common sash for a vinyl patio door. Not only does the common sash have a weatherstrip inserted and gets wept for water drainage, but it also gets punched for rollers, and sometimes holds multiple reinforcing and locking sets as well as antitake-out block or deflection clips, all while being welded to itself or a dissimilar profile and sometimes being reversible—a tall order for any profile.

### WD: Can you walk us through the progression of the Education Center?

**Steve Dillon:** In developing the Education Center, we first had to consider the audience. At VEKA Academy, many of the attendees don't get wide exposure to the market, so we needed to step them through who we are and the role we play in the industry we serve.

The same goes for our employee onboarding process. Most do not know who we are and how our products are used. The Education Center is the hands-on component that we were missing.



VEKA's Education Center includes graphics about how resin is made into extruded vinyl, plus includes a wall showcasing VEKA's products.



We start the training off with our global footprint and what makes up our DNA. We then go through the PVC resin manufacturing process, how we receive and process it, and then how to extrude it. From there, we showcase the inherent properties and benefits of vinyl, all the products we make, and which market each product serves.

Quality is the first benchmark, and we discuss the steps we take from the time raw material enters our facility, to the time the extruded products get shipped out. The center also features operator types, hardware, gaskets, glass, and concludes with environmental and corporate social responsibility (CSR). Once the Education Center is complete, we hope to build a history center, which will round out the complete story of VEKA in North America and globally.

## WD: How are you bringing the industry at large into this Education Center?

**SD:** We've developed many relationships with other industry suppliers, and they have actively participated in VEKA Academy as sponsors. This is just one more opportunity for them to have a permanent display in our Education Center as part of what goes into the fabrication of windows and doors, and continuing to educate new and growing individuals in the industry.

### WD: This area showcases a lot of information about the company, its products and the industry at large. How do you hope to maximize this new space?

**SD:** The first step is developing a guideline document and training current managers on key discussion points in the Education Center—a curriculum on walking someone through it. We feel as though there will be very high-level, informative presentations in the room as well as general walk-throughs, all dependent on the audience. We want leaders in our company to add their own experiences at VEKA. I feel discussions are more genuine and new employees can imagine themselves in a career role within the organization. Once we establish a flow and final adjustments, we can start examining how we can transfer the knowledge to our sister facilities through video or interactive environments like 360 technology or maybe even augmented reality.

### WD: Having such a powerful, engaging space for training and onboarding is especially key as companies grapple with labor. What are some of the biggest employment challenges? How does VEKA work to address these?

**JP:** In general, manufacturing is competing for employees with jobs that may offer flexible hours or hybrid "work from home" scenarios. Our goal is to get our team and job seekers excited about our technology and career development opportunities. The Education Center is a key element in our strategy to introduce our team members to our industry, window technology and a supply chain that ends with a homeowner enjoying a product that makes their home safer, more energy efficient and beautiful.

Beyond the product, it is our business culture as a global family-owned and managed company that sets us apart. Employee turnover during year one is still a challenge. Once our new team members adjust to the manufacturing environment, build friendships and take advantage of the development opportunities, we lose very few employees.

### WD: How does VEKA spread the message about manufacturing as an exciting, rewarding career?

**JP:** We have many employees with over 30 years of experience and a tremendous career progression. For young employees, these team members are terrific examples of what they can accomplish as part of VEKA. Our award-winning, Germanstyle, dual work/study apprenticeship program is a great way to connect us to schools and the community to reach the best talent in the region. It's been hugely successful for us in attracting, developing and retaining great team members.

### WD: We spoke last at length about VEKA's We Care, We Act, We Grow and corporate social responsibility. How does the Education Center tie all of this together?

JP: The Education Center is an important part of our commitment to deliver on the vision and values we have spelled out in We Care, We Act, We Grow: "We Act, to help our employees grow, personally and professionally in developing the most competent experts in the industry." ■

# Energy Starversion 7.0

What companies should know as they prepare for the October implementation of Energy Star Version 7.0

**BY LAURIE COWIN** 



The U.S. Environmental Protection Agency finalized the Version 7.0 Energy Star Specification for Residential Windows, Doors and Skylights on Oct. 20, 2022. The new criteria will go into effect on Oct. 23, 2023, with products meeting the new criteria eligible for early certification starting immediately.

This action is the result of a fouryear collaboration between the EPA, the U.S. Department of Energy and the Lawrence Berkeley National Laboratory that involved modeling the energy characteristics of a range of high-performing windows in different operating conditions. The Energy Star performance criteria for WDS are based on four different climate zones. Qualifying windows for the Northern zones must significantly lower the heat flow (U-factor) out of the house. Products made for the Southern zones must achieve a lower Solar Heat Gain Coefficient (SHGC).

Photo courtesy of ProVia

In a note to Energy Star Residential WDS partners and stakeholders dated Oct. 20, Doug Anderson, product manager for windows, doors and skylights, wrote, "The Energy Star Version 7.0 specification provides a significant jump in efficiency and savings and will recognize a good selection of types and



IMPROVED STANDARDS HAVE BEEN NEEDED FOR A LONG TIME. THIS WILL HELP WEED OUT MUCH OF THE POOR-QUALITY PRODUCTS AS THEY WON'T BE USABLE IN AREAS WITH THE MORE STRINGENT ENERGY CODE **REQUIREMENTS.**"

Source: 2023 Industry Pulse survey respondent

# Timeline FOR ENERGY STAR VERSION 7.0

### **EFFECTIVE IMMEDIATELY:**

manufacturers may elect to have their Certification Body (CB) certify their eligible products to the Version 7.0 requirements.

### APRIL 23, 2023:

CBs will be instructed to stop certifying new product submittals to Version 6.0. Note, however, that existing certifications will remain valid for purposes of Energy Star certification until Oct. 23, 2023.

### OCT. 23, 2023:

Any residential windows, doors or skylights manufactured must meet Version 7.0 requirements to be Energy Star certified and bear the Energy Star label.

Version 7.0 criteria revision will require that all partners update their product labels with a new map since the climate zones have changed to match the International Energy Conservation Code and reflect the changing climate patterns. The EPA has also updated the label layout, provided a bilingual Spanish-English label option, and updated the spine labels.

### **Market saturation**



MY CUSTOMERS ARE SAYING THEY DON'T CARE ABOUT THE ENERGY STAR REQUIREMENTS AS MUCH AS BEING ABLE TO GET PRODUCTS. THE GOVERNMENT IS OUT OF TOUCH WITH REALITY."

Source: 2023 Industry Pulse survey respondent

styles of products offered by a variety of manufacturers at a range of price points. If all residential windows and doors sold in the United States were certified to Energy Star Version 7.0, the energy cost savings would grow to more than \$156 billion each year and more than 53 billion pounds of greenhouse gas emissions would be avoided annually."

### New data analyzation

Several new ways of analyzing WDS data were developed, including:

- The development of a new methodology for analyzing the National Fenestration Rating Council's Certified Product Directory, which contains thousands of product lines and millions of product options.
- An update to the energy modeling analysis performed by LBNL using the latest EnergyPlus software version and modeling, which was expanded to over 130 different U.S. locations.
- More than 280 different U-factor and SHGC combinations were modeled for each location and the results were combined by climate zone.

The resulting analysis required over 600,000 modeling runs.

### **Comments and changes**

The specification revision process involved several rounds of EPA proposals and formal comments from more than 60 stakeholders, including product manufacturers, utilities and energy-efficiency groups. Anderson expanded on several comments in his letter:

"EPA received several stakeholder comments on the Final Draft, which EPA had previously considered and replied to in full. EPA received a few additional comments that did not result in a change to the final criteria but are touched on below. One comment, however, did result in a change.

"Numerous stakeholders shared a common concern regarding the availability of efficient >  $\frac{1}{2}$ -Lite doors. EPA reevaluated its data and confirmed low availability for this subcategory of doors. As such, EPA made a very modest adjustment to the North/ North-Central zone U-factor requirement for >  $\frac{1}{2}$ -Lite doors moving it from = 0.25 to = 0.26. This change will allow a greater selection of >  $\frac{1}{2}$ -Lite doors to qualify.

"EPA received comments from several stakeholders suggesting that the window criteria for the North-Central zone be made less restrictive by raising the U-factor from = 0.25 to = 0.26. EPA considered this request but decided not to proceed as EPA's analysis showed that a good selection of window products is currently available at the = 0.25level, the majority (over 60 percent) with dual glazing.

"Lastly, a few stakeholders raised a spacer modeling issue and requested an easing of the criteria. While the issue is unfortunate, several alternative approaches exist in the market that can be used to achieve equivalent or better performance. Therefore, no adjustment is warranted." Industry response appears to be split between those that think the changes required are unattainable due to high costs or lack of access to technology, and those that believe the new Energy Star requirements will serve as the push the industry needs to take performance to the next level.

"We've heard a mixed bag of responses," says Steve McDowell, residential program manager, National Fenestration Rating Council. "Some of the more aggressive and larger manufacturers want this so they can differentiate their products; it gives them the edge because they have the ability to plan accordingly. But we've also heard from smaller manufacturers that are concerned about what it means from a production process." McDowell reiterates, however, that NFRC is an impartial certification body and that its job is to ensure manufacturers meet requirements-not to get in the middle of what it takes to get there.

The new Energy Star is attributable in part to the market saturation of Energy Star products; EPA data from 2020 shows 85 percent of residential windows, 79 percent of hinged entry doors, 83 percent of all patio doors and 72 percent of skylights meet the current requirements. He says the new release is a combination of market saturation plus the amount of time it's been since the last version was released. "The idea is that [the new standards] drive innovation and change," he explains.

Dean Martin, architectural engineering manager, ProVia, sees pros and cons to the new Energy Star. "One of the things I agree upon from the Energy Star perspective is the industry is so saturated with Energy Star products we do need a little push to enhance our products and try to overachieve what we're doing today," he says. "We're getting a little stagnant as far as what we can do. In that aspect it's good we're seeing new numbers from Energy Star."

That said, Martin calls some of the changes "pretty aggressive" that will require companies to change a lot of what they currently do, especially with vinyl windows in the Northern zones.

# Zone changes

Energy Star Version 7.0 will change zones to match the IECC and reflect changing climate patterns. McDowell says the EPA made this change to align itself more closely and create continuity with the IECC.

### Current climate zones



New climate zones



## Technology to meet performance requirements

"Energy Star 7 for vinyl windows is easily achievable using triple-glazed IGs," says Kevin Seiling, vice president of engineering, Veka North America. "To achieve Energy Star 7 with dual-glazed IGs, you have to work much harder by taking into consideration the climate zone, operator type, glass spacer, gas fill and reinforcing. As window systems have long lifecycles, any new system should be designed with a minimum of one 1-foot-eight-inch IG to allow for triple glazing to achieve Energy Star 7 Most Efficient and Energy Star 8, if and when it publishes."

McDowell says various systems on the horizon could enhance efficiency as well, including vacuum insulating glazing, thin triples or BIPV. See page 46 for a more in-depth look at some next-generation glass solutions.

Martin anticipates the solar heat gain requirements will push ProVia into a triple-pane IG unit. Ongoing glass shortages could make that a challenge, but Martin says the company will "do

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MORE ATTENTION NEEDS TO BE PAID TO THE DYNAMIC/SMART GLASS OPTIONS WHEN CREATING A STANDARD. CONVENTIONAL GLAZING CANNOT CONTINUE TO BE THE BENCHMARK WITH TECHNOLOGY IN THE MARKET THAT CHANGES EVERYTHING."

Source: 2023 Industry Pulse survey respondent



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everything we can to maintain that Energy Star status." He also shares Pro-Via has a lot of hollows in its window frames, which lends more insulating value. "From the frame side technology, we're pretty close to being where we need to be without modifying the frame materials. It'll all be in glass," he says.

Doors also present challenges because of glass options and various requirements. "We have some ideas about how to improve our doors. I think we'll get there; it's just taking some time," Martin says.

Martin observes an industry-wide increased push for frame efficiency, which involves introducing more hollows with thermal breaks and thermal barriers. Filling hollows with foam could also be a tactic for increased efficiency. And, of course, different low-e packages will come into play. "I think in the Northern zone we'll need to look at a hard-coat, fourth-surface low-e," says Martin.

However, "there's only so much you can do with glass packages," adds Martin. "We've also looked into mixed gases, like a krypton-argon mix, if it makes sense to do it that way."

### ENERGY STAR 7.0:

# Making Intelligent Design Decisions

Maximize operations' bottom-line profitability and increase products' market share by making intelligent fenestration design decisions

### **BY ASHRAF HUSSEIN**



Since version 7.0 of the Energy Star eligibility criteria draft was released, the industry expressed concerns about the aggressiveness of the proposed requirements, how they may impact current product designs, and the depth of the associated productivity and financial implications these changes will have on window and door manufacturing operations. Now that Energy Star 7.0 eligibility requirements have been finalized, it is important we fully understand their impact. I will address this through this article, and others that will follow in the future. I will use comparative data analysis of existing window systems that were modeled and simulated to validate compliance with Energy Star 7.0 requirements after specific design changes have been made.

Using simulation and modeling, we debunk speculations and present a factual view of the possibilities to meet Energy Star 7.0 requirements cost-effectively, without hindering operations' productivity.

### Can we meet Energy Star 7.0 requirements using double-pane IGUs?

A lot of the industry focus recently revolved around whether triple-pane IGUs are the only way to meet the requirements. Many have attempted to answer that question. Some may have inferred that triple-pane IGUs are the only way to meet the criteria. Data adds more depth to the story.

It makes common sense that triple-pane IGUs should not be the first "go-to" option if a double-pane IGU can provide adequate performance to meet the new requirements. Triple-pane IGUs can be designed to provide exceptional thermal performance due to the presence of two IG cavities and three panes of glass. They can be the preferred choice when the products' targeted performance cannot be met with double-pane IGUs or if the cost of making the fenestration product with double-pane IGUs exceeds that of triple-pane IGUs due to the use of special product treatments or components.

One of the trade-offs when using triples is the production time, which machinery can help address. Additional trade-offs when trying to use triples as a direct replacement for an existing window include their weight and size. They are heavier and may require upgrades to the sash, the frame and the sash lifting components in the case of double-hung and single-hung windows. Sash and



GED reports its Automated Tri-Lite Assembly System (ATLAS) can produce up to three triples per minute or six doubles per minute.

frame upgrades typically require retooling, which makes changes time-consuming and costly to manufacturers.

Our data shows that some dual-pane IGU configurations can be used to meet Energy Star 7.0 requirements.

### Focus on the equal performance method

The Energy Star 7.0 eligibility criteria for the Northern climate have a prescriptive method and an equal performance method. Unlike the prescriptive method, which calls for the lowest U-value of 0.22 Btu/h-ft^2-F, the equal performance method uses both U-value and SHGC criteria to meet requirements. This distinction is especially beneficial in the case of dual-pane IGU design considerations.

Although all window components play a role in dictating a window system U-value, not all components contribute to the overall system U-value equally. Glass plays the dominant role in fenestration products' performance. Glass manufacturing technology advancements enable us to meet the U-value and SHGC requirement of Energy Star 7.0 with double-pane IGUs. Other consideration factors are the type and concentration of noble insulating gas, spacer type, overall windows and door extrusion

## Windows

Climate Zone	U-Factor1	SHGC2	Perscriptive
Northern	≤ 0.22	≥ 0.17	Equivalent
	= 0.23	≥ 0.35	energy performance
	= 0.24	≥ 0.35	
	= 0.25	≥ 0.40	
	= 0.26	≥ 0.40	

Source: energystar.gov / EnergyStar 7.0 residential windows requirements

designs, reinforcement type(s), and whether framing members use spray foam or foam inserts selectively.

Effective product design efforts should be focused on meeting today's challenges and energy requirements considering true and tested available technologies at the most cost-effective rational—not the challenges of a decade from now at the expense of today's cost premiums.

This means manufacturers' products that meet the 0.26 U-value and  $\ge 0.40$ SHGC are technically the same as the ones hitting the 0.22 U-value. The obvious difference lies in the cost and the amount of product and process changes required.

## Summary of data from a simulation case study

The case study used a dated, double-hung window system that existed for more than 15 years. This window system was selected because it represents a wide base of average-performance, vinyl, double-hung windows in the market.

The window system used a doublepane IGU with Intercept Ultra spacer and a passive solar control glass on surface 2 and a 4th surface low-e on surface 4. The IGU had a 5%-inch cavity and an overall under 7%-inch with a 95-percent argon fill.

- The IGU center of glass U-value came at 0.212 Btu/h-ft^2-F and an SHGC of 0.636.
- The overall product U-value came at 0.24 Btu/h-ft<sup>2</sup>-F, and 0.49 SHGC, making it eligible for Energy Star 7.0.

### Takeaways

- Utilize glass technology advancements to your advantage and make sure the most recent LBNL insulating glass database is used to obtain the most recent glass types.
- Using a passive solar control glass on surface 2 and a 4th surface low-e on surface 4 will yield a low U-value and a high SHGC combination that has a high probability of meeting the Northern Energy Star equivalent performance eligibility requirements.
- Choose design elements carefully to achieve Energy Star 7.0 eligibility without sacrificing manufacturing capacity or pushing the limits of production costs.

In upcoming articles, I will address other fenestration product design considerations and reveal their advantages and disadvantages, and expand on improving production efficiency for volume-centric IG production operations. This article, and the upcoming ones, are intended to serve the interest of the industry and its customers by providing manufacturers with facts that allow them to cost-effectively make the best products. ■

Ashraf Hussein is IG product marketing manager for GED Integrated Solutions.







#### Clockwise:

Aluminum extrusion products on a rack after the extrusion process. Credit: PGT Innovations; An employee works on a product of aluminum extrusion. Credit: PGT Innovations Products of aluminum extrusion. Credit Keymark Corp.



# ALUMINUM EXTRUSIONS

### THE WHY, HOW AND WHAT

ALUMINUM CAN MEET MANY GOALS, INCLUDING THOSE AROUND SUSTAINABILITY, RECYCLABILITY AND DESIGN

> BY RACHEL VITELLO

Aluminum extrusions are aluminum products, which can include window and door components such as frames and panels as well as automobile parts and other uses, manufactured by pushing the aluminum through a die to create the desired shape or form.

#### How are they made?

Before this can happen, however, aluminum in the shape of a log is heated to around 900 degrees Fahrenheit to make it malleable. After being cut into smaller pieces called billets, it is then forced through the die using a hydraulic ram that uses about 3,600 tons of pressure. Afterward, the aluminum extrusion cools to room temperature on a cooling table or rack.

Keymark Corp., a U.S.-based, full-service, aluminum extrusion company, has its own homogenizing oven at its Fonda, New York, facility where aluminum logs go through a homogenization process to get rid of any impurities. This extra step aims to provide customers with what the company dubs a "premium quality product" for their aluminum extrusions.

According to Brent Slaton, national sales coordinator, Keymark, the oven aims to eliminate residual stress produced during casting and improves metallurgical results. After being homogenized, internal elements of aluminum billet are consistent. The homogenizing process features less mold consumption and improved surface quality of the billet. It goes through the homogenizing oven after casting and before the extrusion process. Slaton says it is a crucial unit for enhancing the quality of aluminum profiles.

"In a way, aluminum extrusions are similar to Play-Doh presses. You put Play-Doh in it, squeeze the lever down, and you get a star, or a square, or a bar. It's the same exact thing, just on a grander scale using aluminum," says Scott Condreay, architectural engineering manager, Hydro Extrusion North America, a global company that specializes in custom aluminum extrusions.



**Top:** A die that aluminum would be pushed through. Credit Keymark Corp. **Bottom:** An aluminum log being feed into a heater. Credit: Keymark Corp.

#### Indicators for aluminum extrusions

Sustainability is a huge draw for aluminum extrusions. Unlike vinyl and steel, which can be recycled one or two times, aluminum is infinitely recyclable. According to The Aluminum Association, nearly 75 percent of all aluminum ever produced is still in use today. In most industrial markets, like automotive and building, recycling rates for aluminum exceed 90 percent. Recycled aluminum saves 95 percent of the energy needed to make new aluminum.

Condreay says Hydro purchases post-consumer scrap for its aluminum extrusions, so the company is making a less significant impact on the environment. Aluminum hardly makes its way to landfills, with the ability to continuously resell scraps.

"Aluminum is lightweight, it's corrosion resistant, it's very resilient. The strength-to-weight ratio is great. It's non-combustible and non-toxic compared to other materials," says Slaton.

"One of the other biggest benefits of aluminum extrusions is the array of colors you can achieve. The spectrum is endless; you can get any color under the rainbow whereas some of the other competing materials are limited as to pigments and colors they can achieve. With aluminum, you can anodize it, paint it—both wet and powder—and you can achieve high gloss and low gloss," continues Slaton.

Aluminum has a higher yield strength and typically a longer product life. The cradle-to-cradle sustainability factor of aluminum is infinite when recycled without degradation of properties, according to Slaton.

One of aluminum extrusions' limitations is its high conductivity. Aluminum allows for greater amounts of heat loss in buildings because it is more difficult to weld and fuse corners, whereas it's easier to do so with vinyl.

However, Dean Ruark, vice president of engineering, PGT Innovations, says that new technology is helping solve that issue. Special thermal breaks can now allow aluminum to be used in buildings in colder climates. After attending the most recent International Builders' Show in Las Vegas in early February, Ruark says he's seeing a resurgence of aluminum within the industry because of this. With these new gadgets, aluminum is beginning to meet energy codes in colder climates.

PGT Innovations manufactures aluminum impact-resistant windows and doors. To make these, the aluminum must first be extruded to make everything from the sill to the frame, sash, panel, and even more components. PGTI works with an aluminum extrusion company to create dies specific to its products.

"Aluminum is also great for narrow sightlines. There's a huge trend right now of all glass and unobstructed views, aluminum is great for that because of its ability to be extruded into many shapes. It's really limitless what an architect can do with that product," says Ruark.

ONLINE BONUS CONTENT Visit WindowandDoor.com to see aluminum window products.





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**RIGHT:** Insulated triple glazing at cross-section.



GLASS SOLUTIONS FOR SUPERIOR THERMAL EFFICIENCY AND ENERGY GENERATION

BY KATY DEVLIN, TARA LUKASIK AND RACHEL VITELLO



# NEXT-LEVEL

# PERFORMANCE

UILDINGS ACCOUNT FOR AN ESTIMATED 40 PERCENT OF THE PROBLEM OF GLOBAL CARBON EMISSIONS, WITH BUILDING OPERATIONS ALONE PRODUCING 27 PERCENT OF TOTAL EMISSIONS, ACCORDING TO ARCHITECTURE 2030. GLASS CAN BE A CRITICAL COMPONENT IN ADDRESSING OPERATIONAL CARBON EMISSIONS BY REDUCING ENERGY USE IN EXISTING AND NEW BUILDINGS, SAYS STEPHEN SELKOWITZ, PRINCIPAL OF STEPHEN SELKOWITZ CONSULTANTS AND AFFILIATE AT LAWRENCE BERKELEY NATIONAL LABORATORY. →

**Editor's Note:** This article is adapted for Window + Door from Glass Magazine as part of its All About Glass & Metals series for the architectural community. This article spotlights thermal glass products, including improved IGUs, vacuum insulating glass and thin-glass solutions. Of note, high-performance framing systems are crucial to whole-system performance—a high-performance IGU in a poor-performing frame will result in an underperforming glazed system. This article focuses just on advanced performance technologies in the glass unit itself. Visit GlassMagazine.com for the full original article. A recent study from Glass for Europe emphasized the difference highperformance glazing can make:

- Replacing all existing windows with "readily available high-performance glazing" by 2030 would cut annual energy use by 29 percent and annual carbon emissions by 28 percent.
- Replacing all existing windows with "improved high-performance glazing" by 2050 would cut annual energy use and carbon emissions both by 37 percent.

But there is more than just energy savings and climate benefits driving the use of higher-performing glass technologies.

The recently published Energy Star Version 7.0 greatly increases thermal performance requirements for windows. Meeting the more stringent performance thresholds in the Northern Climate Zone, which covers about 40 percent of the U.S., will require the most advanced double-glazed insulating glass units or, more likely, triple- or quad-glazed IGUs, says Stephen Selkowitz, principal of Stephen Selkowitz Consultants. "We will need about 10 to 20 million triple-glazing units per year," he estimates. (Editor's note: See page 36 for a closer look at Energy Star Version 7.0 and what it means for the residential fenestration industry.)

The Inflation Reduction Act of 2022 includes numerous provisions that will drive performance improvements in buildings. According to Tom Culp, technical code consultant for the National Glass Association and owner of Birch Point Consulting LLC, the IRA includes \$1 billion in state and local government grants intended to accelerate adoption of the latest energy codes and a zero-energy code. The IRA also includes home and building energy-efficiency tax credits, including credits for doors meeting Energy Star requirements and for windows certified to the Energy Star Most Efficient program.

ASHRAE 90.1, state stretch codes and the in-process 2024 International Energy Conservation Code also include language that sets stringent performance requirements.

### PRODUCT 01

### **Advanced IGUs**

BASICS: Widely used in commercial and residential construction since the 1960s, IGUs consist of two or more lites of glass separated by a hermetically sealed air space to provide thermal, sound and solar insulation. Advanced IGUs offer additional performance improvements through methods such as filling the air space with gas, using warm-edge or other higher thermal performance spacers, or adding additional lites (and thus additional cavities) to the unit. For better solar control, low-emissivity coatings can be added to the No. 2 surface, and now, thanks to advancements in coatings, the No. 4 surface, of a traditional double-glazed unit.

**PERFORMANCE:** Highly insulating glazing solutions—doubles with improved spacers and two low-e coatings, or multi-cavity units—will likely be required to meet the more stringent energy codes and standards, says Culp.

The updated Energy Star requirements will also pose challenges. In the previous version, about 80 percent of the residential window market met the 0.27 center of glass U-factor requirement for the Northern climate. The new Energy Star 7.0 moves that number to a U-factor of 0.22. Only the very-best-performing double-glazed units currently on the market would be able to meet the new requirements, Selkowitz says. "For the



first time in 20 or 25 years, we're having to take a hard look at that standard double-glazed, argon-filled, low-e unit."

**DEVELOPMENT:** According to Ducker Worldwide, IGUs account for about 80 percent of the residential market; however, multi-cavity IGUs represent only about 3 percent of the market share for residential glazing. The global insulating glass window market is projected to reach U.S. \$17.2 billion by 2026, growing at a compound annual growth rate of 6.1 percent from 2021 to 2026, according to ResearchAndMarkets.com. The growing trend of green rating systems in various countries is likely to contribute to the growth of the insulating glass window market, with North America projected to be the largest regional market.

The insulating market has also become more complex with the addition of several emerging insulating glass technologies, including vacuum insulating glass, thin-glass multi-cavity IGUs, IGUs with suspended film and units with Aerogel in the cavity.

**CHALLENGES:** The North American insulating glass market has faced challenges moving beyond traditional double-glazed units. Traditional multicavity IGUs, while popular in Europe, have gained only minimal traction in the U.S. "There are obstacles to triple pane. Many manufacturers say it is too heavy, too wide, too expensive. It has long ROIs," says Selkowitz.

Although krypton gas-filled insulating units had gained popularity in recent years as a higher-performing gas option for IGUs, high demand for the gas in the communication sector has spiked the cost of krypton and, because it is largely sourced from Ukraine and Eastern Europe, it is difficult to access, says Selkowitz.



**LEFT TO RIGHT:** Ubiquitous Energy solar panel project in Boulder, Colorado (Photo courtesy of Ubiquitous Energy); residential project in Shaanxi, China, with laminated LandVac VIG from LandGlass in the windows and skylights (Photo courtesy of VIG Glass Technologies); and a quadglazed IGU with two interior thin-glass lites from Alpen Windows.

### PRODUCT 02

### Building Integrated Photovoltaics

**BASICS:** Building-integrated photovoltaics are solar energy-generating systems incorporated into windows, façades, canopies, skylights and more. Glass is an essential component in most BIPV products, protecting solar cells and modules while maximizing solar and light transmission.

**PERFORMANCE:** BIPV meets the requirements for sustainability and integration of alternative sources of energy. Growing the use of onsite renewable energy is critical to achieving net-zero energy and carbon targets and will also help increase grid resiliency and U.S. energy independence, according to the NGA document "High-Performance Glazing Promotes Building Resiliency."

**DEVELOPMENT:** Coming to fruition in the 1990s, the evolution of BIPV technology in recent years has helped it become more mainstream, says Jemssy Alvarez, product manager, Vitro. Alvarez expects to see BIPV in more places in and around buildings as owners and architects look to more sustainable energy sources. Additionally, industry manufacturers have developed BIPV products that offer a range of aesthetic options for designers, including transparent or near-transparent BIPVs.

"Transparent solar window products are aesthetically pleasing and energyefficient windows. They look and function like traditional windows, but also double as renewable energy generation sources that help provide clean electricity to the home or building," says Veeral Hardev, vice president of strategy, Ubiquitous Energy.

Ubiquitous Energy is in the early commercialization phase

with transparent solar window products, says Hardev. "We are currently building our first highvolume transparent solar window manufacturing facility here in the U.S. We expect that this facility will start producing window units as large as 5 feet by 10 feet in 2025," says Hardev. "These window units will be sold into the residential and commercial markets directly through our partners, including [Andersen Windows & Doors], as well as commercial building developers and contractors."

**CHALLENGES:** Alvarez says it's hard for BIPV to compete with the pricing of what someone will pay in electricity. "However, in time, the cost of energy isn't going to get any cheaper and at some point, there's going to be a parity between what you can do with these renewable sources and what it will cost you from the standard," he says.

### RESOURCES

# 01



#### Advanced IGUs

The NGA published the Performance Improvements in IGUs glass technical paper in 2016 and updated it in 2022.



#### Additionally, watch a webinar from Selkowitz discussing the latest IGU technologies, and the research and development still in progress.



#### Building Integrated Photovoltaics

The NGA developed the Glass Properties Pertaining to Photovoltaic Applications as a primer on the role of glass in PV, including the types of glass used, and the roles of glass as both a cover or backing for PV.



### Vacuum Insulating Glass

The NGA developed the Vacuum Insulating Glazing glass technical paper to offer guidance on VIG market applications, performance and size applications.





#### **Thin Glass**

Tom Culp details the resilience and energy-efficiency considerations of using thin triples in this piece for GlassMagazine.com.

# Keeping up

WITH HIGHER-PERFORMING GLASS TECHNOLOGIES

### PRODUCT 03

### Vacuum Insulating Glass

**BASICS:** In vacuum insulating glazing, or VIG, two glass panes are hermetically sealed together around the edges, separated by micro spacers, and the air between the glass panes is extracted. The vacuum minimizes conduction and convection heat losses, lowering the U-factor at a very thin cavity depth.

**PERFORMANCE:** VIG's overall insulating performance rivals that of traditional windows with an R-value of 10, approaching a properly insulated wall rated at 12 or higher, says Daniel Sutton, product manager for Vitro Architectural Glass.

"Historically speaking, the insulating value of windows has been dramatically less performing than a wall with insulation," he says. "With vacuum insulating glazing, now you're leveling the playing field in terms of the insulating performance that is roughly on par with wall insulation."

**DEVELOPMENT:** "Where VIG is going, it's now getting into bigger sizes with architects and designers. The bigger the size, the bigger the windows, the better we can get more natural light in," Sutton explains. Additionally, manufacturers will begin moving toward temperature/ heat-strengthened glass because of its versatility, Sutton says.

**CHALLENGES:** VIG comes with some fabrication challenges. According to NGA's technical paper on VIG, the units are limited in size. Units must have at least two 90-degree corners and shapes are limited to fairly simple parallelograms or simple arcs. VIG is

also not available as bent glass.

Sutton says another limitation with VIG is its dependence on what low-e coating is used within the vacuum space; hopefully, as the technology evolves there will be more freedom to use different high-performing, low-e coatings to meet different energy restrictions or energy code mandates.

There is limited North Americanbased domestic sourcing for VIG, so access and cost can be a challenge. Sutton says Vitro hopes to mitigate this in the future and begin VIG manufacturing in the U.S.

### PRODUCT 04

### Thin Glass

**BASICS:** The glass industry is looking to thin glass—generally considered any





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glass less than 1.6 millimeters thick—in two key applications to improve window system thermal performance. First is the use of thin glass used as interior lite or lites in multi-cavity IGUs. The second, more recent, application is thin glass in window retrofit systems.

Thin glass is produced in two methods: horizontal float soda line (a process NGS Group uses) and vertical fusion drawn boro-aluminosilicate (a process Corning uses).

**PERFORMANCE:** When used in a multicavity IGU, thin glass allows for large thermal performance improvements without adding much weight. Also, because thin-glass IGUs are thinner than traditional multi-cavity IGUs, existing frame systems can accommodate them.

"With the thin triple, you get about an R-8 center of glass," says Selkowitz. "And if you have a slightly larger and wider glass package, you can add two pieces of thin triple glass (making a quad IGU) and get R-14 center of glass."

**DEVELOPMENT:** Selkowitz invented thin-glass triple glazing in the late 1980s, achieving an invention registration in 1991. However, "no one wanted triples back then and thin glass didn't exist," Selkowitz says. Then came the fast emergence and growth of smartphones and flat-screen televisions in the 2000s, which created a new market for thin glass.

Today, thin glass is readily available and affordable. "There is a whole industry out there that knows how to make, cut and transport thin glass. It's a pretty fast learning curve to bring this to industry," Selkowitz says.

Alpen High Performance Products has produced thin-glass, multi-cavity IGUs in North America for several years, says company President Brad Begin. The company began working with the U.S. Department of Energy on developing thin-glass triples for commercial use in 2018. By 2019, it launched it as a product offering following extensive testing and field validation. By mid-2023, the company expects to pass 1 million square feet of thin-glass products sold into the market for commercial and residential applications.

"Thin triples are at niche volume now, but [the technology] has the potential to be more mainstream," says Selkowitz. "From the technology side, there is nothing to hold it back. The price is fine. The handling is fine. What's needed is the market pull side."

**CHALLENGES:** "The one thing you can't do with thin glass is temper it," says Selkowitz. However, there is ongoing research in the industry to address tempering issues and Begin notes the industry has "six different market-ready solutions that solve the issue."

The thin-glass industry has also been limited by size, though Begin says Alpen sources thin-glass sheets that are typically 50 to 60 square feet, with access to sizes of 70 square feet or larger. ■



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### 01 / ODL Inc.

New door glass designs include Margate, Vilano (pictured), Bay Point and Edgewood, all of which are available in impact and non-impact glass. ODL also rates its privacy glass by using a spectrophotometer to measure the amount of light able to pass through designs. The series has four privacy levels of low, medium, high and maximum. 800/253-3900 | ODL.COM

### 02/ Kolbe Windows

Kolbe's VistaLuxe Collection is suitable for contemporary designs that utilize large expanses of glass. The VistaLuxe line offers casements, awnings and direct sets that achieve IPD3 certification as well as outswing, complementary folding and sliding doors that achieve IPD4 certification. **715/842-5666 | KOLBEWINDOWS.COM** 

### 03 / LaCantina Doors

The LaCantina V2 Folding Door features 2 <sup>1</sup>/<sub>4</sub>-inch stiles and rails, hidden hardware, and panel sizes up to 4 feet wide and 12 feet tall. The locking system automatically engages when closing the door. An aluminum exterior is available with an interior finish choice of aluminum or real wood. Dual-glazed, tempered glass is standard. **888/221-0141 | LACANTINADOOR.COM** 











### 04 / Schlage

The Schlage Encode Smart Lever is designed to work with standard, single bore-hole doors. The Schlage Home App enables remote access to the lock and can let homeowners create and manage up to 100 access codes, set schedules, see realtime activity logs, and control their lock via voice through integration with smart home technology. 888/805-9837 | SCHLAGE.COM/EN

### 05 / Simpson Door Co.

Simpson's dog doors are made with heavy-duty aluminum frames and shatter-resistant, K9 composite, saloonstyle panels. Each panel features highdensity, industrial weatherseal to help mitigate air conditioning and heat loss. To accommodate dogs of all sizes, Simpson's latest offering is available in three sizes. 800/952-4057 | SIMPSONDOOR.COM

#### 06 / Cornerstone Building Brands

Ply Gem Perspective is a multi-slide vinyl patio door. The invisible T-lock design is intended for high-performance, high velocity hurricane zones and Missile D impact-resistance ratings. Frame corners are assembled with an offset fastening pattern, says the company. Pocket, bypass and biparting configurations are available. **281/897-7788** | CORNERSTONEBUILDINGBRANDS.COM

### Products





01

### 01 / Weather Shield Windows & Doors

The all-aluminum VUE collection includes the multi-slide door, casement and direct sets, and a hinged patio door (pictured). The multi-slide door has 2 ½-inch stiles thermally enhanced with polyamide thermal breaks and standard panel sizes up to 6 feet by 12 feet. The casement windows have a 320-pound weight capacity and can support windows up to 10 feet high. The patio door, meanwhile, has an internal sill drainage and a molded sill end cap.

800/222-2995 | WEATHERSHIELD.COM

### 02 / PGT Innovations

Diamond Glass, produced in collaboration with Corning Inc., is a laminated glass that weighs up to 45 percent less and is three times more scratch resistant than traditional laminated glass, says the company. It can be used for laminated or laminated insulated windows and doors, and the company will be the exclusive supplier of impact-resistant windows and doors featuring Diamond Glass for residential and mixed-used buildings in the U.S.

800/282-6019 | PGTINNOVATIONS.COM

### 01/VBH

VBH is supplying the Mantis 4 locks from Yale. The locks suit PVCu single and double doors, and there is a composite door variant with a 20-millimeter radius end faceplate. Mantis's combination locking points pair a substantial chamfered hook and a tapered linear bolt that provide a smooth locking action. This is aided further by the inclusion of adjustable roller cams on variants for PVCu doors. These combinations lock in to newly designed one piece keeps or 'multikeep' individual keeps, to provide resistance to pull out, thanks to the positioning of the screw fixings. +(44) 1634-2632-63 | VBHGB.COM



#### 02 / UAP

UAP's Fullex Key Wind Lock is designed specifically for doors with fixed handles and is suitable for composite and timber doors. It uses a key or thumb turn to engage and retract the bolts and latch. Once the door is closed, the latch can't be operated without the key. In addition, UAP has developed a matching escutcheon, providing the option of a full, cost-effective system, including a pull handle, Key Wind Lock, high security escutcheon and 1 Star cylinder.

+(44) 1617-96 72-68 | UAPCORPORATE.COM

### 03 / Roto North America

HPD1 is a hinged patio door locking system that supports taller doors between 6 feet and 10 feet in height and includes three kinds of active locking points: 3-point tongues, 3-point shootbolts, and 5-point tongues and shootbolts. It comes with 35 or 45-millimeter backsets with a 60-millimeter backset under development, a 1-inch deadbolt and a reversible mishandling device to prevent damage to the door frame. **860/526-4996 / ROTONORTHAMERICA.COM** 

### 04 / Guardian Glass

ClimaGuard 70 glass is part of Guardian's effort to deliver new high-performing products that offer advanced coating solutions in anticipation of codes such as Energy Star Version 7.0 and International Energy Conservation Code 2021 that drive energy conservation in residential buildings. It has a visible light transmission of 69 percent and solar heat gain of 0.35 and its center-of-glass 0.24 U-factor aims to help homes manage solar heat in warmer months and provide thermal insulation in cooler months.

855/584-5277 | GUARDIANGLASS.COM

04

# 



#### STAY CONNECTED // Keep up with the latest people announcements at windowanddoor.com/people



Johnson

Marvin appointed Rick Johnson as the company's first-ever chief digital officer. Johnson joins the company's senior

leadership team and will oversee the design of Marvin's future-state enterprise technology and digital strategy, as well as its data and analytics initiatives.

Marvin also announced leadership promotions for its marketing, sales and product management teams. *Malorie Drugg* was promoted to vice president of marketing, *Tim Kasten* was promoted to vice president of sales and *David Goulet* was promoted to vice president of research and development and product management.



Jackson

### **PGT Innovations**

announced that President and CEO *Jeff Jackson* was elected board chair of the Sarasota Manatee Airport Authority board, a public

agency that operates and manages the Sarasota Bradenton International Airport.

PGTI also announced several executive promotions that aim to support the company's strategy to grow organically and through acquisitions.

- *Mike Wothe*, promoted to executive vice president of operations.
- Debbie LaPinska, promoted to chief customer officer with responsibilities for sales and marketing.
- *Rachel Evans*, promoted to senior vice president of human resources.
- Bob Keller, promoted to senior vice president of research and development, product innovation and technology.

- Eric Kowalewski, promoted to president of operations, Southeast region.
- Mark Yeandle, promoted to president of operations, Western region.



**ODL Inc.** promoted *Andy Arnsman* to the newly created position of director of sales, Pro Channel. A member of the ODL team since 2002, Arnsman

Arnsman

has experience across the organization, including buying, finance and most recently as a regional sales manager for the Pro Channel. In his new role, Arnsman will manage a team of seven, serving the needs of residential and multi-family builders through wholesale distribution across North America.



Tuanama

Interlock USA promoted Angel Tuanama to vice president of sales. Tuanama joined Interlock USA in 2006 as sales manager for Eastern North

America. Tuanama is now responsible for national and international accounts while leading a team of 10 sales managers across North America.



Fortune Brands Innovations Inc. has elected Stephanie Pugliese as a Class III member of the Board of Directors, for a term

expiring at the company's 2023 Annual Meeting of Stockholders. Pugliese currently serves as a member of the board of directors of Cooper's Hawk Winery and Restaurants, a privately held restaurant company.



Jeff Fochs has been named regional sales manager for **Tubelite**, serving the Northwest and Southwest. Together with his team of client

development managers, Fochs works with commercial architects, glazing contractors and building project teams to provide consultative support regarding Tubelite's architectural aluminum storefront, curtainwall, entrance, window and daylight control systems.



Linetec hired Joshua Chapple as its Northwest regional sales manager assisting customers with their selection and specification of paint

coatings, anodize and specialty finishes for architectural aluminum products. Headquartered in Wisconsin, Chapple focuses on customers in Iowa, North Dakota, South Dakota, Montana, Idaho, Wyoming, Nebraska, Colorado, Utah and Kansas.

Window + Door has a new team of media sales consultants. *Emily Thompson*, publisher, Window + Door and Glass Magazine, will help leverage all the magazine brands, digital offerings, events, membership and sponsorship opportunities. *Chris Hodges*, senior sales consultant, will handle the West, Midwest and some accounts in Ohio and the Eastern U.S. *Tristan Scoffield*, sales consultant, will take care of the Eastern and Southern regions. ■



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# FrameWork



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Photo: Peter Vance, Wausau, Wisconsin

## Symmetry Meets Style windows and doors help a wisconsin home achieve its design goals

Project: Fotsch Residence; Wisconsin

**Products:** Ultra Series windows and doors from Kolbe Windows & Doors

**Description:** This 7,690-square-foot new construction home on a wooded Wisconsin lot is designed to command a sense of heritage and look like it was built 100 years ago. Windows are positioned so each room has a view in at least two directions so that

the homeowners can achieve their desire to always see "through and out to nature."

Project Team: ARCHITECT: Will & Fotsch Architects Inc. La Jolla, California; BUILDER: Limitless Builders Inc. Oconomowoc, Wisconsin; INTERIOR DECORATOR: Amy Carman Design, Wauwatosa, Wisconsin; KOLBE DEALER: Alexander Lumber, Twin Lakes, Wisconsin

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### Federal Window Tax Credits Benefit the Industry

By Michelle Blackston

The time could not be better for manufacturers to introduce more energy-efficient windows so that homeowners can upgrade their homes and benefit from new federal tax incentives that help offset the costs.

Manufacturers also reap the rewards when listing their window products in the right tool to guide homeowners through the process of finding and selecting an energyefficient window specific to their geographic region. The Efficient Windows Collaborative, powered by the National Fenestration Rating Council, connects consumers to manufacturers in one site for all-things windows.

In addition to homeowner tax credits, the Inflation Reduction Act provides for manufacturers. Check out the Advanced Energy Project Investment Tax Credit, or 48C ITC, that provides tax credits for manufacturing facilities that reduce greenhouse gas emissions by at least 20 percent, according to the Department of Energy. This includes measures such as improving efficiency, reducing waste, carbon capture, and adding low- or zero-carbon heat processes.

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