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TRENDS

MARCH 2019



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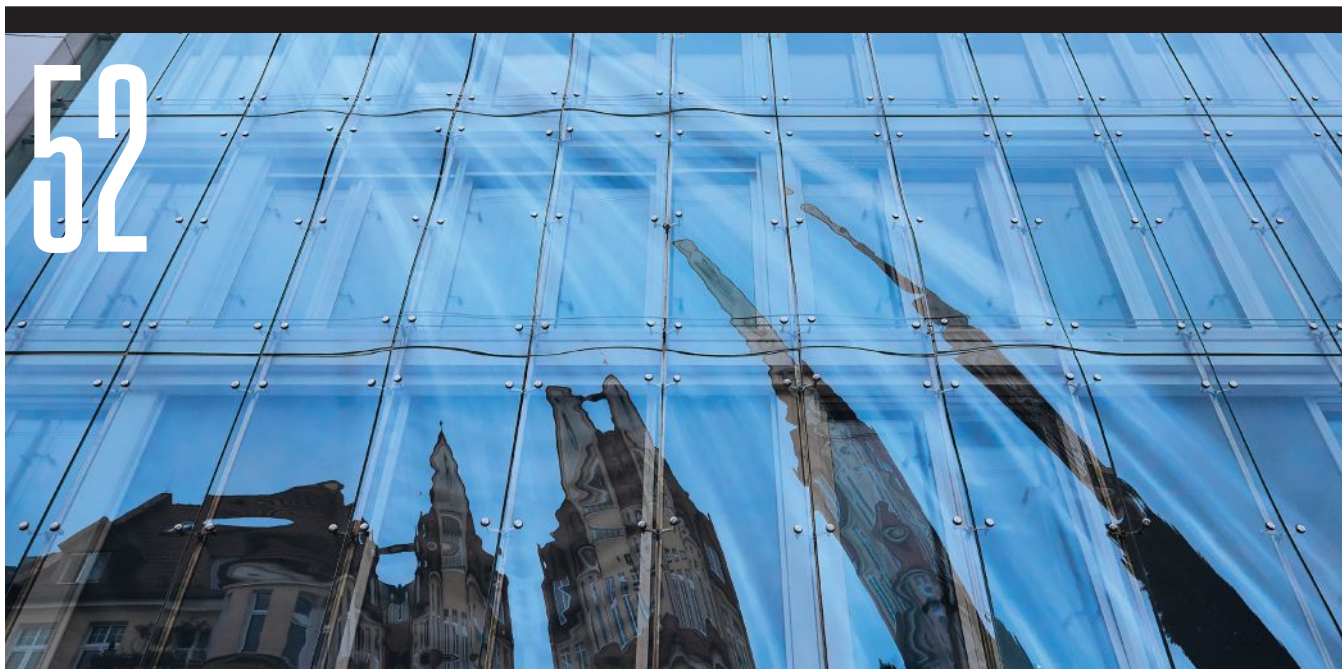
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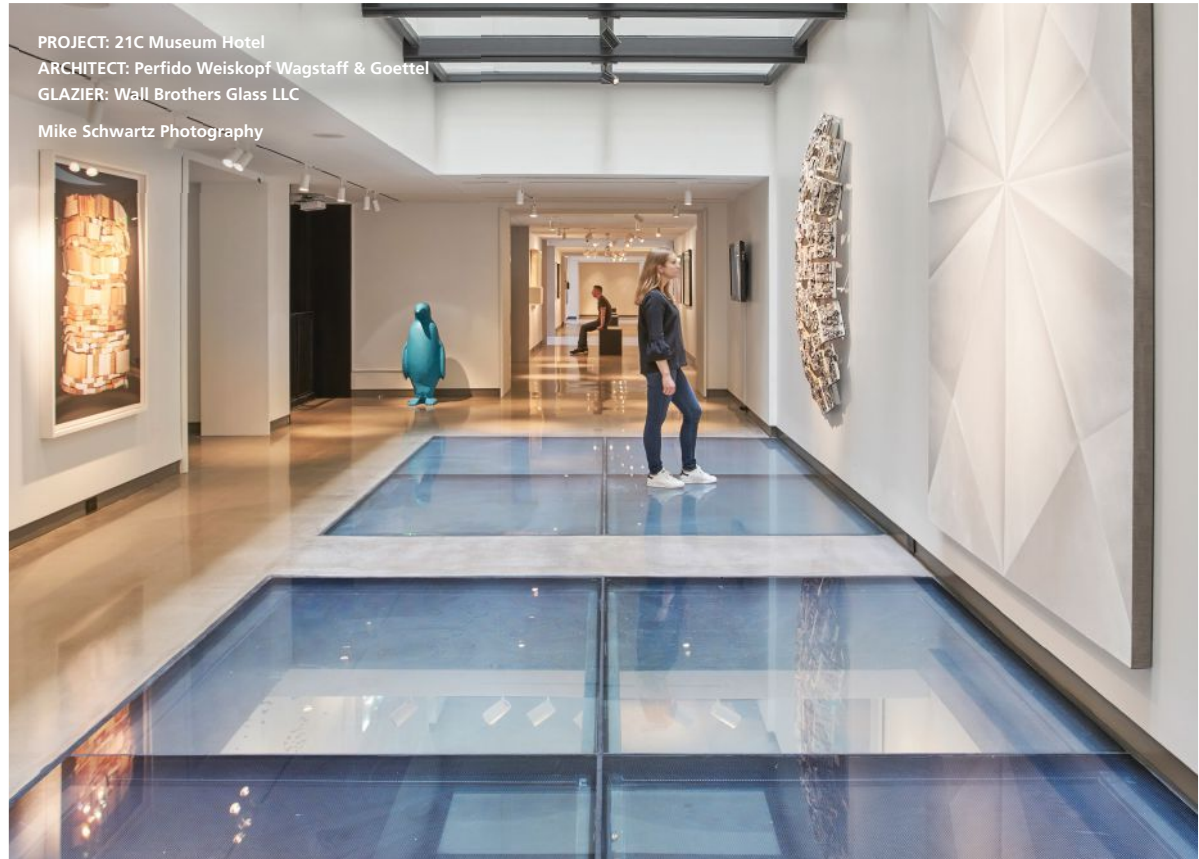
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**ON THE COVER:** Amazon's expanded headquarters in Seattle features an architectural glass canopy connecting the project's two new buildings. Inspired by the overlapping shapes of tree leaves and the patterns of light filtering through them, the canopy, "There is Another Sky," is located four stories above an outdoor plaza. The decorative canopy features a pattern imprinted on technographic interlayer film by Goldray Glass, goldrayglass.com, and then laminated between two lites of Starphire glass by Vitro Architectural Glass, vitroglazings.com. Artist Spencer Finch developed the pattern. "We love to collaborate with others on projects like Amazon to be able to create breathtaking artistry and combine it with the functional side of using glass in buildings," says Cathie Saroka, president, Goldray Glass. Photo courtesy of Goldray Glass.




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PROJECT: 21C Museum Hotel  
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GLAZIER: Wall Brothers Glass LLC  
Mike Schwartz Photography

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## BONUS ISSUE CONTENT

[GlassMagazine.com/March2019](https://www.glassmagazine.com/March2019)

### NEWS

Check out complete news coverage from the NGA Annual Conference

### STUDIES

Reference occupant studies for more information

### PRODUCTS

See more from bird-safe glass suppliers

## GLASSBLOG



**INDUSTRY EXPERIENCE**  
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**TECHNOLOGY**  
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**INDUSTRY FORECAST**  
**From the Fabricator: Predictions for 2019**  
By Max Perilstein, Sole Source Consultants

## GREAT GLAZING

Featured in e-glass weekly. To submit projects, write Wendy Vardaman at [wwardaman@glass.org](mailto:wwardaman@glass.org). **Pictured:** Life Sciences Building at University of Washington



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# THE SMARTER WAY TO CLOSE THE ENVELOPE

PROJECT: Mercy Virtual Care Center  
ARCHITECT: BatesForum  
GLAZING CONTRACTOR: NGG Ltd.  
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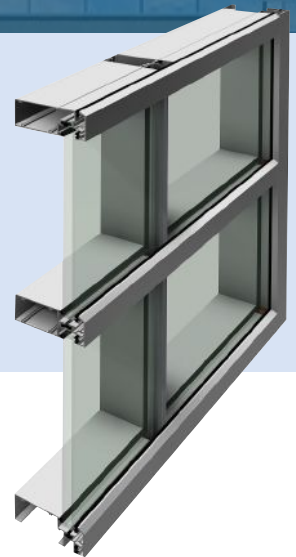
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A striking canopy of decorative glass connects the two office buildings of Amazon Phase VI in Seattle. The office complex earned LEED Gold certification. Photo courtesy of Goldray Glass.

## Next-Gen Green



**KATY DEVLIN**  
Editor-In-Chief  
kdevlin@glass.org

**B**uilding “green” doesn’t mean what it once did. A decade ago, energy efficiency and thermal performance encompassed much of the glass industry’s focus on green. Today, in order to compete in the green environment, industry suppliers must also consider sustainability, recyclability, occupant health, carbon footprint, integrated building performance, environmental impact and more.

“Knowing what is in a product, where it comes from, how it impacts inhabitants and the environment, and product performance are critical considerations,” says Andre Kenstowicz, national architectural manager, Vitro Architectural Glass, [vitroglazings.com](http://vitroglazings.com).

“There’s an increasing awareness throughout commercial construction about the quality of spaces and the real business benefits those spaces can provide,” says Joe Erb, commercial sales specialist for Quanex Building Products, [quanex.com](http://quanex.com).

For glass companies serving the green marketplace, it’s no longer enough to supply a product that meets U-factor and solar heat gain requirements. To meet the increasingly stringent green codes and certifications, industry companies are being asked to offer products and systems that maximize both building and occupant performance. And, they must be prepared to provide details about the health and environmental impacts of those products and systems.

In short, the next generation of green buildings requires the next generation of glass solutions.

This issue of Glass Magazine looks at the glass industry’s role in today’s high-performance, sustainable and occupant-centric green building industry. The feature article, “The Green Building Maze,” beginning on page 42, looks at the wide range of green building codes and certifications, and how they affect the glass industry. Pages 19-20 provide a closer look at the National Glass Association’s 2019 Annual Conference, where product transparency and new high-performance building requirements topped discussions; and on page 34, Quanex’s Joe Erb discusses the evolution of green building in the article “Looking Beyond Thermal Efficiency.”

For additional information on glass products to serve new green demands, check out the article on trends in dynamic glazing from Ryan Park of SageGlass, [sageglass.com](http://sageglass.com), on page 28, and the feature article on bird-friendly glass on page 36.

The glass industry already has solutions to next-generation green demands, and industry companies are constantly working to develop even more. Key to the industry’s success in today’s green marketplace is understanding evolving trends and requirements and educating stakeholders on glass’ role in meeting those needs. ■

A handwritten signature in black ink that reads "Katy Devlin". The signature is written in a cursive, flowing style.





## Pilkington MirroView™

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### Oldcastle BuildingEnvelope Divests from its Antamex Subcontracting Business

On Jan. 3, Oldcastle BuildingEnvelope, obe.com, part of CRH’s, crhamericas.com, Building Products Division, completed the divestment of Toronto-based Antamex International, OBE’s fenestration subcontracting business, to New York City-based private investment company O3 Industries, o3industries.com.

“We are continuously evaluating our portfolio to align with our vision of being the leading supplier of glazing-focused interior and exterior products and services,” says Nathan Creech, president of Oldcastle BuildingEnvelope. “This decision is another step in executing our strategy as we focus on our core business: manufacturing, fabricating and distributing high quality architectural glass, metal, engineered systems, and glazing hardware and supplies.”

### Tecnoglass Enters into Joint Venture with Saint-Gobain

Tecnoglass Inc., tecnoglass.com, entered into a joint venture agreement with Saint-Gobain, saint-gobain.com, on Jan. 11, through the planned purchase of a minority ownership interest in Vidrio Andino, vidrioandino.com, a Colombia-based subsidiary of Saint-Gobain with annualized sales of approximately \$100

million. The transaction is expected to be completed in the second quarter of 2019.

“We are excited to partner with Saint-Gobain and to develop one of the most advanced and efficient glass production facilities in the world near our own plant network,” says José Manuel Daes, CEO of Tecnoglass. “This investment reinforces our vertical integration strategy and positions Tecnoglass to capture benefits from nearly the entire value chain of our high-quality architectural glass production. The joint venture secures our float glass supply and will generate significant synergies for years to come.”

### Xinyi Glass Considers Canadian Locations for New Glass Plant

According to reporting in the *Windsor Star*, windsorstar.com, Xinyi Glass Canada, xinyiglass.ca, will consider a few locations for its planned \$450-million float plant. The publication says that the company is looking at Stratford, London, Welland and Amherstburg, all in the province of Ontario, as potential new locations. Xinyi originally chose Guelph/Eramosa Township, Ontario, as the site for the new plant, but its application was rejected by the local council in July 2018.

### Saint-Gobain Group Inaugurates Modernized Float Line in Poland

Saint-Gobain Group in Poland, saint-gobain.pl, modernized its float glass production line at its facility in Dąbrowa Górnicza. The investment will increase Saint-Gobain Poland’s float glass production potential for the construction sector by 25 percent, say company officials.

The new float line in Dąbrowa Górnicza is equipped with a modern system of nitrogen oxides emission reduction and will consume 20 percent less energy. The line will produce almost 1,000 tons of Planiclear glass per day, in thicknesses of 1.4 millimeters and in widths up to 16.08 feet.

### AIG Acquires Great Lakes Glass Distributors

American Insulated Glass, aiglass.com, acquired Great Lakes Glass Distributors, greatlakesglassdistributors.com, located in Michigan. The late December closing marked AIG’s second acquisition completed in 2018.

“We couldn’t be more pleased with this acquisition because AIG brings a wealth of glass industry experience and resources that together will position us to accomplish so much more for our customers,” says Dan Dirmeyer, president and general manager of GLGD. Dirmeyer will continue to manage the daily operations of this facility.

### Ibis Tek Acquires Standard Bent Glass

Ibis Tek Inc., ibistek.com, a portfolio company of Rockwood Equity Partners, rockwoodequity.com, acquired Standard Bent Glass, standardbent.com, in early January.



# What Do You See?

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Headquartered in East Butler, Pennsylvania, SBG has been manufacturing security and defense glass products for more than 30 years. Its Department of Defense product line is one of the most extensive in the country, and it provides products, including transparent armor, across numerous platforms.

Headquartered in Butler, Pennsylvania, Ibis Tek specializes in manufacturing transparent and opaque armor solutions for military vehicles, in addition to a range of complementary products, such as vehicle lighting and accessories. It also provides first responder vehicle customization for commercial and military vehicles.

### Watkins Associated Industries Acquires Lexington Manufacturing

Watkins Associated Industries, [watkins.com](http://watkins.com), acquired Lexington Manufacturing, [lexingtonmfg.com](http://lexingtonmfg.com), on Jan. 3. WAI is a large, privately-held company, with an existing line of businesses in the building materials sector, among others. Lexington Manufacturing, operating out of Minneapolis, is a full-service window, door and structural millwork component parts supplier, providing a variety of machining and fabrication services to meet specific customer needs. Both firms are multi-generational, family-owned businesses.

The stable, long-term management team at Lexington led by owners Bob and John Dimke and Mike Dillon, president, will remain in place post-acquisition. WAI will partner with this team to drive future investment and growth opportunities in Lexington's core business.

### Bavelloni SpA Acquires Glaston Tools Srl

In early January, Bavelloni SpA, [bavelloni.com](http://bavelloni.com), signed an agreement with Glaston Corp., [glaston.net](http://glaston.net), for the acquisition of 100 percent of the shares of Glaston Tools Srl.

"The acquisition of Glaston Tools represents a milestone in the completion of Bavelloni's product range," says Roberto Califano, marketing director and partner at Bavelloni SpA. "This is an important goal allowing us to return to offering our customers the complete machine-tool synergy in which the Bavelloni brand has always believed since the beginning of its activity."

### Assa Abloy Acquires Keyper Systems, Lorient

Assa Abloy, [assaabloy.com](http://assaabloy.com), signed an agreement on Jan. 14 to acquire Keyper Systems, [keypersystems.com](http://keypersystems.com), a leading



## Weathered Steel Finish

"We really liked the Petersen product. It has a weathered steel look to it and yet it's affordable. We could get the color palette we wanted in a material that we could fabricate in whatever manner fit our design."

-J. Mark Wolf, AIA, Vice President, JHP Architecture



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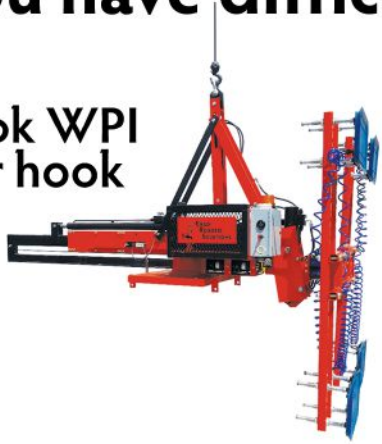
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supplier of electronic and mechanical key management systems in the United States with a strong presence in the automotive segment. The acquisition is conditional upon satisfaction of customary closing conditions and is expected to close during the first quarter of 2019.

Keyper Systems was established in 1993 and has approximately 25 employees. The head office is located in Harrisburg, North Carolina.

Assa Abloy also acquired Lorient, lorientuk.com, a designer and manufacturer of door sealing systems based in the United Kingdom with half of sales exported outside of the U.K. and European Union. The acquisition, announced on Dec. 17, 2018, “delivers on the company’s strategy to strengthen its position in the mature markets through adding complementary products and solutions,” says Nico Delvaux, president and CEO of Assa Abloy.

**Schiavo Partners with Machines and Wheels for US Distribution**

Schiavo, schiavotech.it, an Italian-based company producing glass fabrication equipment, partnered with Machines and Wheels, machinesandwheels.com, to sell its equipment to the U.S. market.

Schiavo adds a new line of machinery to the offerings of Machines and Wheels, including cutting tables, washing machines, storage systems, loading machines, vacuum lifters, cranes and more. Machines and Wheels will offer customers a broader range of quality machines, and the same exceptional service they have always offered, say company officials.

**AGMT Completes Beta Test at FTI**

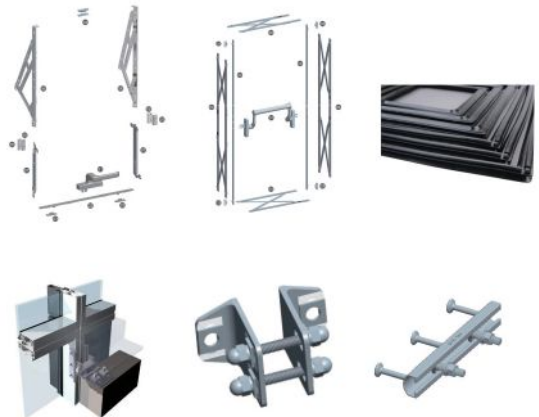
Members of the Architectural Glass and Metal Technician Certification program, agmtprogram.com, traveled to

Philadelphia to beta test the program’s exam in a new region. The Finishing Trades Institute, ifti.edu, of Philadelphia hosted the knowledge and performance test portions.

The event is the second in a series of full beta tests the AGMT team has planned before the certification program goes live in 2019. Following beta-testing in other geographical locations, organizers looked to use the Philadelphia beta test to evaluate the program using a different environment and with additional experienced glazier participants.

**Installed Building Products Announces Acquisitions of Carolina Glass & Mirror and Hamilton Benchmark**

Installed Building Products, installed-buildingproducts.com, an installer of insulation and complementary



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with SunGuard® AG 50

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building products, has acquired Carolina Glass & Mirror Inc, carolinaglass.com, and Hamilton Benchmark Inc., firestopstandard.com.

Carolina Glass installs commercial and residential glass applications with one location in Garner, North Carolina., and serves the greater Raleigh market. Founded in 1993, Carolina Glass has

annual revenue of approximately \$6.2 million.

Hamilton Benchmark installs fire-stopping solutions to the large commercial construction market with one location near Milwaukee, Wisconsin. Founded in 1999, Hamilton Benchmark has annual revenues of approximately \$1.3 million.

**Northeast Building Products Expands Production Capacity with Bystronic IG Lines**

Bystronic Glass, bystronic-glass.com, installed two B’vario TPS insulating glass lines at Northeast Building Products, nbpwindows.com, in Philadelphia.

“We have been impressed with the Bystronic glass brand for many years now, having originally installed two SashLines into our facility,” says Alan Levin, president of Northeast Building Products. “Based on ... the necessity to grow operations, it was only natural to explore and invest in machinery that would guarantee to take this business forward and ensure the success of our customers.”

**Vetrotech Partners with Architectural Glazing Solutions**

Vetrotech Saint-Gobain, vetrotech.com, expanded its territorial reach with Architectural Glazing Solutions, architecturalglazingsolutions.com. AGS is a manufacturers’ rep firm for a wide range of architectural glass and metal products, representing a wide range of manufacturers, including Vetrotech. The company has been a source for architects and glazing contractors in Southern California since 2002.

“Vetrotech products have been a valued part of AGS’s product offerings in Southern California, and we’re thrilled to bring those products to the state of Nevada,” says Nico Pompeo, vice president of sales for AGS. “We believe this expansion will be a tremendous success.”

\*From Dec. 10, 2018, to press time, Jan. 17, 2019. Read these stories, and others, in their entirety at GlassMagazine.com.

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1 HSW Learning Unit



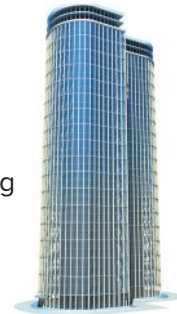


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# Your Association at Work

NEED-TO-KNOW INFORMATION FROM THE NGA

## NGA CONSIDERS DEVELOPMENT OF INDUSTRY-WIDE PROCESSED GLASS EPD

The NGA's Fabricating Committee is considering developing an industry-wide Environmental Product Declaration for processed glass. An EPD is used to disclose the life cycle performance of a product, derived from a set of product category rules, called a PCR.

The proposed EPD would be based on a previously published PCR for processed glass. The PCR was published in 2016 by UL Environment, and funded by the Glass Association of North America (now combined with the NGA) and the Insulating Glass Manufacturers Alliance, [igmaonline.com](http://igmaonline.com). The proposed EPD would include a range of processed glass products, including coated, laminated and insulating glass.

In order to be able to use the industry-wide EPD, companies must participate in the process. Fabricators interested in being involved in the EPD development process should contact [technicalsvcs@glass.org](mailto:technicalsvcs@glass.org). ■



## VOLUNTEERS TAKE CENTER STAGE AT NGA ANNUAL CONFERENCE

During the NGA Annual Conference, held Jan. 22-24 in Naples, Florida, association officials recognized standout member volunteers. "When our volunteers and members unite, we are absolutely a force to be reckoned with," says Angelo Rivera, NGA board chair and vice president of Faour Glass Technologies, [faourglass.com](http://faourglass.com). NGA committee chairs and technical liaisons (pictured above) were presented with Boomerang Awards. Read more about the recipients on [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019).

The C. Greg Carney Member of the Year Award, named for longtime former GANA Technical Director Greg Carney, went to Julia Schimmelpenningh, Laminating technical liaison, and global architectural applications manager for Eastman Chemical Co., [eastman.com](http://eastman.com). ■

“GREG CARNEY ... TAUGHT ME, 'YOU NEED TO LEARN SOMETHING EVERY DAY. YOU NEED TO TEACH SOMETHING EVERY DAY. AND YOU NEED TO DO WHAT'S RIGHT ALL THE TIME.'”



**JULIA SCHIMMELPENNINGH**  
2019 RECIPIENT OF THE  
C. GREG CARNEY MEMBER OF THE  
YEAR AWARD

## GPAD TO HIGHLIGHT FABRICATION EQUIPMENT AND SOFTWARE SOLUTIONS

The NGA is a co-sponsor of Glass Processing Automation Days, GPAD, to be held in San Antonio, Texas, March 26-28. Presented by FeneTech, [fenetech.com](http://fenetech.com), the two-day educational event, targeted at glass fabrication industry leaders, provides in-depth insight into the latest developments in glass

fabrication equipment and software solutions in an up-close and personal setting.

GPAD was founded in 2014 by FeneTech as an opportunity to investigate new and innovative technologies in the glass fabrication industry and discover the additional benefits of automation and integration.

"We are excited to have NGA step forward and provide an active role in helping to plan, promote and execute this event. NGA serves as an active voice in the industry and their involvement will undoubtedly make GPAD an even better event," says Ron Crowl, president and CEO of FeneTech. ■



# The Glass Advocate

EDUCATION, ADVOCACY AND TECHNICAL  
CONTENT FROM THE NGA



The Fabricating Committee, during the NGA Annual Conference.

with the Insulating Glass Manufacturers Association, [igmaonline.org](http://igmaonline.org), is now available online through [glasswebsite.com/publications](http://glasswebsite.com/publications).

- Two additional GIBs are under development: Oversized IGUs and PIB Primary Sealant. Both are being developed in collaboration with IGMA.

#### Laminating:

- The group is continuing its assessment of test data to create new resources on the compression of interlayer tolerances and deflection calculations for laminated glass.
- A new edition of the Laminated Glazing Reference Manual is now available.

#### Protective glazing:

- The group will release an updated version of its Protective Glazing 101 AIA presentation by the third quarter of 2019. The Fire-Rated Glazing Today AIA presentation is updated and ready for use by NGA members.
- The group established a new task group to address Security Glazing for Schools.

#### Tempering:

- A new edition of the Engineering Standards Manual, complete with several important updates, will be released in second quarter 2019.
- The Heavy Glass Door Manual is being updated and will be published in second quarter 2019.

It was announced during the Annual Conference that the association's Fall Conference will be held in conjunction with the Old Guard Reunion, Aug. 13-15, 2019, in Toledo, Ohio.

For additional information, visit [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019). ■

## COMMITTEE ACTIVITIES AT THE NGA ANNUAL CONFERENCE

During the 2019 NGA Annual Conference held in January, members addressed critical glass industry topics, from increased code stringency to glass safety concerns, and discussed need-to-know issues such as product transparency requirements and the industry's role in promoting occupant health. This article presents key committee updates from the conference.

#### Forming Committee

- The association is facilitating an industry-wide flat glass Environmental Product Declaration, or EPD. A first draft is due in April.
- A task group was formed to address recyclability and raw material resource management. The Recyclability of Architectural Glass GIB will be updated.

#### Advocacy Committee

- A task group will develop language to address daylighting in interior space to support occupant well-being.
- The resource, "Health & Wellness Benefits of Daylighting," is published

and available at [glasswebsite.com/daylighting.html](http://glasswebsite.com/daylighting.html).

#### Fabricating Committee

##### Decorative:

- The group is working on several tasks, including: updating the Bird-Friendly Glazing GIB, defining an industry-accepted color variance for decorative glass, determining best practices for installed painted decorative glass and more.

##### Energy:

- Product Category Rules, PCRs, and Environmental Product Declarations, EPDs, topped discussions. Surveys will be issued for a windows PCR and a processed glass EPD, and a list of FAQs will be developed.

##### Insulating:

- Following publication of the new AIA-approved presentation, Multi-Cavity IGUs, a call was made for approved presenters.
- The document Unsupported Edge Conditions of IGUs, published jointly



“  
MANAGING [PRODUCT INNOVATIONS] AND NEW CUSTOMER DEMANDS IS COMPLEX. SO TOO ARE THE RISK ISSUES SURROUNDING NEW INNOVATIONS.  
”

## LEGAL

# THE RISKS OF INNOVATION

*How to navigate the legal concerns of new glazing technologies*

BY MATT JOHNSON



For many years glass and glazing were considered passive participants in a building's performance. Innovation is changing that approach. Today, the use of glass in active and dynamic energy management systems is growing. Now, glazing integrates variable opacity and shading elements that are linked to ventilation and solar generation. These are just a few current innovations that tie glazing to building elements in the active management of a structure's overall performance and occupant health.

Managing these products and new customer demands is complex. So too are the risk issues surrounding new innovations. These systems are often supplied by third parties and must be brought together by glazing trades, and

we have seen that mixing give rise to new claims.

This article presents several key risk management considerations when working with new glazing innovations.

### The systems

Vertical integration of manufacturers is disappearing. Vendors are relied on to supply unique components at lower cost and increased quality. Sourcing and managing the contractual relationships within third-party supply arrangements is legally critical.

Companies must pay special attention to intellectual property protections for integrations and proprietary design elements that integrate these elements into systems. Even trades must consider whether their own unique method or specialty tooling for bringing elements

together is worth seeking patent protection for innovation or process.

Warranties for incorporated systems must be managed. Often, glazing system manufacturer warranties conflict with third-party systems that must embed within the glazing system itself. Contract and warranty commitments must be balanced at the project level to be sure claims of defect or deficiency have a potential remedy before heading to the courthouse.

### Data and integration

Like most areas, glass and glazing innovation is currently focused on the internet and the Internet of Things, the linking of cyber-innovation to physical innovation. But as physical things begin to generate, collect and share information with themselves and others, Big Data risks must be considered.

Privacy is an ever-present data concern. Systems that collect information about how owners use glazing, as well as their habits and the performance impacts of that use, develop information that is personal to the user. And as Facebook and Google show, there is value in

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knowing human habits from seemingly everyday activities. Ensuring data privacy for glazing innovation cannot be overlooked, including something as simple as opening or closing blinds.

Installers must also recognize that these complex systems require complex linkages. Communication between imbedded building systems is essential so they can talk to each other and work efficiently. Watch for change orders or design engineering that do not consider these data communication needs. Improper installation, rather than system compatibility, is often blamed when there is a data communication failure.

#### Installation and use

Once installed and operating, legal risks can arise based on the representations of performance. Contractual targets for energy performance are everyday terms now. Glaziers must seek out these terms

and negotiate them carefully.

Often these targets are within the prime contract. Where a subcontract incorporates the prime, builders argue sub-tiers are responsible for an owner's claim that a deliverable energy target was not met. Trades must find these building targets and work to define how their works contributed to that target in their own agreement. Items that do not fall within a scope-of-work for that trade should be disclaimed.

Equally, the performance requirements must be based on whole building performance over a set period of time. As innovation develops, glazing and building systems are providing real-time access to performance and then extrapolating that performance to near-instantaneous cost calculations. This has allowed some owners to overly focus on seasonal energy costs

or one-time event expenses. Contracts that require delivery of performance-based energy savings should have the basis for that performance defined in terms of time and scope.

Finally, as trades stretch to meet customer goals for new innovations, they are working in areas where the prospect of insurance coverage becomes unsettled. Typical claims surrounding energy or data may not be covered by commercial general liability insurance policies. Owners should talk with their insurance broker about project- or system-specific coverage when opportunities for use of an innovation arise. ■

Matt Johnson is a member of The Gary Law Group, prgarylaw.com, a Portland-based firm specializing in legal and risk issues facing manufacturers of glazing products. He can be reached at matt@prgarylaw.com.

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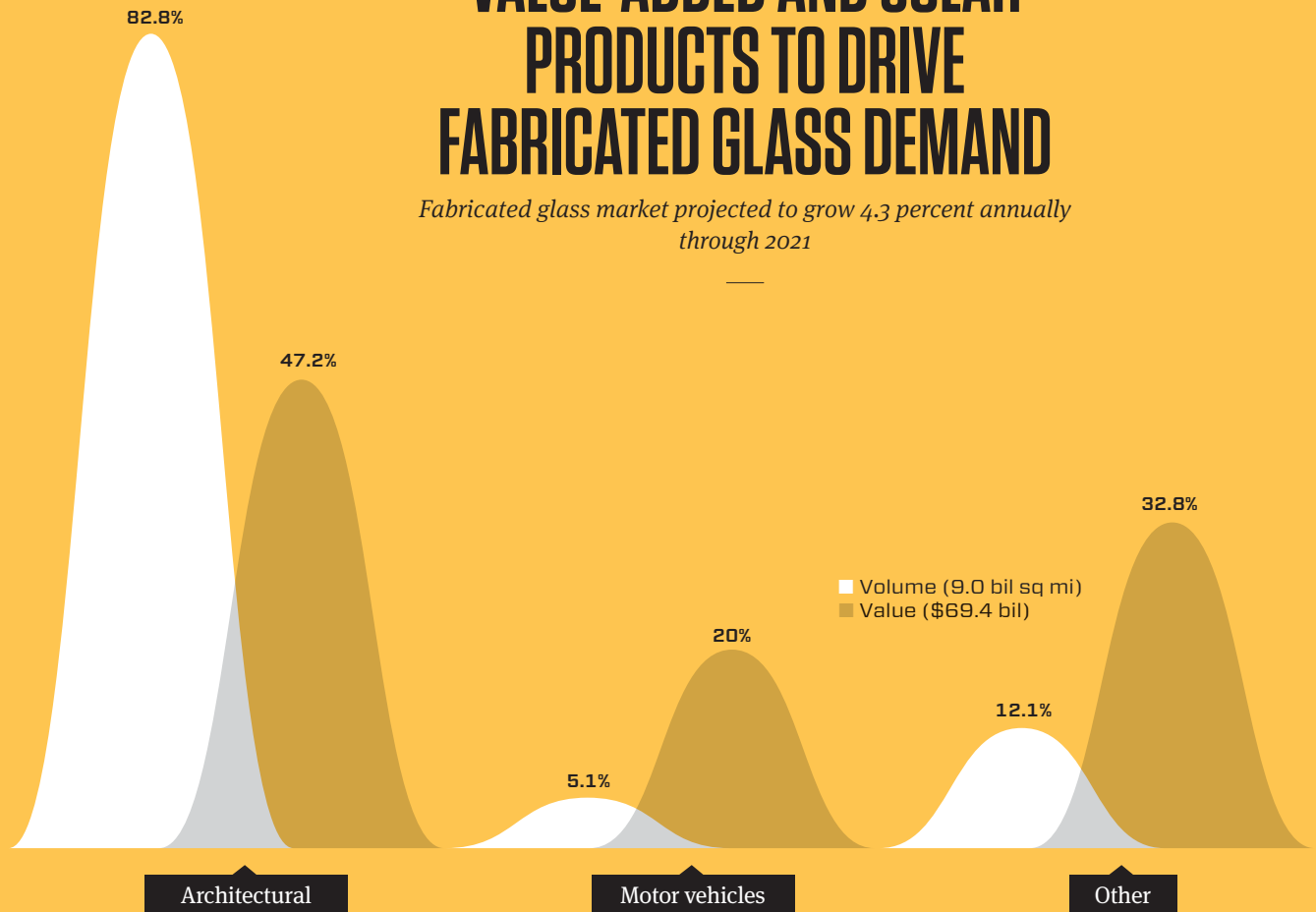
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# VALUE-ADDED AND SOLAR PRODUCTS TO DRIVE FABRICATED GLASS DEMAND

*Fabricated glass market projected to grow 4.3 percent annually through 2021*



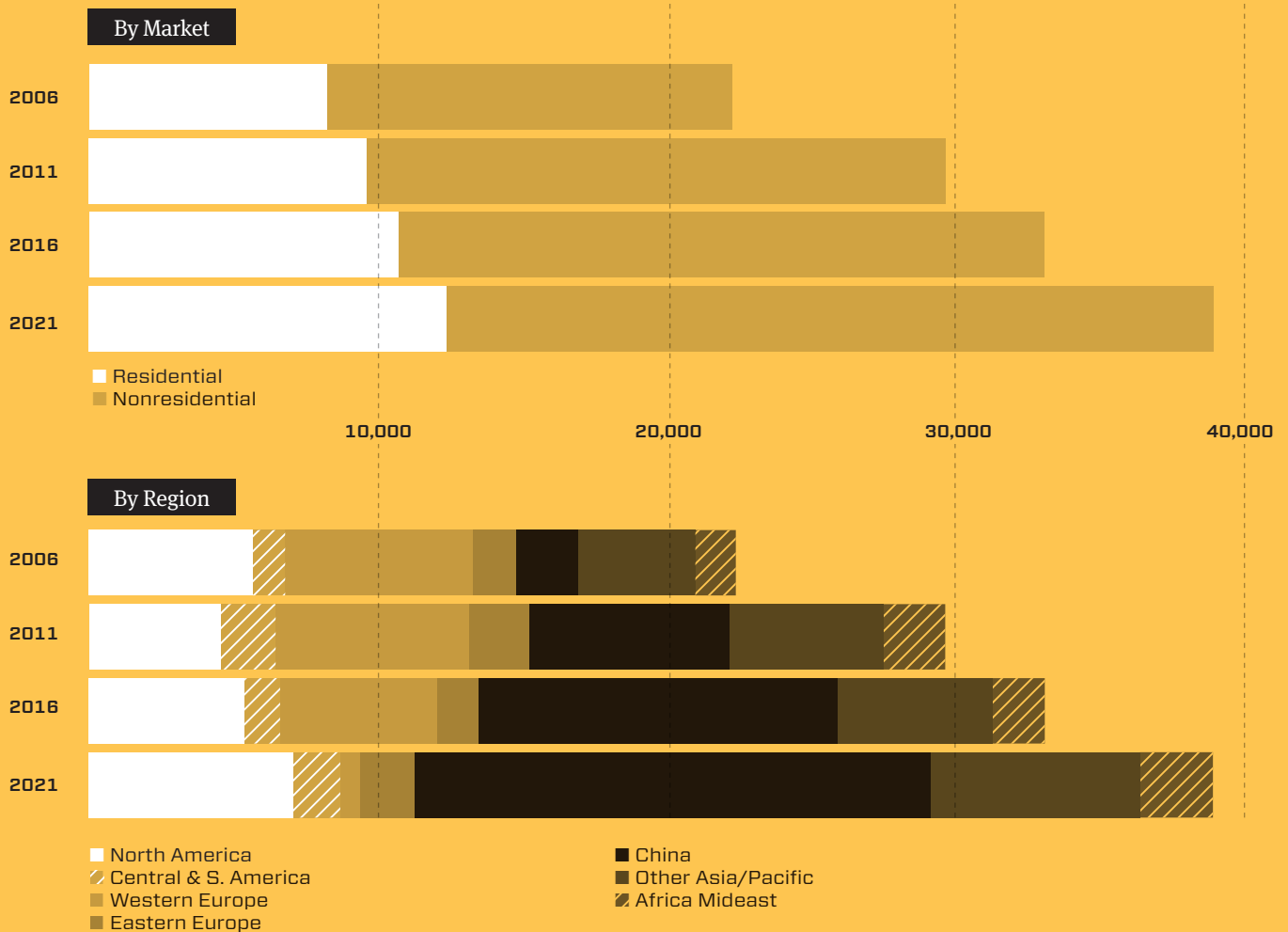
**Fig. 1—Global fabricated flat glass value & volume demand by market, 2016.** In 2016, architectural glass captured 47.2 percent of the global fabricated glass market by value, reaching \$32.7 billion of \$69.4 billion total. In terms of volume, architectural glass led the global market with 82.8 percent of production. The market for other fabricated glass products, such as solar glass, accounted for just 12.1 percent of volume but 32.8 percent of value in 2016.

Global demand for fabricated flat glass is forecast to grow 4.3 percent per year to \$86 billion in 2021. Growth in U.S. dollar terms will improve relative to the 2011-2016 period, when currency fluctuations led to falling average prices. The architectural market will remain the largest outlet for fabricated flat glass and will account for 35 percent of total value demand growth. Sales in the motor vehicle market will benefit from increased production and

use of motor vehicles worldwide. The largest share of global fabricated flat glass demand growth in value terms through 2021 will occur in other markets. While this includes a wide variety of manufacturing applications—such as mirrors, furniture, electronic products and household appliances—rapid growth will mainly be attributable to the expansion of the solar energy market worldwide, as flat glass is a key component of solar panels.

**Value over volume**  
 Global demand for fabricated flat glass in the architectural market is forecast to advance 3.3 percent per year to \$39 billion in 2021. In volume terms, demand will rise 3.5 percent per year to 8.9 billion square meters. Growth in volume sales will decelerate compared to the 2011-2016 period as advances in China moderate and the United States exits a period of rebound-fueled growth. Average prices for architectural glass will fall through





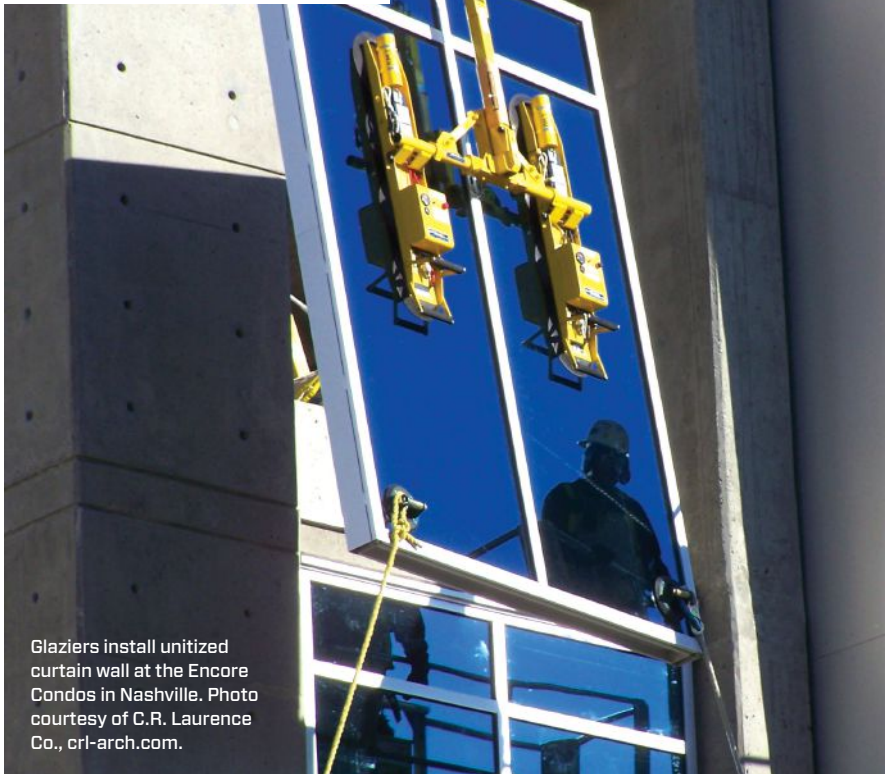
**Fig. 2—Global architectural fabricated flat glass demand (in millions of dollars).** Fabricated glass demand in residential and commercial applications grew steadily from 2006 to 2016. Additional gains are anticipated through 2021, when the overall market is expected to reach \$39 billion. Most of those gains have come from the Chinese market, where demand is expected to reach \$15.2 billion by 2021.

2021 as developing countries with low price levels account for an increased share of the global market.

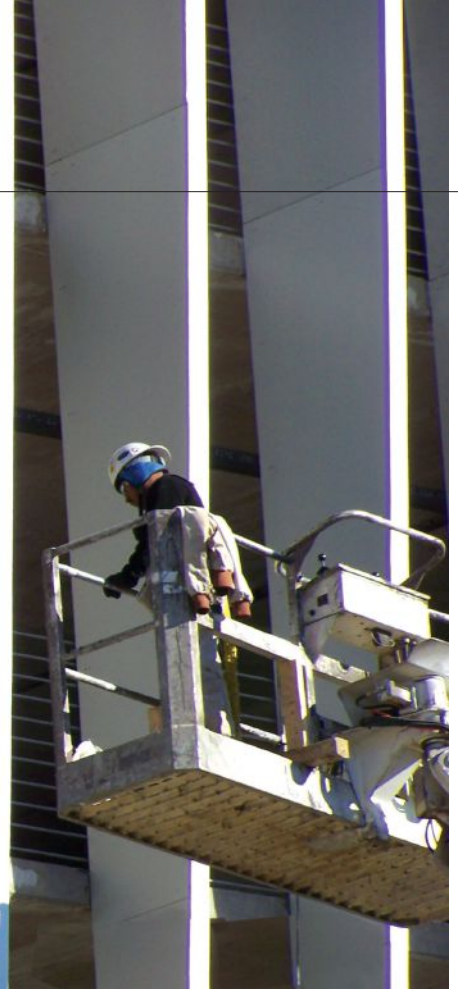
The market for architectural glass will be boosted through 2021 by greater use of value-added glazing products in both new structures and during major renovation and refurbishment activities. While many of these innovations have been the result of company-led research on the part of glass suppliers, customer concerns and governmental regulations

related to energy conservation have also played a role.

One major product trend in architectural glass is the increasing use of solar control glass—glass that is designed to reduce air conditioning and heating costs by raising the energy efficiency of buildings. Solar control glass already has very high market penetration in Western Europe and other wealthy developed countries, but these products hold strong growth potential in industrializing countries. ■



Glaziers install unitized curtain wall at the Encore Condos in Nashville. Photo courtesy of C.R. Laurence Co., [crl-arch.com](http://crl-arch.com).



## TROUBLE FINDING LABOR? GO UNITIZED.

*How unitized curtain and window wall systems can help overcome the challenges of insufficient field labor and strict project schedules*

It's no secret that the shortage of skilled labor has been a significant, ongoing problem in the construction industry. According to the 2019 Construction Outlook Survey from the Associated General Contractors of America, 78 percent of contractors reported having a difficult time filling positions. Unfortunately, the issue is not expected to subside anytime soon.

Insufficient skilled labor can be detrimental to a glazing business and will ultimately affect its ability to remain competitive. Associated disadvantages include prolonged project completion times, missed job opportunities, and higher costs that are passed down to the customer.

The good news is that there are ways to offset the shortage of skilled labor. One such method is to select easy-to-install glazing systems. When it comes to the building envelope, unitized curtain and window walls are rising in popularity for this reason. Understanding their function and

application will let contractors take full advantage of their labor-saving benefits.

### Key benefits

Unlike standard curtain and window walls, unitized systems are assembled and glazed in the shop environment. The shop setting allows for efficient installation of all required setting blocks, water deflectors, end dams and gaskets. It also provides a controlled environment for improved supervision of quality and production without the disruptions related to onsite assembly.

The key benefits of adopting a pre-glaze fabrication method over a traditional approach are twofold. First, unitized systems can reduce the amount of skilled labor needed in the field. Stick-built systems require erection and glazing of aluminum members onsite. Because unitized systems arrive pre-glazed, less manpower is needed for installation. This can



reduce labor costs by up to 25 percent. Field labor is essentially shifted to a more cost-effective factory workforce.

The second key benefit of unitized systems is that they can reduce time spent on the project site by as much as 35 percent. Units can be installed in a third of the time of a typical stick-built system. In short, the building envelope can be closed faster—a significant advantage in the face of tight construction schedules.

From an aesthetic standpoint, unitized systems can deliver the seamless, all-glass visuals of stick-built curtain walls using slab edge covers. They also offer the same high-performance benefits without the engineering and load challenges that stick-built systems present. This makes them ideal for high-rise projects.

Unitized systems offer architects the same performance and aesthetic benefits that standard curtain walls do. They also let the general contractor start work on interior finishes earlier on in the schedule. These factors create a win-win scenario for all major stakeholders.

**Logistic and installation considerations**

Unitized curtain and window walls are typically transported to the jobsite using A-frame racks that can be obtained from the local glass supplier. Another method is to secure the units in specialized box crates, which can be reused to save on material costs.

Glazing contractors should install unitized systems from the exterior when the structure is six stories or less. Units can be picked directly from the delivery trailer and raised to the appropriate floor using a hoisting device. When a structure is taller than six stories, units should be installed from the interior. In this case, a modified electric pallet jack can help get the job done quickly and safely.

With unitized systems, glaziers will

“  
**UNITIZED SYSTEMS CAN REDUCE TIME SPENT ON THE PROJECT SITE BY AS MUCH AS 35 PERCENT. ... THE BUILDING ENVELOPE CAN BE CLOSED FASTER—A SIGNIFICANT ADVANTAGE IN THE FACE OF TIGHT CONSTRUCTION SCHEDULES.**  
 ”


typically have to get on the outside of the building to seal the perimeter joints. Utilizing a head can may reduce the requirement for exterior sealing of the system to just the jamb condition.

Glaziers should be sure to work with a reputable manufacturer that can help specify the right unitized system, transportation method and installation equipment for the job.

Today's skilled labor shortage and fast-paced construction schedules pose a serious problem to glazing contractors. Unitized curtain and window walls can go a long way in alleviating some of the corresponding stress that's placed on their operations. ■

Joe Schiavone is director of sales for C.R. Laurence Co., [crl-arch.com](http://crl-arch.com), [crlaurence.com](http://crlaurence.com). He can be reached at [joe\\_schiavone@crlaurence.com](mailto:joe_schiavone@crlaurence.com).

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# FROM AIRPORTS TO IoT: DYNAMIC GLASS TRENDS IN 2019



The Millennium Center in Crissier, Switzerland, a smart building expected to open in 2020, will exclusively use SageGlass Harmony, a connected, building dynamic glazing solution. Photo courtesy of SageGlass, [sageglass.com](http://sageglass.com).

2018 was a busy year for dynamic glass. The industry experienced an increased emphasis on designing for occupant health and well-being, and saw a bevy of innovative technology integrations and new products emerge in the marketplace. In 2019, expect to see continued growth in these areas and the emergence of a few new trends.

visual and thermal comfort can also help airport staff perform at their best at security checkpoints, where being focused and avoiding distractions caused by lack of comfort are mission-critical.

## TREND 01:

### FOCUS ON AIRPORTS



According to ACI's Airport Service Quality research, an increase of 1 percent in global passenger satisfaction generates an average growth of 1.5 percent in non-aeronautical revenue. In other words, comfortable travelers are happier travelers, and happier travelers spend more money.

To prioritize comfort, airports are turning to dynamic glass. Research

shows travelers prefer more natural light and unobstructed outdoor views, even under conditions when it is estimated to be sufficient. But letting in natural light can result in glare and excessive heat, aggravating already tense and rushed travelers and creating a frustrating experience for travelers, staff and airport businesses hoping to gain travelers' attention.

Dynamic glass improves the airport experience for travelers by controlling glare and managing excessive heat. The use of dynamic glass to promote

## TREND 02:

### A WELLNESS BOOM



Comfortable indoor environments increase productivity in the workplace and improve patient outcomes in hospitals—and companies around the world have taken notice. Businesses are designing buildings focused on occupant health and well-being, a trend which will continue to remain top of mind this year.

This is evidenced by Future Workplaces' study, which found that



**ONLINE**

▼  
 Visit [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019) for links to occupant studies referenced in this article.

an absence of natural light and outdoor views hurts the employee experience. Incredibly, over a third of employees feel they don't get enough natural light in their workspace. Another 47 percent of employees admit they feel tired or very tired from the absence of natural light or a window in their office, and 43 percent report feeling gloomy.

TREND 03:



**EMPHASIS ON "SMART" BUILDINGS**

Smart buildings are becoming increasingly popular as owners and occupants demand constant connectivity and more control over their environment. By using the Internet of Things, IoT, and the cloud to control

various aspects of the building, from heating and cooling to lighting controls, occupants are given more control, and the building management team is able to better track the building's performance. As a result, we expect to see "smart," connected buildings grow in popularity since these buildings provide a more seamless experience for occupants and building managers while

simultaneously maximizing energy efficiency.

As the use of IoT in buildings becomes increasingly popular, occupants will come to expect a higher level of comfort, personalization and control over their environment. This will no longer be a nice-to-have, but a necessary component of building design in order to remain competitive in the marketplace. Since it can be a part of this IoT ecosystem, expect owners and architects to increasingly use dynamic glass in connected buildings that support both occupant well-being and sustainability. ■

Ryan Park is global head, marketing and product management, SageGlass, [sageglass.com](http://sageglass.com). He can be reached at [marketing@sageglass.com](mailto:marketing@sageglass.com).

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**MANAGEMENT**

# IS YOUR GLASS COMPANY RECESSION-READY?

*Break down business operations and improve efficiencies*

There is growing concern that the United States is entering a recession. The decade-long recovery may be losing steam, and the economy may experience a contraction. At least, that is what some experts, and many TV pundits, say. Conversely, many experts are looking at the same or similar data and are coming to a different conclusion. They think the economy is stable and doing well.

As a business owner, how do you know which experts are right? More importantly, how do you develop a sensible business strategy considering this uncertainty?

Business owners should work now to protect their companies against these economic uncertainties. And the

best time to prepare is when things are going well, and an owner has time and resources to move in deliberate and calculated ways.

Protecting a company against economic uncertainty involves instituting several common-sense business practices. An owner should be implementing these practices regardless of whether or not there is a slowdown coming. If there isn't a slowdown, these practices will most likely improve profitability. And if there is a slowdown, they will improve the chances of survival. More importantly, if there is a slowdown, they will improve the chances of capitalizing on new opportunities when the economy recovers.



**ONLINE**

Is a recession coming? Find out the key economic indicators to watch, from Marco Terry, at [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019).

### **Improve collections and credit.**

A common reaction to a slowing economy is to pay vendors more slowly. Almost all customers do this. In other words, if things get tough, an owner can expect good clients to take longer to pay. Average clients may slide into marginal territory. And clients who were



in marginal territory may slip into the bad debt territory.

On the credit front, owners should check the commercial credit of every major client before providing them with 30- to 60-day payment terms. Do not provide credit to clients who don't deserve it. Clients who don't have good credit should prepay for products and services.

Many credit reports also show payment trends. These trends are important. Look at them carefully. Review reports for major ongoing clients every 60 to 90 days. Be wary of clients with a negative payment trend. This behavior is often an indicator of problems to come. An owner can check commercial credit reports through vendors such as Dun & Bradstreet, Cortera, Experian Commercial, and Ansonia Credit.

An owner should fine-tune the

collections department and ensure that clients get invoiced as soon as the contract allows it. Verify that invoices and supporting documents have been received on time. Call clients when a payment is delayed and determine when it will be received.

Lastly, consider sharing data with credit bureaus (check with the legal department first, but it's usually OK). This practice allows an owner to put a notice on your invoices that alerts clients that their payment experience, good or bad, will be disclosed. This notice can motivate companies to pay on time.

#### **Get better payment terms.**

An owner may be tempted to conserve cash by paying their own vendors slowly. This strategy is valid. However, there is a right way and a wrong way

to do it. The wrong way is to simply delay payments and pay vendors past deadline. Sure, this approach conserves cash. It also hurts the company's credit, as those late payments may be reported to credit bureaus. This reporting may prevent a company from getting credit terms in the future.

A smarter strategy is to negotiate better payment terms beforehand. Businesses can ask for higher discounts for early payment and for a longer payment term. This approach allows a company to pay more slowly, while still being reported to credit bureaus as a good payor. Vendors are more likely to provide better terms while things are going well.

#### **Build a cash reserve.**

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A company should always have a cash reserve. This reserve gives a company breathing room and enables owners to make decisions carefully.

The size of the cash reserve is a matter of preference and debate. Some people advocate for a month's worth of expenses. Others advocate for a longer period, such as three months. Ultimately, it is a personal choice.

However, there is a trade-off between having a large cash reserve and growing the business. Why? Funds in the cash reserve can't be used to pursue new opportunities or clients. Those funds must sit unused in a bank account.

There is, however, one way around this problem. An owner can get a line of credit and use it only in emergencies. This line of credit can be used to complement a smaller cash reserve. Just keep in mind that banks decided to close many of

these lines during the last recession, just when their clients needed them the most.

**Optimize costs.**

Review costs with a fine-tooth comb and look for places where things can be improved. Examine costs by order of importance. Determine which costs can be reduced by finding better suppliers, consolidating teams, or outsourcing functions. Any cost that can be trimmed now gives a company resources that can be ploughed into cash reserve or used elsewhere.

**Cut unprofitable services and products.**

Work with the finance team to determine the profitability of products and services. Determine all-in cost of delivering a product or service. Consider cutting unprofitable ones, unless there is a valid strategic reason to keep them.

**Consider diversifying the business.**

This strategy is crucial if revenues are concentrated on any specific client, client type or products. Such concentration makes revenues sensitive to minor changes in the economic landscape.

A company can diversify by adding new alliances, promotions, sales efforts, products, services or locations. Adding new sources of revenue helps diversify income. This approach can provide stability during slowdowns. ■

Marco Terry is managing director of Commercial Capital LLC, [comcapfactoring.com](http://comcapfactoring.com), a factoring company and leading provider of invoice financing to companies in the glass industry. He can be reached at 877/300-3258.

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**SALES**

# LOOKING BEYOND THERMAL EFFICIENCY

*The industry's increasingly significant responsibility to contribute to total occupant comfort*

Over the years, there's always been a continuous push-and-pull within the commercial building and construction industry over material choice. How much glass is enough, versus brick, concrete and other materials that make up the building? How much glass might be too much?

In recent decades, it seems as though glass began winning the battle. Especially as glass technology has evolved, and excellent thermal efficiency became increasingly attainable, architects and designers

have come to utilize glass as predominant points of visual interest.

But industry attitudes, and occupant attitudes, are constantly changing. Is the use of bigger glass and more complex curtain wall systems here to stay in the commercial design world? I think a number of new factors will be critical to how the industry thinks about, and continues to create, the striking, sleek glass buildings that have become increasingly ubiquitous in the world today.

## **A move toward comfort**

My thoughts around this topic got rolling after I attended the Façade Tectonics Institute, [facadetectonics.org](http://facadetectonics.org), forum in July 2018. The forum—The Good and the Bad: Evolving Considerations and Practices of Building Façade Glazing—addressed some of today's key issues facing building envelope and glazing design. One of my biggest takeaways: thermal performance remains as important as ever, but commercial glass manufacturers and glaziers must increasingly work toward holistic occupancy comfort.

There's an increasing awareness throughout commercial construction about the quality of spaces and the real business benefits those spaces can provide. Things like natural light, air quality, natural ventilation and sound control all contribute to occupancy comfort, and so much of that starts with the glass.



## PROJECT SNAPSHOT

The Siemens corporate headquarters in Munich exemplifies sustainable building. The company, which announced plans to achieve a carbon neutral footprint by 2030, built its head office to consume 90 percent less electricity and about 75 percent less water as a regular building. The glazing makes a considerable contribution towards the sustainable energy balance of the new headquarters. For the project, Petschenig glastec GmbH, [petschenig.com](http://petschenig.com), supplied more than 75,000 square feet of Uniglas Sun, [uniglas.de](http://uniglas.de), triple insulating, solar control glass units with Edgetech Europe GmbH, [de.quanex.com](http://de.quanex.com), Super Spacer spacers. The fabricator also supplied nearly 11,000 square feet of specialty glass units for the facade. Photo courtesy of Siemens AG.



**ONLINE:** Visit [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019) for additional coverage from the Façade Tectonics Institute forum.

“

**WE NEED TO MAKE SURE WE'RE ALWAYS WORKING TOWARD BETTER GLAZING, BETTER CURTAIN WALL TECHNOLOGY, AND BETTER PERFORMANCE**

”

Some of the conversations at the FTI forum echoed Glass Magazine's Glass and Metals 301: A guide to the interior (beginning on page 34 of the April 2018 issue). The article noted some glass benefits we don't always think about. In office settings, for instance, it's been shown that daylight can “increase productivity and product output, and decrease absenteeism and employee turnover,” the article states. “In hospitals, studies show decreases in stay and in use of pain medication.

In schools, test scores and productivity improved.”

Consider also the beautiful views that large glass façades afford in a broad range of commercial and residential space, including high-rise apartments. For real estate developers, the continued use of bigger glass is rather appealing. Who can resist the wow factor?

### Challenge of performance

But with all of this in mind, there is a broad range of performance challenges the glass industry must be able to overcome. Are our glass designs and finished projects combating glare effectively? Are they delivering the right performance in terms of heat gain? Contributing to the desired acoustic performance?

Consider that a new commercial office building can be designed with the intent of delivering a wealth of natural light to benefit its employees. But if lower-

performance glass is used, a desk near a west-facing window wall could end up unbearably hot and uncomfortably bright once the sun begins to set. Shades and blinds could be deployed. But then, what's the point of all that glass?

### Our continued responsibility

I also don't believe many in the broader building and construction industry find the use of less glass and glazing to be an attractive option, for a variety of reasons. But increasingly stringent codes and standards may one day force the issue. We need to make sure we're always working toward better glazing, better curtain wall technology, and better performance across the wide range of criteria to which we're increasingly being held. ■

Joe Erb is commercial sales specialist for Quanex Building Products, [quanex.com](http://quanex.com). For more tips, read Quanex's blog, In Focus, or contact Erb at [joe.erb@quanex.com](mailto:joe.erb@quanex.com).

# BIRD GLASS

# COLLISIONS

## MAKING GLASS THE SOLUTION, NOT THE PROBLEM

By Katy Devlin and Olivia Parker



ONLINE



Visit [GlassMagazine.com/](http://GlassMagazine.com/March2019)  
March2019 for information on  
bird-safe glass products and  
suppliers.

This article is based in part on a joint presentation by Krista de Groot, landbird biologist for the Canadian Wildlife Service, Environment and Climate Change Canada, and consultant David Bruce. De Groot and Bruce spoke at the 2018 Summer Conference for the Insulating Glass Manufacturers Alliance, [igmaonline.org](http://igmaonline.org), held in Vancouver, Canada.

**G**lass is a leading cause of bird deaths in North America. Between 365 and 988 million birds are killed every year in the United States due to collisions with glass; in Canada, the estimate is 16 to 42 million, says Krista De Groot, landbird biologist for the Canadian Wildlife Service, Environment and Climate Change Canada. “The Deepwater Horizon oil spill was considered a disaster in terms of bird deaths. But the number of bird deaths each year, according to the lowest estimates in the U.S., equates to 455 Deepwater Horizon spills every year,” says De Groot.

Since the 1970s, a large number of North American bird species have lost over 50 percent of their population. “Several widespread species have lost over 70 percent of their population,” De Groot says. “Although it is difficult to quantify population change due to a single source of mortality, the cumulative effects of both habitat loss and other human-related sources of bird mortality is causing steep declines in many different species of birds,” she adds.

Why does this matter? According to ornithological consultant David Bruce, birds are essential to the environment. They provide vital ecosystem services like pollinating wildflowers, dispersing seeds and helping to control pest populations. “Birds consume over 100,000 metric tons of insects daily including flies, mosquitos, and forest and agricultural pests,” Bruce says, while larger birds like owls and falcons help reduce larger pests like voles, rats and pigeons.



Bird-friendly glass clads the Integrated Science Commons at Vassar College in Poughkeepsie, New York. The project, designed by Ennead Architects, [ennead.com](http://ennead.com), features Isolar Ornilux Bird Protection Glass from Arnold Glas, [ornilux.com](http://ornilux.com). The glass features a patterned UV-reflective coating that is visible to birds while remaining virtually transparent to the human eye. This reduces the risks of bird collisions.

According to Arnold Glas officials, even at the planning stage, the design specifications for the façade stipulated that the glass should be bird-friendly. Covering an area of about 13,000 square feet, the installation is one of the biggest areas of completely transparent bird protection glass to be installed in the United States to date. Photo courtesy of Arnold Glas.



# BIRD/GLASS COLLISION **FAQS**

## When do most collisions occur?

Birds are vulnerable to collisions with glass year-round. However, in most regions the number of fatalities is highest during bird migration periods, says Krista De Groot, landbird biologist for the Canadian Wildlife Service, Environment and Climate Change Canada.

## Where do most collisions occur?

Major cities adjacent to large bodies of water, e.g., Toronto and Chicago, can be hot spots for bird-window collisions during bird migration. In addition, birds can be drawn off course by city lights during their nocturnal migration. At daybreak they need to seek food and shelter, surrounded by a sea of glass.

Buildings near green spaces with a high percentage of glass, adjacent trees and shrubs are also good places to focus collision prevention efforts, says De Groot. This includes institutional buildings, for example on college and university campuses, commercial buildings and homes. “There are more homes on the landscape than any other building type, therefore these structures are responsible for a significant percentage of bird-window collisions,” says De Groot.

## Is bird glass necessary on all stories of a building?

Collisions generally occur in the lower stories of a building. “Bird-friendly glass is typically specified on the first three floors/up to 60 feet on the building,” says Sarah Wansack, Guardian Glass, [guardianglass.com](http://guardianglass.com), marketing manager, interiors, North America. If a building is surrounded by taller trees, bird-glass protections should extend to the height of the trees.

## Why aren't the signs of bird deaths more visible?

The signs of bird collisions can go largely unnoticed. Scavengers—whether cats, raccoons, rats, gulls or crows—can quickly carry off dead birds, says De Groot. Building maintenance crews also perform clean-up, often in the early morning, to remove dead and injured birds from building perimeters and sidewalks.

Unlike many other leading causes for bird deaths, such as loss of habitat or the effects of climate change, bird/glass collisions are easily preventable, says De Groot. “The solution is simple: make glass visible to birds. This isn't climate change. This isn't complex. Implementing the solution isn't always easy, but we know what to do,” she says.

Numerous glass manufacturers have added bird-friendly product options in recent years. (For product information on the industry's bird-friendly options, visit [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019).) And demand is growing, driven by new incentive programs and, in some jurisdictions, bird-friendly glass requirements. “The issue isn't going away. In fact, we see it gaining momentum, becoming mainstream,” De Groot says. However, the work is just beginning.

While the solution to reducing glass-related bird deaths may be straightforward, it remains a niche market. It is a value-added product, and most owners won't make the investment until they are required to do so, according to one supplier. Additionally, “there is both a lack of education and availability,” De Groot says. “The conservation and glass manufacturing communities need to work together to fix it.”

## A TWO-FOLD PROBLEM

Glass presents a two-fold problem for birds: clarity and reflectivity. “Birds behave as if clear and reflective glass is invisible—[it] creates the illusion of clear passage,” says Sarah Wansack, Guardian Glass, [guardianglass.com](http://guardianglass.com), marketing manager, interiors, North America.

“Birds do not recognize reflective and transparent glass as a barrier, nor do they recognize architectural clues alerting to the presence of the glass,” adds Brad Thurman, vice president, sales and marketing, for GGI, [generalglass.com](http://generalglass.com).

Glass' transparency becomes a particular concern in walkways, greenhouses, bus shelters and glass railing systems. “The birds can see through the glass to the sky and vegetation on the other side,” says De Groot. This phenomenon is not unique to birds. “I'm sure many of us have collided with glass doors or walls at some point,” says De Groot. But the collision is much more harmful to birds than other species. “Birds are usually



traveling at much higher speeds than most which makes the impact much deadlier,” she says.

Glass’ reflectivity, on the other hand, acts as a mirror of the area surrounding it, so birds may think that they are simply moving from one tree to another or flying into the continuing sky. “This is even more likely when a bird has been spooked or is being pursued by a predator,” De Groot says.

## A STRAIGHTFORWARD SOLUTION

The solution to bird/glass collisions is straightforward: make glass visible to birds. Applying visual markers to glass, be they simple patterns or intricate decorative designs, allows birds to see and avoid the glass. To be successful, however, the markers must meet certain contrast and spacing requirements.

To create enough contrast for a bird to be able to see the visual markers and thus avoid collisions, the deterrent markers should reside on the No. 1 surface. Many species of birds have low resolution frontal vision due to their laterally facing eyes. If the markers are not on the No. 1 surface, reflections on the glass can overwhelm the deterrent pattern at certain times of the day, De Groot says.

Opsis Architecture, [opsisarch.com](http://opsisarch.com), designed the Oregon Zoo Education Center with a primary goal of keeping birds safe. Architects closely observed and studied how birds see and fly, and identified the biggest hazards they face when flying near buildings. The design team specified Walker Textures, [walkerglass.com](http://walkerglass.com), AviProtek E bird-friendly, acid-etched pattern on Solarban 70XL solar control low-emissivity glass by Vitro Glass, [vitroglazings.com](http://vitroglazings.com), for the building.

Intended to be a hub of environmental learning and activity, the 20,000-square-foot facility, which opened in March 2017, features extensive use of bird-friendly floor-to-ceiling glass with an etched pattern of varying line widths and spacing. This visual marker enhances visibility and prevents bird collisions, while supporting the center’s mission of education.

The building is designed for net-zero annual energy use, aided by the high-performance glass, plus passive ventilation, solar panels, LED lighting and more. The project is designed to achieve Living Building Challenge Net-Zero Energy certification, along with LEED Platinum certification. Photo by Rick Keating.

Spacing—the density of the deterrent pattern—is also vital. Birds can fly through small gaps at high speeds. (This is why even small windows present a hazard to birds.) Gaps in the visual markings on the glass should be no more than 2 inches horizontally and 4 inches vertically. This is referred to as the 2-by-4 rule.

“Research from the American Bird Conservancy shows that songbirds, the most numerous victims of collisions, will not fly into a space that is less than 2 inches by 4 inches,” says Wansack. “Songbird body size averages 2 inches tall with a 4-inch wingspan, so if a pattern on the glass observes this guidance, birds will usually avoid this area.”

One increasingly common option is glass with ultraviolet patterns. “Most birds see light in the ultraviolet spectrum,” says Thurman. Glass with a UV-reflective coating “makes it visible to birds while remaining virtually transparent to the human eye,” he says.

Another collision deterrent are glasses fabricated with more traditional decorative techniques, such as acid-etched or fritted glass.

“Bird-friendly glass can be an acid-etched or ceramic frit design applied to the glass surface that is visible to both humans and to birds,” says Thurman.

For aftermarket options, there are a number of films, tapes and markers that can be added to glass that fulfill the 2-by-4 rule. Building owners can also consider adding grilles, screens or shades to the exterior of windows, says De Groot.

## REQUIREMENTS AND INCENTIVES

Increasing research and development of bird-friendly glass and building product options can be attributed to three main drivers: municipal bird-friendly building development guidelines, green building program incentives and lawsuits targeting building owners with high bird collision rates, says De Groot.

A growing number of municipalities are adopting bird-safe regulations and guidelines, say suppliers. “We have been in the bird-friendly glass business from the start. I can tell you that we hear more and more about the need for it. Municipalities

**Left:** Arnold Glas', ornilux.com, Ornilux Mikado UV-patterned glass appears in high contrast to birds, but the pattern is invisible to the human eye in most conditions. Pictured, the Ornilux Mikado pattern is visible with the light at a certain angle.



**Right:** Acid-etched patterns on the No. 1 surface provide a decorative bird-safe glass solution. Pictured, the Walker Textures, walkerglass.com, AviProtek E bird-friendly, acid-etched pattern on floor-to-ceiling Solarban 70XL solar control low-emissivity glass by Vitro Glass, vitroglazings.com, at the Oregon Zoo.



across North America are adopting guidelines to protect the bird population,” says Danik Dancause, marketing operations manager, Walker Textures, walkerglass.com.

“There are many areas in North America that have adopted regulations, including Toronto, which was the first large city to create bird-friendly codes,” adds Guardian’s Wansack. There is a “broad sampling of different types of municipalities responding to this issue,” she says.

Jurisdictions in California, Illinois, Maryland, Minnesota, Michigan, New York, Oregon and Washington have adopted some form of bird glass regulations, voluntary or required, says Charles Alexander, business development director, Walker Textures. In Canada, requirements are in effect in jurisdictions in Alberta, British Columbia and Ontario.

Of particular note, CSA, the Canadian Standards Association, is poised to publish a bird-friendly glass performance standard for new and existing buildings. The voluntary standard is expected to be approved and published in July 2019, says Alexander. In the United States, there is also a pending bill, The Federal Bird-Safe Buildings Act of 2017, that would require bird-safe glass for GSA projects.

However, several sources note that, while the publication of voluntary standards helps improve knowledge of the problem, the adoption will be limited to more environmentally focused owners and architectural firms until the standards are required.

In addition to the codes, green certification programs are also driving demand for bird-friendly design. For example, the U.S. Green Building Council’s Leadership in Energy and Environmental Design program includes Pilot Credit 55 for the use of glass with bird-friendly patterns.

A third push for bird-safe building could come from the courts. Lawsuits over bird deaths are also becoming a greater concern, particularly in Canada. In one high-profile case, real estate developer the Menkes Group was charged under Ontario’s Environmental Protection Act for bird deaths at its Consilium Place towers in Toronto. The suit alleged that light from the reflective surfaces of the towers caused death to birds. The group was acquitted, but Menkes Group still took steps to treat the glass.

In another case, several charges were brought against commercial real estate company Cadillac Fairview for bird deaths at the glass-clad Yonge Corporate Centre. Cadillac Fairview was charged under

**JURISDICTIONS IN CALIFORNIA, ILLINOIS, MARYLAND, MINNESOTA, MICHIGAN, NEW YORK, OREGON AND WASHINGTON HAVE ADOPTED SOME FORM OF BIRD GLASS REGULATIONS, VOLUNTARY OR REQUIRED. IN CANADA, REQUIREMENTS ARE IN EFFECT IN JURISDICTIONS IN ALBERTA, BRITISH COLUMBIA AND ONTARIO.**

the Ontario EPA for emitting a reflected light “into the natural environment and that these emissions caused injury or damage, including death, to animal life,” according to court documents. The firm was also charged with contravention of the federal Species at Risk Act, which prohibits killing of a threatened or endangered species.

The case against Cadillac Fairview could be precedent-setting, says De Groot. “The judge ruled that building owner had contravened both the Ontario EPA and the federal Species at Risk Act. But Cadillac Fairview began testing bird-friendly films on their building’s most lethal facades prior to charges being laid, and the company’s due diligence in preventing deaths resulted in acquittal,” she says.

## LOOKING AHEAD

The growing demand for bird-safe glass presents a key opportunity for glass suppliers—those that are already working in the market and those who aren’t, says De Groot. “We need these products—a range of these products at different price points,” she says. “We see this as an opportunity for [the glass] industry.” ■

# THE GREEN BUILDING



*A look at the complex world of green building codes, standards and certifications, and how they're changing building design*

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**BY KATY DEVLIN AND WENDY VARDAMAN**



igh-performance, sustainable construction continues to make impressive gains worldwide. According to the World Green Building Trends 2018 SmartMarket Report from Dodge Data and

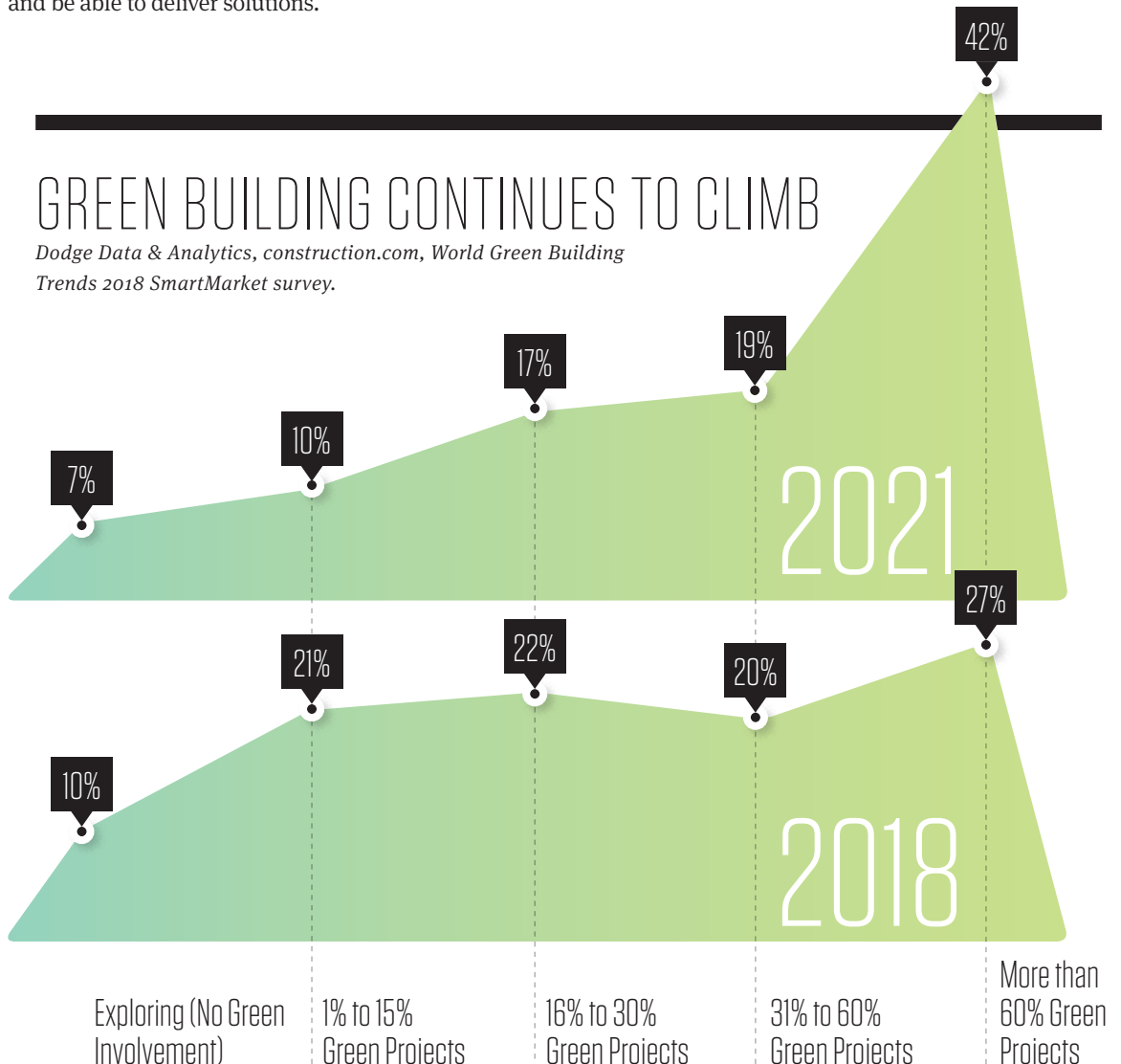
Analytics, construction.com, green construction is expected to see “dramatic increases” between now and 2021. And, nearly half of respondents to the Dodge survey expect that the majority of projects will be green by 2021.

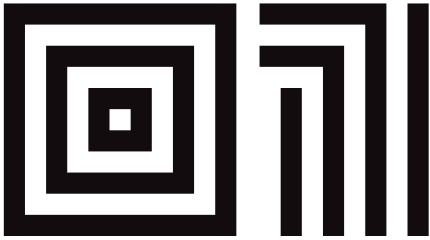
However, the path to better buildings can be daunting. The green building sector is mainly driven by a web of ever-changing codes, standards and certification programs pushing new performance requirements, setting higher benchmarks, and changing the way projects are designed and built. To compete in—and contribute to—the evolving green building industry, glass and glazing company leaders and project managers must understand the changing high-performance product requirements and be able to deliver solutions.

“What can the industry do? We need to continue to provide products with improved performance. We need to be tracking the requirements, understanding what the architectural community needs. We need to know what’s going into our materials and be able to determine whether they are truly sustainable,” says Lance Lawrence, architectural design associate, Viracon, viracon.com.

Additionally, industry representatives need to “be prepared to communicate the value of glass in high-performance buildings,” says Tom Culp, code consultant for the National Glass Association, glass.org, and owner of Birch Point Consulting. “When you’re talking with architects, it’s an opportunity to reiterate the benefits of glass. It’s an opportunity to talk about daylighting, access to views—how glass promotes health and wellness and increases real estate values.”

This article takes a closer look at the leading green building codes, standards and certifications, and how those programs are changing the industry.





## THE GREEN BUILDING MAZE

PART 01: GREEN BUILDING CODES, STANDARDS AND CERTIFICATIONS

BREEAM  
566,948

## BY THE NUMBERS

Global certifications of leading green building programs\*

BREEAM, which was first launched in 1990, leads the way in global project registrations with 566,948 in 80 countries. While BREEAM operates a program in the United States, it is most active in Europe, and the vast majority of the registrations come from European countries. LEED, developed by the U.S. Green Building Council in 2000, comes in second with 93,800 certifications.

LEED  
93,800



**ONLINE:** Visit [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019) for additional high-performance building programs.

PASSIVE HOUSE  
4,555

## BREEAM

*Building Research Establishment  
Environmental Assessment Method,  
[breeamusa.com](http://breeamusa.com)*

BREEAM was developed in 1990 by Building Research Establishment, or BRE, a multidisciplinary building science organization based in the United Kingdom. BREEAM In-Use was developed in 2009 and is the BREEAM program for existing commercial buildings. It rates buildings based on performance benchmarks. There are no prerequisites. A building owner or their consultant measures performance using the BREEAM In-Use online tool, which generates an unverified score for the building. For certification, an independent BREEAM In-Use licensed assessor is hired by the client to conduct a site visit, verify performance and confirm the performance rating on a scale of one to six stars.

“BREEAM is the UK version of LEED. They would say they were the first [green building certification program]. They’ve been trying to bring the program to the U.S.,” says Helen Sanders, strategic business development, Technoform North America, [technoform.com](http://technoform.com).

## LEED

*Leadership in Energy and  
Environmental Design,  
[new.usgbc.org/leed](http://new.usgbc.org/leed)*

Created in 2000 by the U.S. Green Building Council, LEED is used throughout North America as well as globally for virtually all building, community and home project types. To earn LEED certification at one of four levels, project teams must earn points outlined in the rating system by adhering to prerequisites and credits across nine measurements for building excellence from integrative processes, to building materials, to indoor air quality. The certification process takes place online and can occur upon completion of construction.

“When I hear about green certification, it’s generally about LEED,” says Tom Culp, code consultant for the National Glass Association, [glass.org](http://glass.org), and owner of Birch Point Consulting. The program has been in effect in the United States for nearly two decades and has been used to certify about 94,000 buildings.

The latest version of LEED, LEED v4, notably increased the stringency of its requirements, according to industry officials. “LEED version 4 got harder to meet. The daylighting and view credits, in particular, were harder to meet. I have heard of people building to LEED, but not certifying,” says Sanders. LEED v4.1, set to launch later this year, addresses some of those issues. “I understand that version 4.1 will reduce the stringency of the daylighting requirements,” says Sanders.

# ASHRAE 189.1 AND IGCC

*ASHRAE 189.1, ashrae.org, and International Green Construction Code, iccsafe.org*

Two leading model codes for green building, ASHRAE 189.1 from the American Society of Heating, Refrigeration, and Air-Conditioning Engineers and the International Green Construction Code from the International Code Council, consolidated into one model code for the 2018 version. The code—ASHRAE 189.1, Standard for the Design of High-Performance, Green Buildings Except Low-Rise Residential Buildings—contains minimum requirements for increasing the environmental and health performance of buildings' sites and structures. Generally, it applies to the design and construction of all types of buildings except single- and two-family residential structures, multifamily structures with three or fewer stories, and temporary structures.

"Glass wise, the major changes we see are due to the energy codes. There are more and more stringent requirements. The codes are really pushing the products or coatings that we're coming out with," says Lance Lawrence, architectural design associate, Viracon, viracon.com.

# ENERGY STAR

*energystar.gov*

The Energy Star Rating System, a government certification program from the U.S. Environmental Protection Agency and Department of Energy, uses a benchmarking method to assess a building's energy and water use. It is a voluntary program that provides tools and resources to businesses and organizations that want to strategically manage their energy use. Energy Star also has a product certification program. Canada also operates a version of the program, Energy Star Canada, run by Natural Resources Canada, nrcan.gc.ca.



THE CODES ARE  
REALLY PUSHING  
THE PRODUCTS OR  
COATINGS THAT  
WE'RE COMING OUT  
WITH.



# WELL

*Well Building Standard, wellcertified.com.*

Launched in 2014, the Well Building Standard from the International Well Building Institute is a third-party performance-based certification program for buildings, interior spaces and communities seeking to implement, validate and measure features that support and advance human health and wellness. Well was developed by integrating scientific and medical research and literature on environmental health, behavioral factors, health outcomes and demographic risk factors that affect health with leading practices in building design, construction and management. The standard measures attributes that affect health, including air, water, nourishment, light, movement, thermal comfort, sound, materials, mind and community.

"Well requires you to not just think about building design, but also the building operations all the way down to how walkable it is, whether the stairs are located in a place where people will actually use them, or even the types of foods on offer," says Sanders. "The program includes a nice requirement for daylighting and views, which [reflects the program's] focus on quality of environment."

"We believe the industry will experience a significant growth in Well-certified projects. [Well] provides guidelines that minimize disruption to the body's circadian system, enhance productivity, support good sleep quality and provide appropriate visual acuity," adds Ryan Park, global head, marketing and product management, SageGlass, sageglass.com.

GREEN GLOBES (U.S. AND CANADA)

3,328

WELL

228

LBC

86



## LBC

*Living Building Challenge, [living-future.org/lbc](http://living-future.org/lbc)*

The Living Building Challenge visualizes the ideal for the built environment. One of four programs administered by the International Living Future Institute, it is the most stringent. The program covers landscape and infrastructure projects, partial renovations and complete renewals, new construction and community design. Living Buildings must demonstrate that they have achieved net positive energy, net positive water and net positive waste. Certification requires actual, rather than anticipated, performance demonstrated over twelve consecutive months. The program works in combination with LEED.

“The Living Building Challenge reflects the push for actual, true sustainability—the push for net zero. It is starting to catch people’s eyes,” says Max Perilstein, owner, Sole Source Consultants, [solesourceconsultants.com](http://solesourceconsultants.com).

The program is considered the most stringent among many in the industry. “If LEED is a slight stretch [to meet higher performance requirements], the Living Building Challenge is a massive stretch. It is in ether when it comes to stringency,” says Sanders.

## PASSIVE HOUSE

*[passivehouse.com](http://passivehouse.com)*

Passive House Certification is a program developed and run by the German independent research group Passive House Institute. The program is based on a voluntary standard that promotes building design and product specification that reduce a building’s ecological footprint, resulting in high-performance buildings that require little energy for heating or cooling. The certification is applicable for residential and nonresidential projects. The Passive House Certification is not only available for buildings, but also for building components and professionals.

“Passive House certification is growing increasingly prominent in modern building and construction, which dictates extraordinarily strict new performance criteria, including thermal insulation, airtightness, heat and moisture-recovery ventilation, and the use of double- or triple-paned windows,” says Joe Erb, commercial sales specialist for Quanex Building Products, [quanex.com](http://quanex.com).

Sanders notes, however, that bringing the German Passive House program into North America presents challenges. “For one, [it measures] U-factor with a different calculation method. You have to figure out how to translate the European U-factor to something that works in the United States,” she says.

## PHIUS+

*Passive House Institute US Certification, [phius.org](http://phius.org)*

PHIUS is a non-profit organization committed to making high-performance passive building the mainstream market standard. All building types are eligible. The PHIUS+ Certification program is built on the new, PHIUS+ 2015 passive building energy standard, cost-optimized by climate. A Quality Assurance and Quality Control program is performed onsite by third-party raters. Buildings consume 86 percent less energy for heating and 46 percent less energy for cooling, depending on climate zone and building type, when compared to a code-compliant building.

“Passive House in the U.S. has worked with the U.S. government, the government labs, to figure out how to make climate-specified products more economically viable,” Sanders says. “We see more Passive House coming up in Canada, and this is a portent for what’s happening in the U.S.”



The new LEED Gold-certified Ent Center for the Arts at the University of Colorado, Colorado Springs, features solar-control, low-emissivity glass to maximize the building's energy efficiency, while meeting the architect's aesthetic goals. Vitro Architectural Glass, [vitroglazings.com](http://vitroglazings.com), supplied its Solarban 90 glass for the project, which was designed by Semple Brown Design, [semplebrown.com](http://semplebrown.com). Oldcastle BuildingEnvelope, [obe.com](http://obe.com), was the glass fabricator, and El Paso Glass, [elpasoglass.com](http://elpasoglass.com), the contract glazier. Learn more about this project at [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019). Photo by Tom Kessler.

## GREEN GLOBES

[greenglobes.com](http://greenglobes.com)

Green Globes is a building guidance and assessment program for existing buildings and new construction, with credits earned in different areas, including energy, indoor environment, site, water, resources, emissions and project/environmental management. The program originated in Canada, where it is run by the Building Owners and Managers Association Canada and was brought to the United States by the Green Building Initiative in 2004. The program has no prerequisites. A rating requires a Green Globes Assessor to perform an onsite assessment of the building. The first step toward certification is completing an online assessment survey.

## ZEB

*Zero Energy Building Certification, [living-future.org/net-zero](http://living-future.org/net-zero)*

One of four programs administered by the International Living Future Institute, ZEB certification requires that one hundred percent of the building's energy needs on a net annual basis must be supplied by onsite renewable energy. No combustion is allowed. Certification is based on actual, not modeled, performance. Any building, anywhere in the world, can become certified. Zero Carbon Certification is a slightly less stringent sister program for existing buildings only, in which combustion is allowed.

## C2C

*Cradle to Cradle, [c2ccertified.org](http://c2ccertified.org)*

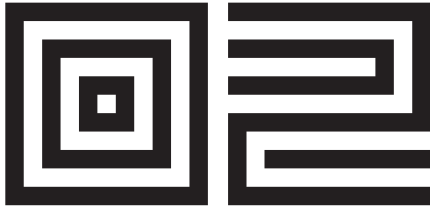
The Cradle to Cradle Products Innovation Institute, a non-profit organization, administers the Cradle to Cradle Certified Product Standard. The standard provides designers and manufacturers with criteria and requirements for continually improving what products are made of and how they are made. It looks at products through five quality categories: material health, material reutilization, renewable energy and carbon management, water stewardship, and social fairness.

## 2030

*2030 Challenge, [architecture2030.org](http://architecture2030.org)*

Architecture 2030 established the 2030 Challenge in 2006, setting a goal for all new buildings, developments and major renovations to be carbon-neutral by 2030. To support the 2030 Challenge, the American Institute of Architects, [aia.org](http://aia.org), created the 2030 Commitment Program, aimed at transforming the practice of architecture to respond to the climate crisis in a way that is holistic, firm-wide, project-based and data-driven. Over 400 A/E/P firms have adopted the 2030 Commitment, and firms from all over the country have been tracking and reporting projects since 2010, with over 2.7 billion square feet of project work reported in 2016 alone.

"It's great to see how many architecture firms are signing up for the 2030 Challenge," says Darijo Babic, architectural sales director, North America, Guardian Glass, [guardianglass.com](http://guardianglass.com). "We're excited to help our customers design, build and retrofit buildings that are going to reduce energy consumption and improve occupant comfort."



## THE GREEN BUILDING MAZE

PART 02: GREEN BUILDING  
TRENDS TO WATCH

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The Bullitt Center in Seattle was the first office building to achieve Living Building Challenge certification. Designed by The Miller Hull Partnership, millerhull.com, the 50,000-square-foot office features hundreds of sustainable building products that allow the building to execute its core performance functions while generating or renewing, onsite, 100 percent of its energy, water and waste management functions. Schüco USA, schueco.com, designed the high-performance curtain wall, which was fabricated by Goldfinch Brothers, goldfinchbros.com, and features Solarban 60 solar control, low-emissivity glass from Vitro, vitroglazings.com. The system incorporates triple-glazed insulating glass units fabricated by Northwestern Industries. Read more about this project at [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019). Photo by Tom Kessler.

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### PRODUCT TRANSPARENCY

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The industry continues its push for additional product transparency, driven by incentives and requirements in various certification programs, and even some calls for transparency at the legislative level. For example, the Buy Clean California Act, AB 262, will ask bidders on public works projects in California to submit an EPD, or Environmental Product Declaration, for specified flat glass products.

“Knowing what is in a product, where it comes from, how it impacts inhabitants and the environment, and product performance are critical considerations when designing a building,” says Andre Kenstowicz, national architectural manager, Vitro Architectural Glass, vitroglazings.com. In response, a number of industry companies have released EPDs and Health Product Declarations for their glass products. Learn more at [GlassMagazine.com/March2019](http://GlassMagazine.com/March2019).

### PERFORMANCE BENCHMARKING

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The next steps in green code development will be benchmark requirements and outcome-based codes, says Helen Sanders, strategic business development, Technoform North America, technoform.com. Benchmarking, which is newly required in places such as New York City and Chicago, requires building owners to post building energy use in a similar way to how restaurants post health inspection letter grades.

Benchmarking will allow the building community to have a baseline for building performance— “you can’t manage what you don’t measure,” says Sanders. Additionally, it may act as an incentive to owners to improve their own building’s performance. “You will have to disclose your performance, and you will try to make your property better than your neighbor’s.”



### OUTCOME-BASED CODES

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The next step after benchmarking will be outcome-based codes that would require buildings to meet their intended performance targets, says Sanders. “Now architects will not just make sure their model beats code. They will be engaged past occupancy,” she says. The outcome-based codes “will change behavior in all the right ways. [They] will make sure we’re building better buildings. The architects are going to make the right choices up front. Higher performance products will get specified and will stay specified. We as an industry are going to benefit.”





## HOLISTIC PERFORMANCE

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Several green certification programs, such as Well Building Certification and the Living Building Challenge, continue to push for whole-building performance rather than individual component performance. “This is what the forefathers of the green building movement have always wanted,” says Max Perilstein, owner, Sole Source Consultants, solesourceconsultants.com. “They have always wanted the project to be green, not just the product. This is where we’re headed.”

## NEW GLASS TECHNOLOGIES

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Energy codes are driving the glass industry to develop increasingly high-performance products, says Lance Lawrence, architectural design associate, Viracon, viracon.com. “It’s changing the products we see. Technologies like electrochromics, photovoltaics, [vacuum insulating glass], all seem to have a space in the industry,” he says.

Other products to watch include bird-safe glass and systems with continued improvements in thermal insulating, adds Kenstowicz.

## INTEGRATED DESIGN

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Meeting those whole-building performance goals will require more integrated design and project team collaboration. “Guardian Glass recommends that architects and design teams adopt the integrated design process, IDP, for designing high-performance buildings, and we’re starting to see this,” says Dar-ijo Babic, architectural sales director, North America, Guardian Glass, guardian-glass.com. “IDP is a holistic approach that requires the project team to think of the entire building and all of its systems together, which means the team is working collaboratively to implement sustainability goals.

“Applied during the early project stage, building performance analysis tools such as energy modeling, daylight modeling, thermal comfort modeling and heat transfer analysis are all critical to helping the team select the appropriate glass products,” Babic says.

## CERTIFICATIONS IN THE CODES

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Green certification programs are popping up in jurisdictional building codes. “Several cities have made it a requirement for city-owned, publicly owned buildings to be LEED certified,” says Tom Culp, code consultant for the National Glass Association, glass.org, and owner of Birch Point Consulting. “Washington, D.C., went the farthest, requiring all buildings over a certain size to meet green code—LEED, ASHRAE 189.1 or IgCC.”

Culp says there could be additional incentives on the horizon in some jurisdictions, such as tax incentives or expedited permitting for projects that meet certain green standards. ■

# PRODUCTS



SuperClear 45-HS-LI

SPOTLIGHT

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The SuperClear 45-HS and SuperClear 45-HS-LI, Safti First's new monolithic, fire-protective glasses, are rated for 45 minutes, with a clarity that enhances the product's aesthetics, says Tim Nass, vice president of sales, Safti First. SuperClear 45-HS and SuperClear 45-HS-LI, the latter being the low-iron version, meet all the fire, hose stream and safety requirements without the use of wires, films or laminates, says Nass. In addition to their durability, SuperClear 45-HS and SuperClear 45-HS-LI have a 37 STC/35 OITC rating in standard hollow metal framing.

The new series also features optical

clarity, with a visible light transmission of 90 percent. Listed and labeled by Underwriters Laboratories, SuperClear 45-HS and SuperClear 45-HS-LI can be used in 45-minute doors up to a maximum clear view area of 3,288 square inches and in 45-minute sidelites, transoms and openings up to a maximum clear view area of 3,880 square inches.

"We feel that this product will have mass appeal on various levels," says Nass. "Certainly, the architects will appreciate the aesthetics, flexibility and the fact that it is 100 percent tested/ listed and approved by code." Owners

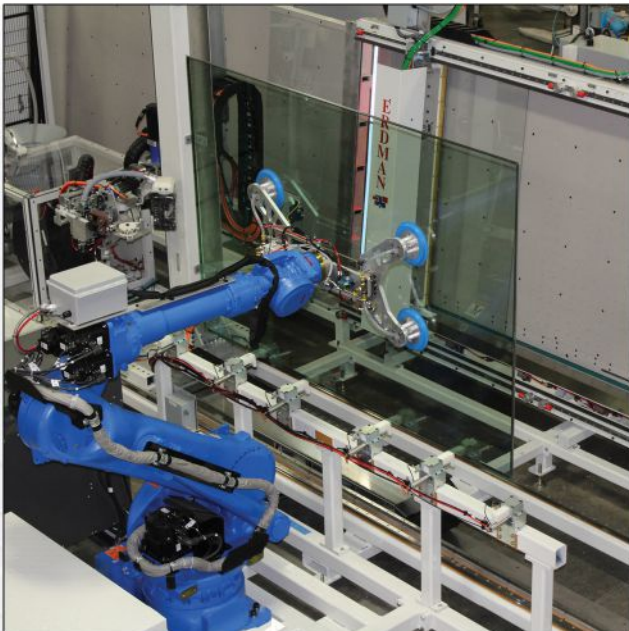
will also appreciate the product's clarity and ease of maintenance, as no films means the glass cannot scratch, Nass says. And, glaziers will also like the product's durability and a short lead time courtesy of domestic manufacture at the company's Merced, California, facility, he says.

Nass also anticipates broad application for the product, including schools and the institutional market. "We really see this product as a catch-all from door lites to sidelites/transoms and protected openings on both the interior or the exterior of the building," he says. 888/653-3333 | SAFTI.COM

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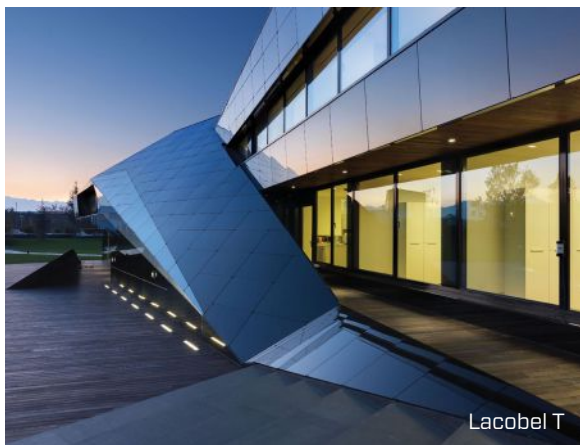
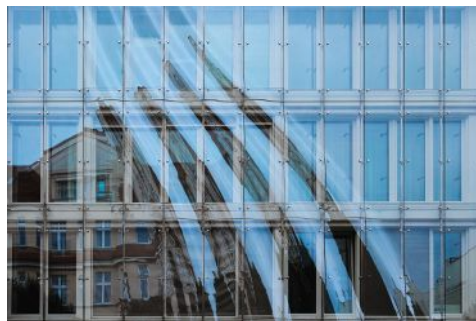
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PRODUCTS

01



02



03

Lacobel T



04

**01. Low-emissivity glass**

Şişecam’s Temperable Solar Control Low-E Glass Neutral 60/28, its new triple silver product, offers solutions for the diverse needs of prestigious projects, according to company officials. The high-performance glass provides light transmission, efficient solar control and energy savings, as well as a neutral appearance. A related product, the Temperable Solar Control Low-E Glass Neutral 50/27, offers solutions for office, hospital and hotel projects where neutrality is at the forefront, and a bluish color effect on the façade is required. +[90] 0850-2065-050 | SISECAM.COM

**02. 3D glass**

Press Glass introduced its 3D glass panes. The company’s 3D glass is fabricated using a new thermoforming approach with a patented technology based on ceramic molds instead of the previously employed metal molds. An efficient forming process of individual ceramic molds gives more freedom in the forming of large surfaces composed of unique glass panes, says the company. The 3D glass panes can also be laminated with one another using PVB foil. +[48] 3432-7506-9 | PRESSGLASS.COM

**03. Back-painted glass**

AGC Glass North America introduced a new portfolio of back-painted decorative glass. Its interior and exterior temperable back-painted glasses will include Lacobel T, a float glass painted on one side with a high-quality temperable paint to create a glossy finish, and Matelac T, an acid-etched float glass painted on one side with a high-quality temperable paint to create a satin finish. Each product is available in a palette of 10 colors. 800/251-0441 | AGCGLASS.COM

**04. Colored mirror**

Bendheim expanded its Glamir colored mirror collection with “Living Coral,” the 2019 Pantone Color of the Year. The new product is produced with specialty low-iron glass, eliminating the typical bluish-green glass tint and allowing the pure, delicate golden-pink hue to come to the fore. Ideal applications include wall-cladding material for hotel lobbies, restaurants, lounges and luxury residences. It is available to the trade in customizable sizes up to 47 inches by 120 inches in approximately 1/4-inch thickness. 800/221-7379 | BENDHEIM.COM



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PRODUCTS



01



02



03



04

**01. Shower enclosure**

Consolidated Glass Holdings Inc. launched Invisiwall shower enclosures, a complete glass-and-hardware solution for commercial shower applications. Pairing high-quality glass with multiple hardware combinations, Invisiwall shower enclosures provide a frameless, modern, high-end finish for commercial projects large and small. Available with standard clear glass or low-iron glass for superior transparency, Invisiwall shower enclosures also can be custom fabricated with acid-etched, sandblasted, silk-screened, decorative cracked and other glass types. 800/257-7827 | CGHINC.COM

**02. Colored stainless steel**

Kloeckner Metals Corp. installed new physical vapor deposition processing equipment to expand capacity and color options for surface-treated stainless steel and aluminum. Colored stainless steel is suited for multi-use developments, conveyance and hospitality spaces. The PVD process allows for various colors and provides increased wear resistance, hardness and resistance to corrosion. Stainless sheets are available in sizes up to 60 inches by 144 inches, parts and profiles in sizes up to 144 inches. 678/259-8800 | KLOECKNERMETALS.COM

**03. Tool tether**

Gear Keeper's new RT3-5605 retractable tether minimizes user fatigue and dangling tool entanglement, says the company. ANSI-121 compliant, the heavy-tool retractable tether's low profile keeps tools weighing up to 3 1/2 pounds close to the body when retracted while still allowing complete accessibility when needed. The RT3-5605 heavy-tool tether offers a reach extending more than 4.5 feet. The tether's durable, impact-absorbing nylon webbing does not require an additional shock-absorbing lanyard end. 888/588-9981 | GEARKEEPER.COM

**04. Digital printer**

Tecglass, a Fenzi Group company, released its new Single Pass Evolution digital printer. It can reach print speeds of 29 1/2 feet in 60 seconds, in continuous cycle, on glass sheets of any width. The Single Pass Evolution comes standard with the Vitro Scan tool to ensure perfect print results. It automatically reads and records the dimensions and position of the glass prior to printing, thus reducing the possibility of error, allowing for more reliable results, making the operator's job easier and optimizing production speed. +[1] 4166-7438-31 | FENZIGROUP.COM

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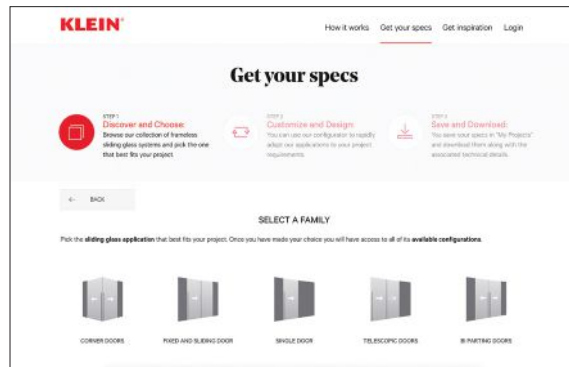
01



02



03



04



### 01. Glass tempering roll

Vesuvius released its newly designed glass tempering roll, the Smartly Driven Plus Rolls. A type of fused silica glass tempering roll, the new design brings greater accuracy, tighter tolerances, greater strength and a lighter weight than the existing designs. Vesuvius's Smartly Driven technology is an all-mechanical endcap, which uses no glue or resins to connect the ceramic to the endcaps. The original product line was designed to withstand the high temperatures needed to produce tempered, low-emissivity glass. 843/774-6026 | VESUVIUS.COM

### 02. Communication device

RugGear, a manufacturer of rugged mobile devices, introduced the RG725, a device as flexible and quick to use as a walkie-talkie but with all the advantages of a smartphone, according to company officials. The product is built with push-to-talk oriented design for industrial users to boost communication and workflow efficiency in a variety of work situations. A large battery and an extra-loud, over-105-decibel front speaker perform well on noisy construction sites, say company officials. 786/860-5555 | RUGGEAR.COM

### 03. Online program

Klein developed a new online program that creates specifications and jobsite drawings. According to the company, the tool quickly and accurately allows architects and designers to evaluate and select sliding glass door products and product options and create custom specifications, details and drawings. Features include a resource of inspiring project examples for users' designs, a built-in configurator designed to offer precise measurements, and the ability to create completed custom BIM files capturing all the product details and parameters. 973/246-8181 | KLEIN-USA.COM

### 04. IoT application

Intermac will release Sophia to the North American market. Sophia is the company's Internet of Things application and cloud-based software management tool. The tool helps users achieve higher productivity, say company officials, by providing them with an easy-to-use dashboard containing real-time visibility of machine status, performance and functionality. Sophia provides a comprehensive overview of specific machine performance features with remote diagnostics and constantly updated statistics. Sophia will be introduced on select models. 704/357-3131 | BIESSE.COM





Hawes

**PGT Innovations**

PGT Innovations, [pgtinnovations.com](http://pgtinnovations.com), elected *Frances Powell Hawes* to its board of directors.

Hawes' committee appointments are expected to be determined at a future PGT Innovations board meeting during 2019. She will serve as a class II director and the board expects to nominate her to stand for election as a director at PGT Innovations' 2020 annual meeting of stockholders. In connection with Hawes' appointment, the board increased its size from nine to 10 directors. Hawes formerly served as chief financial officer of NCI Building Systems Inc., [ncibuildingsystems.com](http://ncibuildingsystems.com), and Grant Prideco Inc., [nov.com](http://nov.com).

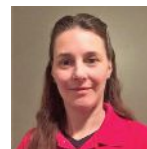


Hester

**Security Door Controls**

Security Door Controls, [sdsecurity.com](http://sdsecurity.com), appointed *Mary Hester*, a 17-year glass industry

veteran and the company's central regional sales manager, to lead a new initiative for easing the adoption and practical application of electrified hardware to glass doors. Hester is overseeing the assembling of SDC's code compliant, electrified hardware products—door operators, exit devices, access controls and locking devices—into complete electronic system solutions for glass doors.



Bradley

**Gateway Extrusions**

Gateway Extrusions, [gwextrusions.com](http://gwextrusions.com), promoted *Simone Bradley* to maintenance manager

for the company's manufacturing facility. Bradley and her staff are responsible for all maintenance and repair of production equipment and building systems for the 170,000-square-foot Gateway facility. She directs all machine and building repairs, establishes periodic maintenance schedules, oversees building maintenance projects, and works with all OEM vendors and service providers. In coordination with Gateway's safety manager, Bradley is working to improve safety and fire prevention programs throughout the plant.



Kafka-Harkema

**American Architectural Manufacturers Association**

The American Architectural

Manufacturers Association, [aamanet.org](http://aamanet.org), hired *Kathy Kafka-Harkema* as its codes and regulatory affairs manager. Kafka-Harkema will oversee the efforts of AAMA code consultants, in addition to her primary responsibility of helping the organization better understand the impact of the various code and regulatory agencies on the fenestration industry. This will include coordinating possible AAMA interactions with the International Code Council and state agencies, such as Florida, Texas and California. She will serve as a staff liaison for a number of AAMA code and regulatory groups and will lead member activities to facilitate the development of consensus AAMA positions on key issues.

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Williams

**Vitrum Glass Group**

Vitrum Glass Group, vitrum.ca, welcomed *Russell Williams* of Architectural Insider LLC as its newest sales and architectural representative. Located in the Greater Los Angeles area, Williams will focus on client representation in the Southern California, southern Nevada, and Hawaii markets. As a professional engineer, Williams understands the intricacies of various building systems and has the in-depth knowledge and ability to decipher building codes. This knowledge greatly assists clients in navigating the products best suited to their projects.



Kraft

**Suntuitive Dynamic Glass**

Suntuitive Dynamic Glass, [suntuiveglass.com](http://suntuiveglass.com), welcomed Kraft Consult, and its founder *Alexander Kraft* as an independent sales representative for the glass and glazing market in Germany. Kraft is an experienced consultant with a well-demonstrated history of working in the building materials industry, say company officials. Kraft has more than 18 years' experience in the innovative glass technology space. He will be responsible for sales growth and customer service throughout Germany and will be working closely with the regional Suntuitive Certified Fabricators along with Jim Gresehover, vice president, international development for Suntuitive and his team.



Roberts

**Azon**

Azon, [azonintl.com](http://azonintl.com), appointed *Margaret Roberts* as chief operating officer for the Azon companies. In this position, Roberts will be working with production, customer relations, information technology and overall assistance with the Azon international operations. Roberts has been with Azon for over 30 years serving most recently as the chief financial officer, overseeing all financial operations for the global company. Her corporate responsibilities include serving on the board of directors and the Azon management committee.

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
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
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
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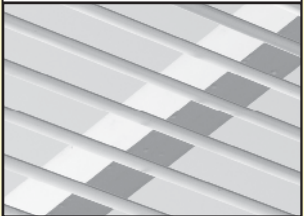
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## THE FUTURE OF WEARABLE TECH ON THE JOBSITE



The new Guardian XO Max is a full-body exoskeleton designed for industrial, public safety and military sectors, according to Sarcos Robotics, the manufacturer. Photo courtesy of Sarcos Robotics.

Construction may be going bionic. In November 2018, Sarcos Robotics, [sarcos.com](http://sarcos.com), a global technology firm that designs robotic systems, announced in a company release that the company developed a “full-body, powered industrial exoskeleton robotic system,” the Guardian XO Max. The technology, the product of a nearly two-decade research and development process, allows the user to lift up to 200 pounds and is slated to be available in 2020.

“The potential for full-body, powered exoskeleton technology is immense—from giving our workers super-human strength without putting added strain on their bodies, to improving productivity and efficiency,” says John Santagate, research director, IDC, [idc.com](http://idc.com), a market intelligence firm.

Sarcos Robotics’ innovation, designed for the industrial market, has clear implications for all construction and building industries, and specifically for workers on the jobsite. Survey responses from the Commercial Construction Index, compiled by the USG Corp., [usg.com](http://usg.com), and the U.S. Chamber of Commerce, [uschamber.com](http://uschamber.com), suggest that construction firms are ready to invest in these new technologies. The fourth quarter 2018 report of the CCI, released in December 2018, showed that 74 percent of construction contractors surveyed expect to adopt new technologies, including wearable technology, over the next three years.

Current wearable technologies include a range of some automated equipment and robotics, but also wearable sensors connected to the BIM model that may denote what training and permissions employees have, says Donna Laquidara-Carr, Industry Insights Research director at Dodge Data & Analytics, [construction.com](http://construction.com). “These kinds of tags are designed to make workers’ abilities and movements transparent to a supervisor,” she says. “For example, workers moving into a section of a worksite that is beyond their training level might be flagged as a danger to prevent injury.”

According to the CCI, most contractors—83 percent—see wearable technology as a way to improve worker safety. Improved workforce management and productivity were other perceived advantages.

Increased affordability is also a likely variable in the adoption of these technologies. “Cost is always a major factor,” says Laquidara-Carr. “Costs for those technologies are coming down, contributing to contractors’ interest in using them.”

Another factor in the anticipated adoption of these technologies is the growing tech literacy of workers. While the construction industry can be slow to change, says Laquidara-Carr, most workers at construction companies have become familiar with different forms of tech through regular use. “Workers no longer have this huge barrier to learn fancy new tech,” she says. “Normal consumers, including people in construction, have gotten much more tech-savvy.” ■

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