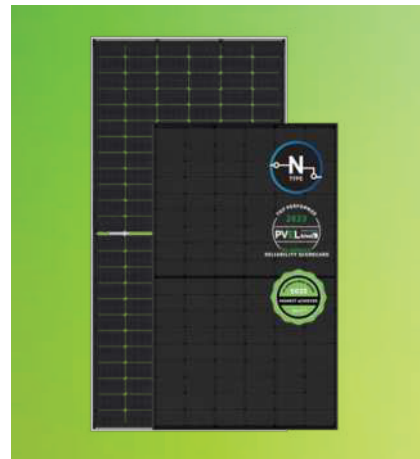


Award-Winning Coverage of Sustainable Construction, Products and Lifestyles

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March/April 2024 / www.greenbuildermedia.com



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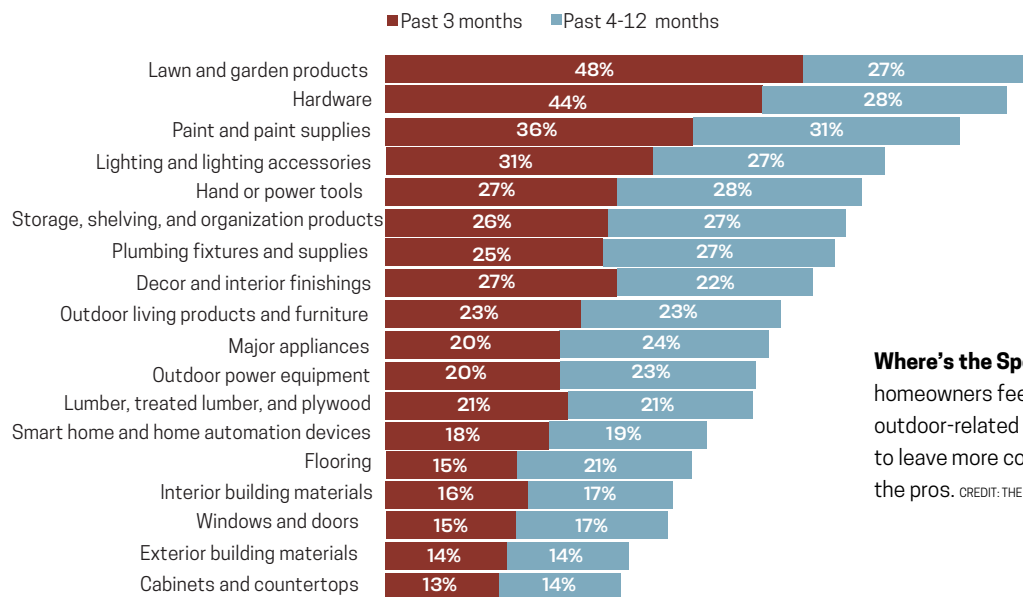
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DIY Trends Point to Young Homeowner Priorities

Purchase Incidence



Where's the Spending? When it comes to DIY, homeowners feel most comfortable with outdoor-related goods and projects. They tend to leave more complex indoor installations to the pros. CREDIT: THE FARNSWORTH GROUP

If you look at the products of interest to new homeowners in the DIY sector, you can get a sense of the lifestyle and homes they prefer.

What's the "perfect" product to catch the eye of a 30-year-old who just bought her first home? Based on the latest surveys from the **Farnsworth Group** and our own **COGNITION SmartData**, it will be something outside the four walls of the house.

My list would include decking made from recycled materials, porous pavers, solar-powered patio lighting and perhaps a small outdoor kitchen area. On a more gimmicky level, throw in an off-grid chicken house and a small greenhouse, and you've got millennials' attention.

This interest in the outdoors marks a mental shift. A survey from 2022 found that most Americans spend 93 percent of their lives indoors (87 percent inside buildings and 6 percent in automobiles). Only 7 percent of their time is spent outdoors. How can we expect creatures acclimated to living in boxes and mobile tin cans to seriously address the climate crisis?

So what's the purchasing pattern for home products related to outdoor living? It goes something like this:

- Box store backgrounding.** More than two-thirds of young buyers do their research on websites operated by big do-it-yourself (DIY) retailers such as Lowes, Home Depot or Ferguson, followed by Google searches or Amazon browsing.
- YouTube for the details.** Once they find products of interest,

they go to YouTube and watch installation videos. Facebook is their next "go-to" resource.

- Hands-on buying.** Despite the online researching, two-thirds of DIY purchases occur at a physical location. However, the younger the buyers, the more likely they close the deal online.

Another takeaway from surveys is that homeowners don't want to do *everything* themselves.

Their confidence level drops off rapidly as projects get more complex. For example, they have a high level of comfort with painting, replacing door hardware or upgrading lighting, but few want to tackle replacing a shower or countertop.

Performance and price matter most

Don't underestimate the financial stress facing younger homeowners. They're careful with their DIY budgets, willing to wait for items to go on sale or free shipping before buying. They track reviews closely before buying. They care about sustainability, but they want it "baked in" to the brands they support.

You'll find a lot of those brands in this, our annual product award issue. Companies that make the extra effort to reduce their carbon footprint don't just win awards. They win the loyalty and dollar of the next generation of homebuyers. **GB**



Matt Power
Editor-in-Chief

matt.power@greenbuildermedia.com

Smatrix Pulse Wireless Controls: Award-Winning Sustainability



This smart-home system is a Green Builder 2024 Sustainable Product of the Year designed to create lasting comfort. Homeowners can control their radiant and forced-air systems via a voice assistant or an app.

Discover more about this innovative, energy-efficient solution at uponor.com/smatrixpulsecontrol.





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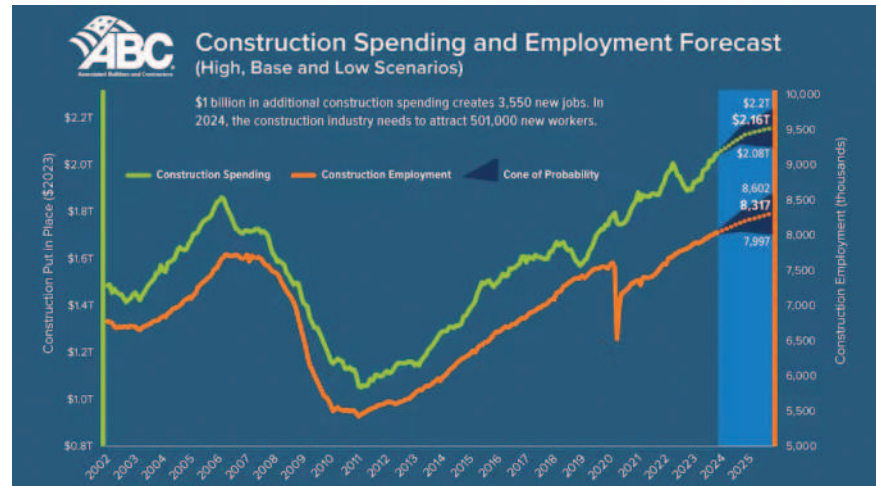
Building Industry Faces Critical Labor Shortage

Estimates call for more than 500,000 new workers to meet this year's demand.

The U.S. construction industry will need to attract an estimated 501,000 additional workers on top of the normal pace of hiring in 2024 to meet the demand for labor, according to a proprietary model developed by trade group **Associated Builders and Contractors**. And in 2025, the industry will need nearly 454,000 more new workers on top of normal hiring to meet industry demand, and that's presuming that construction spending growth slows significantly next year, according to Michael Bellaman, ABC president and CEO.

The increased labor demand comes on top of the current, above-average level of construction job openings, ABC notes. Projected industry retirements, shifts to other industries and other forms of anticipated separation are also embodied within the model's computations.

One positive note: Labor shortages have led to job security. According to Census Bureau Job-to-Job Flows data, the U.S. construction industry unemployment rate in 2023 averaged 4.6 percent for the second straight



Employment opportunities. If the amount of construction in 2024 increases by \$1 billion, there will be 3,550 new jobs to fill. A projected \$2.2 trillion market will mean a need for more than half a million additional workers.

SOURCE: ASSOCIATED BUILDERS AND CONTRACTORS

year, matching the second-lowest level on record, while job openings remained historically elevated at an average of 377,000 per month. As a result, contractors laid off workers at a slower rate than in any year between the starts of the data series in 2000 and 2020. **GB**

Report: Rental Housing Ill Prepared for Climate Impacts

Millions of houses and apartments were not designed for the danger zones they are in.

More than 18 million rental units nationwide are exposed annually to climate- and weather-related hazards, and most of them are not able to withstand these increasingly occurring disasters, according to the latest **American Rental Housing Report** from Harvard University's Joint Center for Housing Studies (JCHS). The rentals most threatened are usually older, less-expensive and occupied by people who can't afford to move, JCHS notes.

Units with the highest risk are manufactured housing, according to Sophia Wedeen, a researcher on rental housing, residential remodeling and affordability at the Joint Center for Housing Studies. Fifty-two percent of such homes are in locales with extreme hazards like wildfires, flooding, earthquakes and hurricanes. There are more than 48 million rental units nationwide, according to the Census Bureau.



Danger zone. Nearly one-third of all rental units across the U.S. are not designed to withstand severe natural- or climate-driven disasters such as fires, floods, earthquakes or hurricanes. CREDIT: ISTOCK/BILANOL

Low-rent or subsidized units also face preservation issues, leaving them in poor physical condition, the study notes. Also, owners of nearly half of rental properties across the country don't know they have a flood risk, which usually means a lack of flood insurance, according to Jeremy Porter, head of climate implications research for First Street Foundation, a nonprofit organization in New York. **GB**

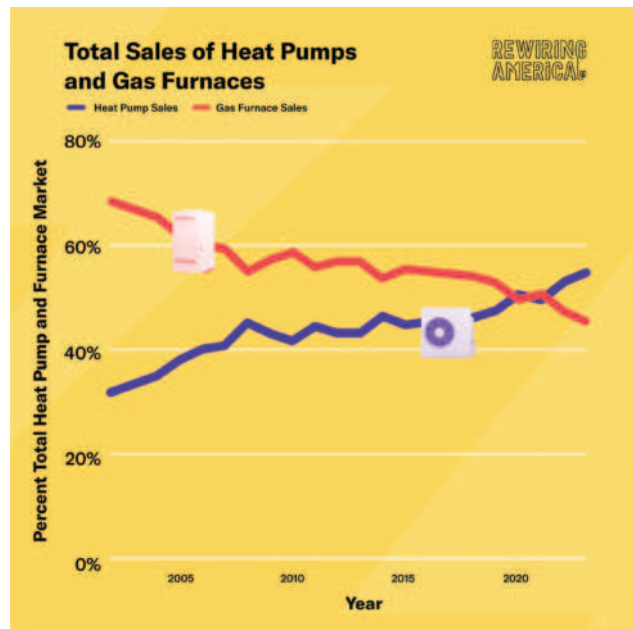
Electric Heat Pump Purchases Keep Rising

Sales of gas-burning furnaces are falling further behind.

For a second consecutive year, U.S. heat pump sales have outpaced those of gas-burning furnaces, with the emissions-free electric machines increasing their total market share from 52.8 percent in 2022 to 54.7 percent in 2023, according to a report from the [Air-Conditioning, Heating, and Refrigeration Institute \(AHRI\)](#). Heat pumps' growing market share "indicates a strong trend of changing consumer preference and the positive effects of state and federal policies designed to incentivize their adoption," AHRI notes.

Tax credits of up to \$2,000 for heat pump or heat pump water heater upgrades included in the Inflation Reduction Act (IRA) became available to American homeowners in 2023. In 2025, significant IRA rebates will come online in multiple states, which will likely increase overall sales even further, according to AHRI's report.

In addition, public awareness of heat pump benefits continues to grow—including that they can serve as air conditioners in warm months, replacing,



Hot sales. As climate change creates demand for residential cooling in climates where it had not been necessary before, more people are opting for heat pumps, capable of providing heating and cooling in one dual-use machine.

SOURCE: REWIRING AMERICA

less energy-efficient AC units, AHRI notes. Thank the web for much of it: Google searches for the term "heat pump" have doubled since 2019, according to search analytics company Ahrefs. **GB**

Renewables, Nuclear to be World Energy Standard by 2025

Coal's future continues to dim as more nations switch to cleaner power.

Renewable energy is set to overtake the world's use of coal by early 2025 and will then account for more than one-third of Earth's total electricity generation. At the same time, nuclear power generation is forecast to reach record highs by 2025, rebounding from recent declines, [according to a study by the International Energy Agency \(IEA\)](#). Renewables and nuclear will account for almost half of the energy generated on the planet by 2026, up from less than 40 percent in 2023, IEA notes.

According to a report by POLITICO, the changing electricity mix will drive down emissions from the power sector—currently the world's largest source of carbon dioxide emissions—even as demand rises. Although electricity demand grew just 2.2 percent globally in 2023, lower than the 2.4 percent increase a year before, demand is forecast to accelerate by 3.4 percent



Atomic energy age? Coal's decline is clean energy's gain. Almost half of the world's power is expected to come from renewables and nuclear by 2025. Ten years earlier, coal, natural gas, and all other energies each accounted for one-third, according to the National Academies of Sciences, Engineering and Medicine.

CREDIT: ISTOCK/RELAXFOTO.DE

from 2024 to 2026, IEA notes.

That increase is driven by a number of factors, including the electrification of homes and businesses, the growing role of electric vehicles, and industrial growth, the agency adds. **GB**

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SMART HOME TECHNOLOGY

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
1	Amazon (Alexa)	1.3	6.1	1.1	4.1
2	Google (Nest)	2.9	6.2	1.2	4.1
3	Samsung (SmartThings)	3.8	6.3	1.1	4.1
4	Apple	4.2	6.4	1.2	4.1
5	Honeywell	8.1	6.5	1.3	4.1
6	Leviton	8.9	6.6	1.1	4.1
7	Forecon (Jaxx, Linkys, Phys, Water)	7.8	6.7	1.2	4.1
8	Savant Systems	8.1	6.8	1.2	4.1
9	Snap On (Control)	8.6	6.9	1.3	4.1
10	Brilliant	9.4	7.0	1.1	4.1

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"At the end of the day, that program is a juicy cash cow used to lure companies in the building products sector into the inner circle and then milk them for major bucks." [PAGE 64](#)

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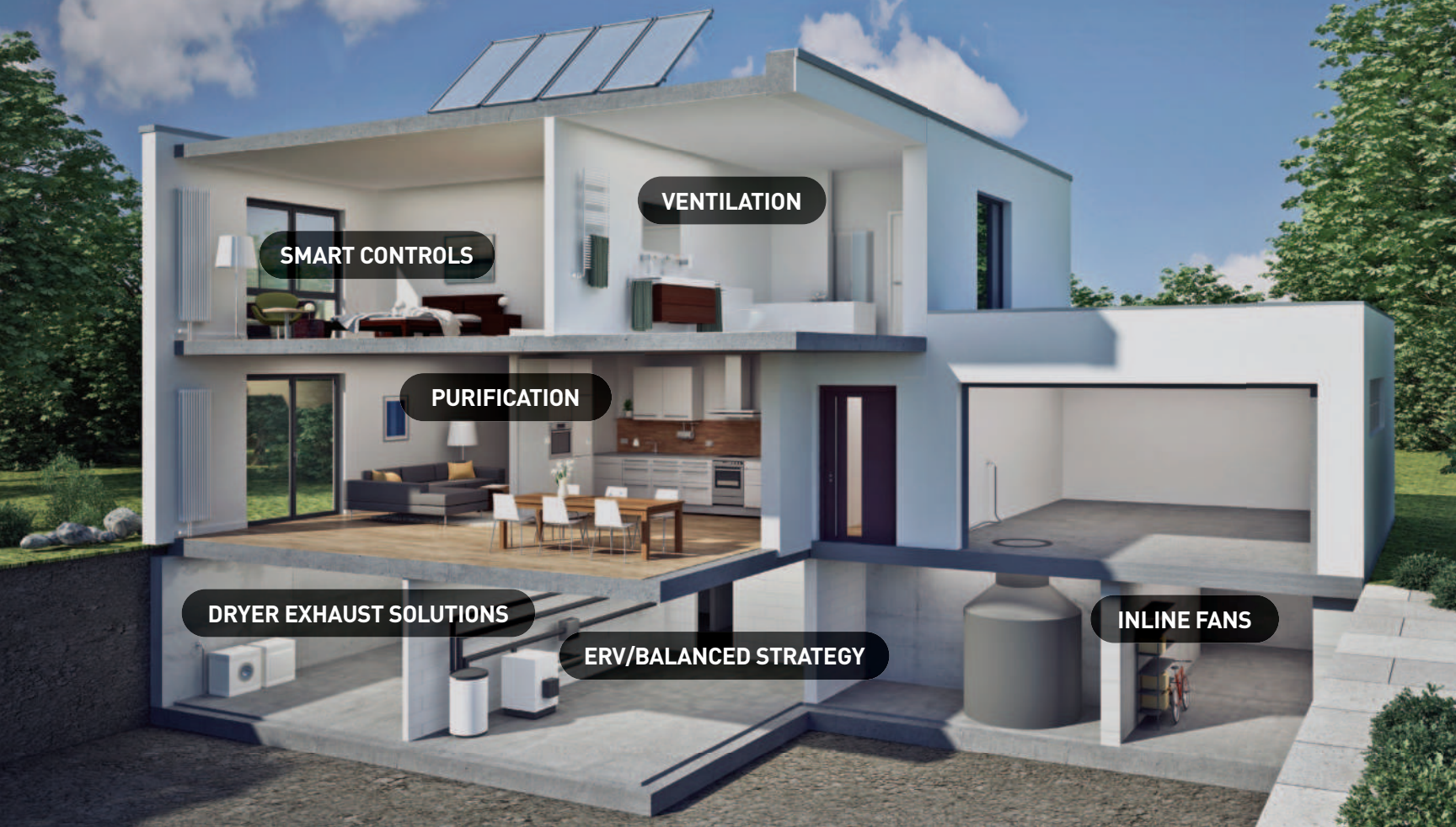
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FROM 'NEW AND IMPROVED' TO 'CUTTING EDGE,' THESE HIGHLIGHTED SUSTAINABLE PRODUCTS ARE A **GRAB BAG OF GREEN.**

BY GREEN BUILDER STAFF

At one time, everything we now buy, use or own was new and groundbreaking. Most of these items have been upgraded many times. **Green Builder's "Sustainable Products of the Year"** lineup for 2024 includes some of these classic fixtures. But there are also eye-popping innovations making their debut. Our 2024 roster manufactures items that encourage sustainability through innovative technology and vision. For returnees, reappearing on our list reinforces their enviro-friendly actions. For newcomers, it's a chance for their products to become tomorrow's classics.



Appliances



KitchenAid 4-Element Induction Slide-In Convection Range

No natural gas used, a definite energy savings and green construction make *KitchenAid 4-Element Induction Slide-In Convection Range* a sustainable product. Ease of use makes the 6.4-cubic-foot, 30-inch model an eye catching one for consumers.

Billed as “a sophisticated blend of precision and versatility,” the *4-Element Induction Slide-In Convection Range* features a sensor-induction cooktop that directs heat precisely within cookware. Regular electric cooktops lose heat as it travels from the element through the surface of the cooktop. However, sensor induction results in little-to-no heat loss from the surface of the appliance to a serving platter. Induction cooktops also offer exceptional responsiveness to temperature changes, and a homeowner does not need to wait for the coil to cool when lowering the heat setting. A user may quickly go from a rolling boil to a gentle simmer.

FOR MORE INFORMATION: WWW.KITCHENAID.COM

LG Heat Pump 27-inch All-In-One WashCombo

Using 60 percent less energy with every load, the 2024 All-In-One *WashCombo* from LG Electronics can wash and dry clothing in under two hours with help from the Inverter Heat Pump technology, without having to alternate the load. With LG’s advanced inverter heat pump incorporated into the ventless electric dryer, it specializes in low-temperature drying without damage to fabric, and it can be installed virtually anywhere with a standard 120-volt plug.

The ENERGY STAR-certified *WashCombo* also saves water. It has built-in sensors with AI technology to detect fabric texture and load size. It automatically selects the right wash motions and temperatures, dispenses detergent and softener, and selects the drying motions level for more-advanced fabric care. The super-large 5.0-cubic-foot capacity means fewer loads, further conserving energy and water.

LG’s washer-dryers also pair with the *TWINWash* feature, the *SideKick* mini-washer that is ideal for cleaning delicates or daily workout gear without the need for additional space. And, the *WashCombo* is compatible with the *ThinQ* app, which enables updates, downloadable features, diagnostic alerts and maintenance via an owner’s smartphone.

FOR MORE INFORMATION: WWW.LG.COM



Bertazzoni Professional Series 48-inch Induction Range

When appliance shopping, homeowners are increasingly taking environmental aspects as well as aesthetics into consideration. Bertazzoni’s latest *Professional Series* range is a very big step—the company’s biggest thus far—into the benefits of induction cooking

Bertazzoni’s 48-inch induction range delivers functionality, design and easy cleanup while conserving energy and preserving indoor air quality. The unit features one continuous cooking surface—the largest the company has ever offered—with six high-power heating zones with a maximum power output of 3,700 watts. The right-side heating zones can be bridged to create a larger cooking area. Each induction area has a convenient read-out interface on the glass worktop. The range also features a dedicated air-frying mode for healthier cooking, digital-timed cooking functions and sensor-controlled cookware detection.

Meanwhile, the unit’s 4.6-cubic-foot oven is designed to maximize interior volume and can be wiped clean without effort. A 2.4-cubic-foot auxiliary oven is perfect for smaller dishes and for warming. Both ovens include features such as smooth telescopic glides for shelves and soft-close doors. And, the range’s new extra dark Carbonio finish provides a seamless blend from the hood to the kitchen surface.

FOR MORE INFORMATION: [HTTPS://US.BERTAZZONI.COM](https://us.bertazzoni.com)



Bath and Lighting



DMF Lighting X Series 2-inch Modular Downlights

DMF Lighting's collection of modular 2-inch downlights feature field-changeable trims, modules and optics for exceptional versatility, performance, installation, serviceability and sustainability. The downlights are free of toxins and harmful chemicals deemed non-sustainable. The energy-efficient LED downlights are also ENERGY STAR rated and only consume 9.5 watts to 16.5 watts, depending on desired brightness.

Drivers are integrated into the light engine modules versus the housing for easy serviceability. Because housing can be reused, there is no need to rip out the ceiling when wanting to change optics and trims, or when LED chips are upgraded as technology continues to advance.

Meanwhile, in a breakthrough for error-free installation, the downlights are shipped with a patent-pending collar to eliminate over-cutting and drywall repair, which is common with small-aperture fixtures. The collar provides depth adjustment and a secure fit, making flush-to-ceiling installation in drywall or millwork easy to achieve. It also provides overspray protection.

Housings and modules can ship separately so the housings can be installed before the lighting design is finalized, reducing onsite storage requirements and helping an installer maintain a tight project deadline.

FOR MORE INFORMATION: WWW.DMFLIGHTING.COM



Niagara Phantom One Piece Toilet

Niagara's *Phantom One Piece* toilet is a blend of design and award-winning technology, offering industry-leading performance and water efficiency that helps customers reduce water consumption and alleviate high utility bills. The *Phantom One Piece* toilet includes Niagara's patented *Stealth Technology*, which has re-engineered the flush into a high-power, low-maintenance, virtually clog-free, water-efficient solution that has saved billions of gallons of the world's water. The WaterSense-certified unit also has a vacuum-assist pull and a noise-canceling tank for a whisper-quiet flush at 0.8 gallons per flush (GPF).

The *Phantom One Piece* displays a modern, sleek design that is ideal for residential and multifamily properties. It also offers a comfortable elongated bowl and ADA height. Its design offers a concealed trapway that is aesthetically pleasing and makes it one of the easiest toilets to clean.

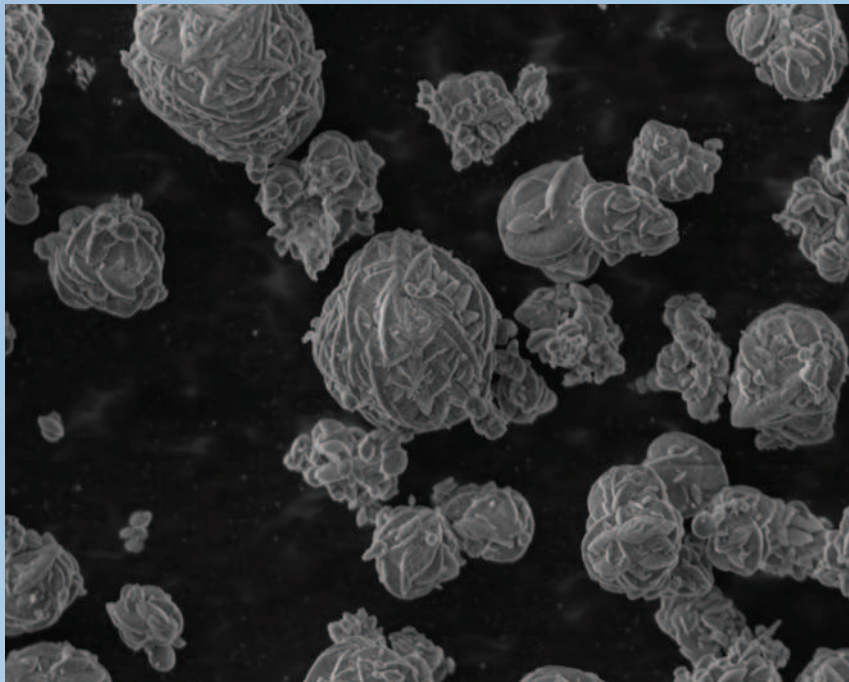
Builders and plumbing professionals will find the convenience of a pre-assembled tank extremely useful—the *Phantom* can be installed quickly and efficiently. The *Phantom* also offers an extra-large footprint so that replacement requires little to no floor repair.

FOR MORE INFORMATION: [HTTPS://PRO.NIAGARACORP.COM](https://pro.niagaracorp.com)





Construction



Fortera *ReAct* green cement

With cement becoming a huge environmental problem—experts estimate that producing 1 kilogram (kg) of concrete also means sending 1 kg of carbon dioxide into the atmosphere—Fortera developed the *ReCarb* process, a groundbreaking method to manufacture low-carbon cement within the existing production infrastructure. *ReCarb* generates cement with 70 percent less CO₂ from its proprietary chemistry. When combined with green energy, cement becomes zero CO₂ emission, and when combined with green energy and carbon capture, utilization, and storage (CCUS) techniques, CO₂ emissions prevention surpasses 100 percent, meaning it actually absorbs carbon from the atmosphere.

This transformative bolt-on technology seamlessly integrates with current cement facilities, leveraging the entire production framework, from machinery to feedstocks, to ensure a globally scalable solution for sustainable cement manufacturing.

The *ReCarb* process results in *ReAct*, a green cement that meets regulatory standards and can be blended with or used in place of traditional cement. It can be blended into ASTM C150, C595, or C1157-ASTM C150. Industry applications include *Portland Limestone Cement*, *Slag Extender*, *Fly Ash Extender*, *PLC Extender*, *LC3 Enabled*, *Fiber-Cement Board* and *Lightweight Aggregate*.

FOR MORE INFORMATION: [HTTPS://FORTERAGLOBAL.COM/PRODUCTS](https://forteraglobal.com/products)

Preflex Building System

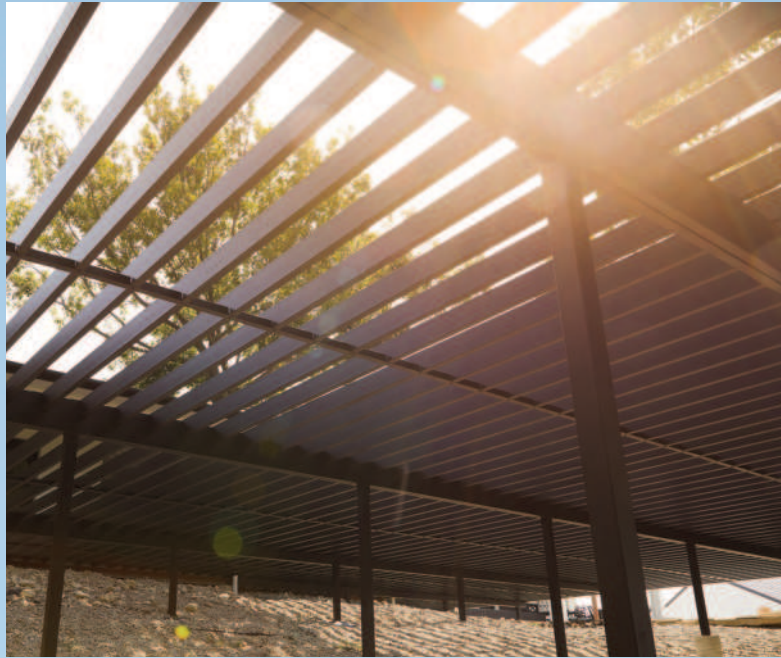
Preflex Inc.'s *Preflex Building System* harnesses the power of building information modeling (BIM) and offsite fabrication to engineer and manufacture structural insulated panels (SIPs). The SIPs include a solid core of expanded polystyrene (EPS) structurally laminated between two oriented strand board (OSB) skins, resulting in superior energy efficiency, unmatched comfort, exceptional air quality, flexible design, robust structural strength, and a construction process that is twice as fast compared to traditional stick framing.

The system also dramatically reduces environmental impacts and jobsite waste, and all manufacturing waste is recycled. Preflex structures emit 45 percent less CO₂ annually than traditional stick frame buildings, significantly contributing to a greener planet. The airtight construction eliminates contaminants such as dust and pollen coming into the building, prevents mold growth, and reduces noise pollution. A Preflex SIP home uses 40-60 percent less energy than its stick frame counterpart.

The Preflex SIPs' resilience against natural disasters result in stronger homes that can lead to lower insurance costs, and their superior energy performance often results in higher appraisal values.

FOR MORE INFORMATION: [WWW.PREFLEXINC.COM](http://www.preflexinc.com)





Fortress Building Products *Evolution* steel deck framing system

Fortress Building Products' *Evolution* steel deck framing system leverages the proven advantages of steel. This comprehensive system is manufactured with mild carbon steel, which is formed into light-gauge steel (LGC) components. The recyclable building material has a yield strength roughly 10 times greater than wood, and flexes with force. And, steel framing should last at least 50 years, long beyond treated wood, which needs to be stained and sealed every few years and replaced every two decades.

Steel is also noncombustible, which means that it can help builders and contractors complete fire-safe projects in regions that are prone to wildfires, or densely populated urban areas where fires can spread rapidly.

The material's capacity for load-bearing weight has a direct correlation with its ability to provide greater spans. For example, fewer posts are required, which frees up more usable space underneath a customer's upper-level deck. Contractors are not handcuffed by the span limitations of wood joists, allowing for greater design flexibility with design. They can also conserve resources and support a more-sustainable project.

FOR MORE INFORMATION:

[HTTPS://FORTRESSBP.COM/FRAMING/EVOLUTION-FRAMING](https://fortressbp.com/framing/evolution-framing)

GMX/Novawood North America *Thermowood* Ayous Sustainable Lumber

GMX Group/Novawood North America's *Thermowood* Ayous lumber combines the elegance of premium wood aesthetics with cutting-edge thermal modification technology. Harvested from fast-growing Ayous trees, this premium lumber ensures minimal environmental impact. It allows architects and designers to elevate projects with quality, durability and the sophisticated look of Ayous wood.

Crucial for ceiling, wall and rainscreen applications, the lumber's thermal modification process significantly reduces moisture content, making *Thermowood* Ayous a lightweight material with exceptional adaptability and minimal need for maintenance. The thermally modified lumber is up to 300 percent drier than standard wood species, allowing easy handling, simplified installation and reduction of labor. The process also increases the wood's resistance to decay, insects and moisture.

Thermowood has a smaller ecological footprint compared to concrete and steel. Concrete and steel production requires 3 to 4 times more water and almost twice as many fossil fuels, exacerbating environmental strain. While growing, wood captures carbon dioxide and stores it, effectively reducing atmospheric carbon levels. And, aiding in controlling noise levels within interiors, Ayous offers natural acoustic properties that contribute to sound absorption to create more comfortable indoor environments.

FOR MORE INFORMATION: WWW.THERMOWOOD.COM





Controls and Sensors



Uponor *Smatrix Pulse* control system

Uponor's *Smatrix Pulse* is a smart solution for maximum energy efficiency. The unit is a wireless control system that provides radiant and air-side comfort for multiple zones in a home. Homeowners can enjoy precise control of their radiant floor heating as well as their forced-air heating and cooling systems with one solution that connects to a smart home assistant. It can be controlled remotely via the *Smatrix Pulse* app or a favorite voice assistant.

The system measures air, surface and floor temperatures in each zone with embedded operative sensors in the thermostats, along with optional slab sensors. The system includes revolutionary autobalancing technology for the radiant side, providing homeowners with 25 percent faster radiant reaction times and up to 20 percent greater energy savings. The control system includes the latest encryption technology and options for personal settings to ensure homeowner information is safe.

Installation is easy for contractors with the elimination of thermostat wiring. Also, plus no internet is needed with the *Installation Wizard* in the *Smatrix Pulse* app. Users experience long-lasting, intelligent design with the latest technology and cloud functionality from the experts in radiant heating.

FOR MORE INFORMATION: WWW.UPONOR.COM

Resideo *First Alert L Series Water Leak Damage Defense System*

The combined technology of Resideo's *First Alert L Series Water Leak Damage Defense System* stops water waste and damage at the source, responding to water alerts with an automatic shutoff response for simple water damage prevention.

First Alert L1 WiFi Water Leak and Freeze Detector senses water leaks, temperature changes and humidity, and sends homeowners an alert via the Resideo app or the device when a leak or freeze is detected, or when the temperature or humidity levels are outside a set range.

The new *First Alert L2 WiFi Water Sensor and Switch* helps give customers added water damage protection from condensate overflow. The compact device can automatically shut off or turn on HVAC equipment — including air conditioners, heat pumps, dehumidifiers and pumps — if condensation or moisture is sensed where it doesn't belong.

First Alert L5 WiFi Water Leak Shutoff Valve can automatically turn water off if a leak is detected by a sensor cable or a paired *L1* or *L2*. The *L5* can be controlled through auto shutoff, remotely via the Resideo app, or with a manual override to turn water on or off.

FOR MORE INFORMATION: WWW.RESIDEO.COM





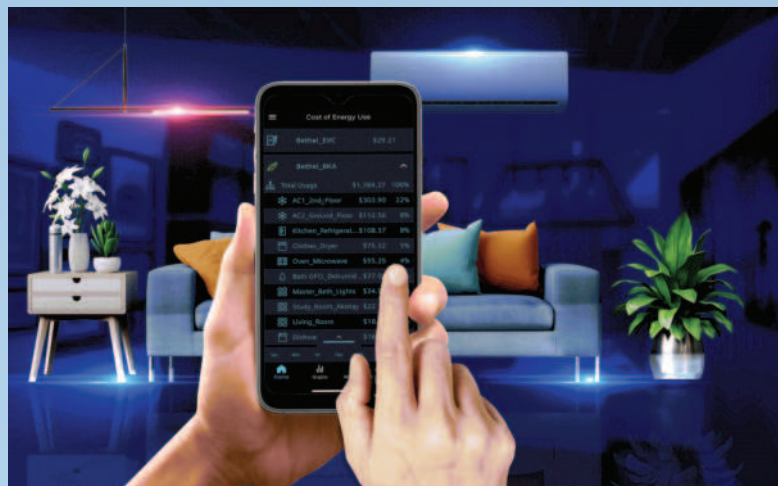
Siemens Inhab Energy Monitor

Siemens' *Inhab Energy Monitor* (IEM) continuously monitors a home's electrical system by allowing an owner to set alerts, manage peak demand and control energy costs. Unlike some energy monitors, IEM connects directly to key circuits—such as for the furnace, air conditioner, refrigerator, washer, and electric vehicle charger. This means no algorithms, no guessing and no waiting for results. Data is accessed in real time, which provides a homeowner with meaningful insight into how to take control of energy usage, reduce the electric bill and make a home more sustainable and efficient.

With IEM, a homeowner can receive notifications for savings opportunities or abnormal energy behavior, shift usage patterns from peak to off-peak rates, compare past usage to set achievable goals, and track and manage solar energy usage. Setup and monitoring uses the Siemens mobile app.

IEM is part of *Inhab*—the *Intelligent Habitat*—a suite of cutting-edge energy monitoring and control products designed to help homeowners meet the ever-increasing electrical demands of modern homes. The *Inhab* suite is fully UL approved and adheres to the most up-to-date national electrical codes and standards.

FOR MORE INFORMATION: WWW.SIEMENS.COM



Trane Technologies *Trane Autonomous Control*

Building owners and operators searching for ways to decarbonize and reduce energy consumption can look at *Trane Autonomous Control powered by BrainBox AI*. The product uses Artificial Intelligence (AI) to continuously identify and perform system optimization actions. An enhancement to existing *Trane Tracer SC+* systems, *Trane Autonomous Control* is self motivated, constantly observing, correcting and improving, and does so without the need for human intervention.

Available as a secure, cloud-based service that requires no additional hardware, the product is a highly scalable AI tool that acts as a single solution for multiple locations. The service can adapt to your building portfolio as it evolves.

The product's augmentation of control systems enables users to capture and synthesize a wealth of real-time and predictive data, including occupancy levels, weather patterns, and system performance information, to optimize efficiency and carbon reduction without sacrificing comfort; improve system performance and reduce operating and maintenance costs without investing in additional equipment or overburdening employees; and support sustainability goals by reducing energy use by up to 25 percent and minimizing carbon emissions by 20 to 40 percent.

FOR MORE INFORMATION: WWW.TRANE.COM



Cooling and Heating

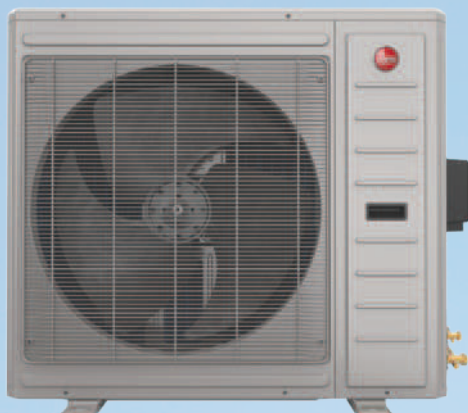
Carrier Infinity 24 Heat Pump with Greenspeed Intelligence

The *Infinity 24 Heat Pump with Greenspeed Intelligence* takes Carrier's most advanced technology to the next level. *Greenspeed Intelligence* is created by pairing adaptable-speed technology with the *Infinity System Control*. The unit's unique, variable-speed compressor allows it to adapt its output to the needs of the home. With adjustments between 25 and 100 percent capacity, it gives the home the necessary amount of cooling or heating. This allows the system to operate longer at steadier, lower capacities, which ensures extreme energy efficiency, comfortable humidity levels and quiet operation with tighter temperature control than standard systems.

The unit is ENERGY STAR certified, operates quietly, at as little as 51 decibels, and removes up to 400 percent more moisture than standard systems. When compared to a standard efficiency heat pump, the *Infinity 24* 2-ton model can save up to \$77 a year in cooling and up to \$182 a year in heating.

Carrier's *Infinity 24 Heat Pump with Greenspeed Intelligence* supports the company's 2030 Environmental, Social and Governance (ESG) goals of reducing its customers' carbon footprint by more than 1 gigaton.

FOR MORE INFORMATION: WWW.CARRIER.COM



Rheem Endeavor Line Classic Plus Series Universal Heat Pump RD17AZ

Households generate 72 percent of greenhouse gas emissions, and switching to a heat pump can reduce that impact. Rheem's *Endeavor Line Classic Plus Series Universal Heat Pump RD17AZ* boasts reduced emissions and less environmental impact while also offering precise comfort. *RD17AZ* works with nearly any heating and cooling system option, including *EcoNet Enabled* and non-communicating systems, or as a universal replacement with minimal alterations required.

And just like a vehicle's MPG rating, the higher the Seasonal Energy Efficiency Ratio/Energy Efficiency Ratio/Heating Seasonal Performance Factor (SEER2/EER2/HSPF2) rating, the higher the efficiency of a heat pump, resulting in more energy savings.

The cutting-edge, highly efficient *RD17AZ* (19 SEER2/12 EER2/8.5 HSPF2) has an *EcoNet Enabled* heat pump system with a 7-millimeter condenser coil, which reduces refrigerant requirements up to 15 percent. This lowers the amount of greenhouse gases emitted, while also contributing to Rheem's sustainability goal of a 50 percent reduction in its greenhouse gas footprint by 2025.

FOR MORE INFORMATION: WWW.RHEEM.COM



Jaga Climate Designer indoor climate control

Jaga's cutting-edge indoor climate control solution is in the realm of HVAC technology. The product is an independently active chilled beam system that offers unparalleled efficiency in temperature regulation while significantly reducing energy consumption. This innovative system harnesses the power of chilled water to extract heat from indoor air, ensuring a consistently comfortable environment without the hefty energy bills or carbon footprint.

A 24-volt scroll cage fan circulates cool or warm air through a high-capacity hydronic coil, eliminating the need for conventional ductwork. This reduces material requirements and streamlines the installation process, making it a perfect fit for residential environments.

The unit can deliver up to 18 MBH of cooling by using chilled water that is just 43 degrees Fahrenheit. It operates on a mere 54 watts of 24-volt DC power, which translates to an efficiency of 0.08 per cubic foot per minute per watt. Moreover, its integrated condensate tray expertly manages condensation, ensuring a dry and comfortable space. And, the unit requires no line voltage electrical connections, further simplifying its installation and use.

FOR MORE INFORMATION: WWW.JAGA-CANADA.COM

Decking



Oldcastle *MoistureShield Meridian* composite decking

MoistureShield, a signature composite decking brand of Oldcastle APG, is pushing its engineers in the right direction. The capped composite decking is made with 95 percent recycled materials. The company uses the waste product of nearly 250,000 Americans to create its high-performance decking—equivalent to 125 million pounds of wood fiber, plastic regrind, rigid plastics and film plastics (roughly two Statues of Liberty) being diverted from landfills every year.

Oldcastle has taken its green efforts up a notch with its new *MoistureShield Meridian Catalina* color. This particular decking features an industry-first *CoolDeck*, which reduces heat absorption by up to 35 percent compared to composites in similar colors. Meanwhile, the line's *TruTexture* surface technology adds superior scratch resistance.

Meridian features the company's proprietary *Solid Core* manufacturing process for protection against moisture absorption, warping, rotting and damage from insects. It is well-suited for installation on the ground, on the ground or underwater. *MoistureShield* decking has a 30-year lifespan with zero structural failures and is backed by a 50-year transferrable structural warranty.

FOR MORE INFORMATION: WWW.MOISTURESHIELD.COM



TimberTech *Terrain+ Collection* composite decking

The *Terrain+ Collection* is the latest in TimberTech's long-lasting line of composite decking. The company—a subdivision of The AZEK Co.—creates outdoor products engineered from 60 to 85 percent recycled content. These items outperform wood and help homeowners create nature-inspired, sustainable outdoor living spaces. With *Terrain+*, TimberTech material scientists have developed more-sophisticated aesthetics, featuring multi-color variegation and more-realistic emboss patterns, while still maintaining the superior, scratch-resistant durability of the manufacturer's original *Terrain Collection*.

Featuring protective 4-sided capping, the *Terrain+ Collection* is made of a mix of high-performance and recycled polymers and reclaimed wood fibers. The composite decking won't splinter, crack, cup or peel. Its recycled material includes reclaimed wood fibers, plastic bags, milk jugs and other discarded plastics, for an eco-friendly choice.

When compared to traditional wood decking, TimberTech's composite has a lower global warming potential over its lifetime—about 15 percent less than pressure treated pine and 8 percent less than Brazilian tropical Ipe. And, like all TimberTech decking, *Terrain+* can be recycled at the end of its 30-year life through AZEK's Full-Circle Recycling Program.

FOR MORE INFORMATION: WWW.TIMBERTECH.COM



Doors, Walls and Windows



PowerShades Version 2.0 TRUEPoE automated window shades

Powered by a reliable, quiet Power over Ethernet (PoE) motor, PowerShades' Version 2.0 TRUEPoE automated window shades have an abundance of new features and benefits, many of which continue to enhance energy savings and sustainability. The new shades require only 5 watts of power, unlike competitors whose PoE motors may demand 30 watts. More torque than competitors combined with dramatically less energy consumption means unmatched energy efficiency.

Other enhancements to the newest TRUEPoE shades include upgraded CPU and electronics, more dry-contact functions such as "Stop" and "Favorite," a built-in web server offering configuration of motor and limits, modification of network settings, programmable dry-contact functionality, and advanced diagnostics.

PowerShades TRUEPoE shades have always been on the cutting edge of sustainability and energy conservation. PowerShades' technology can be set to automatically lower the shades when the sun is shining directly onto buildings, thereby reducing solar heat gain in the summer. In the winter, the shades can be set to open on east facing windows when the sun is at its highest point.

FOR MORE INFORMATION: WWW.POWERSHADES.COM

Sherwin-Williams Scuff Tuff Interior Waterbased Enamel

Sherwin-Williams' Scuff Tuff Interior Waterbased Enamel is a durable paint that stands up to wear and tear in high-traffic areas, while resisting burnishing even after frequent washing. It is also GREENGUARD certified for low chemical emissions, tested and evaluated to meet stringent chemical emission limits.

Scuff Tuff is designed to meet MPI standards and meets VOC regulations with less than 50 g/L VOCs. Beyond that, Scuff Tuff meets the MPI High Performance category for cleansability testing, and exceeds the scrub and sheen change requirements, with a minimum of 4,000 MPI scrubs with less than 20 percent change in sheen.

This water-based enamel is available in flat, matte, eggshell and semi-gloss finishes, along with multiple bases to meet the sheens and colors required. Scuff Tuff also tints using zero VOC colorants so that any color chosen will not raise the VOC of the paint. Scuff Tuff's resistance to scratches also means fewer touch ups and paint jobs, contributing to its sustainable appeal.

FOR MORE INFORMATION: WWW.SHERWIN-WILLIAMS.COM



Andersen A-Series windows

Andersen's A-Series windows are offered with triple pane glass, made for high-performance building. The extra pane of glass helps keep more heat in and cold air out, meaning inside temperature is less affected by the temperatures outdoors. A-Series windows are constructed with 14 percent pre-consumer recycled glass and wood fiber content.

They are also ENERGY STAR certified and Indoor Advantage Gold certified for indoor air quality. The windows are constructed with fiberglass and composite exteriors that won't peel, blister, fade or corrode, and resist water while sealing out the elements. The casement and picture windows are certified by Passive House Institute U.S. (PHIUS), the leading passive building certification program.

As part of Andersen's Architectural Collection, the A-Series windows are the best performing, most energy-efficient windows and doors the company has ever offered. The added energy efficiency of triple pane glass can be beneficial in all regions, especially in colder climates where more months of the year are spent heating the home.

FOR MORE INFORMATION: WWW.ANDERSENWINDOWS.COM

Energy Management



Schneider Electric *Schneider Home*

Schneider Electric is on a mission to empower consumers to make the most of their energy by bridging technology and sustainability throughout the home. In 2023, the company launched *Schneider Home*, a first-of-its-kind home energy management solution. It offers a unique integration of energy resources and digital capabilities, such as *Schneider Pulse*—the heart of the electrified home—a smart electrical panel powered by embedded technology, functionality, and intelligence to interconnect various energy sources within the home.

There is also *Schneider Boost*, the home battery for energy storage. Solar energy is accumulated during the day and used during peak rates for utility bill savings, and to keep home power flowing during an outage; *Schneider Inverter*, the high-power hybrid inverter for solar and storage, which converts solar energy output into usable AC electricity; and *Schneider Charge*, the electric vehicle (EV) charger, which leverages onsite solar and storage to boost charge speed and reduce charging costs.

All of these are controlled with *Schneider Home*'s app, by which a user may monitor, control and automate whole home energy management.

FOR MORE INFORMATION: WWW.SE.COM

Blue Planet Energy *BlueWave* energy storage solution

Blue Planet Energy's *BlueWave* is an all-in-one residential energy storage solution with the ability to adapt to time-of-use needs, provide backup power, and accommodate growing energy demands. Energy capacities range from 3 to 48 kWh. Designed to optimize space, *BlueWave* includes built-in battery management system and battery maintenance units, communication features, and the option for AC and DC inverters.

Powered by reliable, non-toxic Lithium ferrous phosphate chemistry batteries, *BlueWave* ensures reliable energy supply with exceptional safety and density, representing the future of advanced energy storage. The unit's pre-wired system eliminates the need for cumbersome wiring, cables and multiple boxes. Modular batteries and inverters can be simply snapped in. *BlueWave* is designed to operate in harsh conditions, from minus 4 degrees Fahrenheit to 122 degrees F.

BlueWave is equipped with a mobile app for ease of monitoring and management. The system is expandable, designed to adapt as a user's energy requirements evolve and expand. Installations can be completed in less than two hours by one technician using minimal tools.

FOR MORE INFORMATION: WWW.BLUEPLANETENERGY.COM





Flooring and Surfaces



IceStone countertop surfaces

IceStone's self-named countertops and bathroom vanity surfaces keep safety in mind. Made from three simple ingredients—recycled glass, Portland cement and non-toxic pigment—it does no harm to the earth and contains zero resins, glues, petrochemicals, plastics or chemical binders. Workers can install the crystalline silica-free product without fear of contracting silicosis, a lung disease that is often fatal.

A major environmental problem that IceStone helps solve is what to do with waste glass. To date, the company has kept more than 20 million pounds of glass—roughly 1 million per year—from being dumped in landfills. IceStone gets its recycled product from third-party commercial recyclers, who buy defective or excess glass from manufacturers of items such as bottles, auto glass and windows.

IceStone is 75 percent recycled content, stain, mold and bacteria resistant, and almost impossible to burn. This results in a surface that is easy to care for and environmentally responsible. There are no VOCs emitted, and the product is eligible for LEED credits.

FOR MORE INFORMATION: WWW.ICESTONEUSA.COM



FLOR carbon negative area rugs

Peninsula, *Stratosphere* and *Hemisphere*—the first carbon negative area rugs from specialty design brand FLOR—combine durability, beautiful design, and a negative carbon footprint into all spaces where people live. The rugs pair high style and on-trend designs with a low environmental impact, resulting in a beautiful and earth-friendly product.

All three rug styles take cues from nature. Each square tile style within the collection is made with Aquafil's recycled ECONYL yarn, which reduces the global impact of nylon by 90 percent. This yarn, paired with ultra-environmentally friendly CQuest BioX backing, results in an area rug that draws more carbon from the air than is released during the supply chain and manufacturing processes. Turning these plant-based materials into durable, certified recyclable carpet tiles keeps the carbon they stored from re-entering the atmosphere.

More food for thought: Selling just 10 of FLOR's standard 8-by-10-foot carbon negative area rugs captures and stores at least the equivalent amount of carbon that would be emitted if 16.6 pounds of coal were burned—or if a cell phone was charged 1,825 times.

FOR MORE INFORMATION: WWW.FLOR.COM



Vermont Natural Coatings PolyWhey 3500 wood floor finish

PolyWhey 3500 wood floor finish from Vermont Natural Coatings promotes heavily trafficked hardwood floor durability without compromising air quality. Formulated for exceptional mar and scratch resistance, the product, derived from whey protein, has a neutral odor—a departure from traditional finishes that often emit strong and unpleasant fumes. This makes it a very logical choice for interiors where air quality is a priority.

Compliant with CDPH Standard Method V1.2, which represents the nation's strictest emissions and air quality testing, PolyWhey 3500 ensures the safest possible environment with emissions at or below 0.5 mg/m³. There are no "red list" ingredients, meaning there are no chemicals linked to cancer, birth defects or reproductive harm. Flooring professionals give the product a thumbs-up because of its easy cleanup and adherence to high indoor air quality standards.

The wood floor finish offers great coverage, allowing for efficient application and ensuring a consistent, attractive result. Its quick-drying properties further contribute to a streamlined application process, reducing downtime and inconvenience. And, because it consists of a single component, there is no limited pot life and therefore, no wasted finish.

FOR MORE INFORMATION: WWW.VERMONTNATURALCOATINGS.COM



Cosentino Silestone Le Chic Collection

Cosentino *Silestone Le Chic*, the latest *Silestone* collection, is the result of a new, innovative design process and leading sustainable technology. *Silestone* is created using Cosentino's innovative *HybriQ Technology*, a high-performance blend of premium minerals, quartz and recycled materials. It is produced through a sustainable manufacturing process that uses 99 percent reused water, 100 percent renewable electric energy and, within *HybriQ* products, a minimum of 20 percent recycled raw materials in its composition. The new manufacturing process also has zero water discharge, ensuring that local water sources are not polluted.

Silestone is highly resistant to stains, acid, scratches and impacts, featuring almost zero posterity, making the durable material highly resistant to water and moisture.

Le Chic maintains all of *Silestone*'s properties and certifications in terms of resistance, performance and hygiene, while increasing its aesthetic possibilities thanks to the selection of premium minerals and the incorporation of recycled materials in its composition. Cosentino continues to achieve greater efficiency in terms of energy, consumption of resources, use of renewable electricity and sustainable mobility policies.

FOR MORE INFORMATION: WWW.COSENTINO.COM

Mohawk PureTech flooring

PureTech, Mohawk's latest eco-oriented flooring, offers a sustainable alternative to traditional stone polymer composite (SPC) and wood-plastic composite (WPC) products. A PVC-free item made from 70 percent total recycled materials, *PureTech*'s organic core also contains 80 percent renewable plant-based material for a stronger and more-sustainable locking system.

In addition to sustainable attributes, *PureTech* provides performance benefits. *PureTech* features *WetProtect*, a lifetime surface and subfloor waterproof warranty. It is also three times more scratch resistant and backed by a no-hassle pet scratch warranty. Expertly crafted with premium embossing and a beveled and painted edge, *PureTech*'s ultra-realistic finish embodies the allure of natural hardwood at comparable market pricing.

With *PureTech*, Mohawk is also partnering with social recycling advocate Plastic Bank. With every purchase of *PureTech*, Mohawk and Plastic Bank will collaborate to help prevent more than 1 million pounds of plastic—the equivalent of more than 22.5 million plastic bottles—from reaching earth's oceans. Plastic Bank collection communities stop ocean-bound plastic in vulnerable coastal areas and exchange it at local collection branches for life-improving benefits that help them transcend poverty.

FOR MORE INFORMATION: WWW.MOHAWKFLOORING.COM



HTMX Industries Mycelium Collection SRP Rigid Core TPU flooring

HTMX Industries' *Mycelium Collection of SRP Rigid Core* thermoplastic polyurethane (TPU) flooring represents a new, transformative product solution for a diverse cross-section of the construction marketplace by transforming waste plastic bottles into innovative flooring. The product is made with approximately two polyethylene terephthalate (PET) water bottles per square foot, helping mitigate the amount of plastic waste in the environment.

In nature, mycelium refers to a network connecting individual plants together to transfer water, carbon, and other minerals. The designs in the *Mycelium Collection of SRP Rigid Core TPU* flooring were inspired by this network—a concept of community that nurtures collaboration and connection. By introducing nature's intricate systems and patterns into design, inhabitants can reap the biophilic benefits of improved mental health, reduced stress levels and increased productivity.

After a lifetime of use, *Mycelium SRP TPU* flooring can be recovered and made into new *Mycelium* planks and tiles with the same characteristics of excellent abrasion resistance, chemical resistance and tensile strength.

FOR MORE INFORMATION: [HTTPS://HMTX.GLOBAL/NEOCON/](https://HMTX.GLOBAL/NEOCON/)





Caesarstone Mineral Time Collection

Caesarstone's new *Mineral Surfaces* are made from a blend of natural minerals such as quartz and feldspar, advanced innovative materials, and recycled products. Characterized by a low crystalline silica content, the exclusive formulation improves performance, increases recycled content and promotes sustainability. This combination aligns with the company's eco-friendly practices and ensures delivery of high-quality materials. Crafted from a unique blend of natural and recycled materials, these premium low-silica surfaces have exceptional resistance, captivating aesthetics and unmatched versatility.

Drawing inspiration from the allure of quartzite and marble, the Caesarstone *Mineral Time Collection* presents three adaptable contemporary designs capable of seamlessly integrating diverse design elements or making a bold statement on their own. This innovative line maintains a crystalline silica content below 40 percent, with some compositions dipping below 10 percent, making them significantly lower than other market offerings.

A blend of durable materials that shows off the premium quality of Caesarstone's pioneering manufacturing technology, *Mineral Surfaces* prioritizes longevity and durability.

FOR MORE INFORMATION: WWW.CAESARSTONEUS.COM

Florim USA EcoStone by MILEstone tiles

EcoStone by MILEstone is a groundbreaking, porcelain tile collection that offers a sustainable option for interior and exterior projects. This carbon-neutral porcelain tile collection pays homage to the timeless elegance of travertine, offering two distinct visuals inspired by cutting techniques: Cross-Cut and Vein-Cut.

The Cross-Cut style highlights the cloudlike patterns unique to travertine, while the Vein-Cut showcases the renowned banding and striation of the natural stone. In either case, a range of sizes includes an industry-first, carbon-neutral 48-by-110-inch large format. This size offers a myriad of environmentally friendly benefits, such as enhanced thermal insulation, weather resistance, wear and tear protection, and enhanced acoustic performance.

Moreover, the 6-millimeter thickness of the large format size reduces the raw materials consumed during production, amplifying its sustainability profile. *EcoStone* also goes beyond traditional offerings by introducing *Digital Texture*, an innovative technology that creates a textured surface without the need for punches, minimizing waste in creation and maintenance.

FOR MORE INFORMATION: WWW.MILESTONETILES.COM



Daltile Rekindle tile

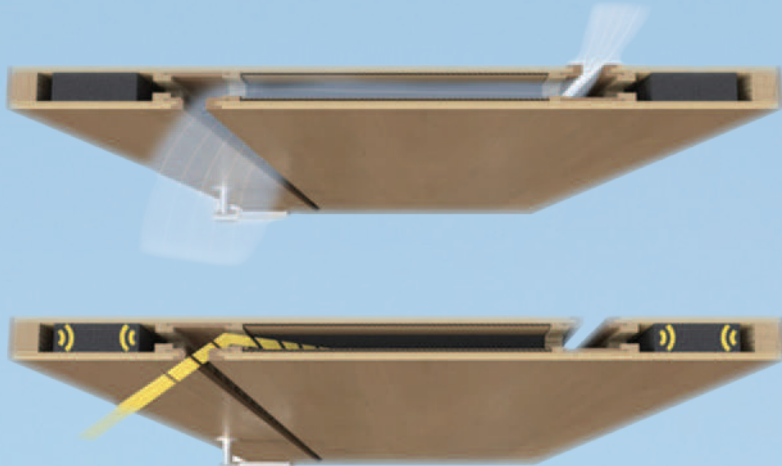
Dal-Tile Corp.'s *Rekindle* is a near-zero emissions product that also promotes public safety. *Rekindle* features *StepWise* (anti-slip) and *Microban* technology, a perfect choice for outdoor living spaces and offers a lifetime of built-in antimicrobial product protection that does not wash off or wear away. There are no VOCs—which makes for healthy living spaces—and it's green certified.

None of the plastics or dangerous chemicals found in other flooring types are present in *Rekindle*. The product is the latest effort by Dal-Tile to promote the merits of tile, which has the smallest carbon footprint of any flooring surface. Ten of the company's 15 North American manufacturing plants recover and reuse 100 percent of the wastewater generated by the manufacturing process. This prevents 125 million gallons from entering local municipal water treatment facilities.

Another 48 million pounds of materials that cannot be used to make new tile products go to state-approved beneficial reuse programs for roadbed base material, brick and cement manufacturing, and land reclamation.

FOR MORE INFORMATION: WWW.DAL TILE.COM

Indoor Air Quality (IAQ)



VanAir Design VanAir Door

Indoor air quality is critical for a healthy living and working environment. VanAir Design takes on this task with its *VanAir Door*, which features a built-in ventilation system, exceptional acoustics, and superb aesthetics. The product is built with staggered slot openings on the door's opposing faces to create a unique through-door airflow channel for enhanced air circulation. The *VanAir Door* also promotes wellness through better air quality achieved by natural airflow, not an energy-based, mechanical solution.

The *VanAir Door* delivers outstanding sound privacy, with sound absorption on par with solid-core doors. Built-in acoustic baffles isolate sound at low and high frequencies, achieving an independently tested Sound Transmission Class (STC) rating of 26.

Aesthetically, the product allows architects and interior designers to avoid unsightly vents, grills, and louvers, while meeting the most stringent building codes. The new ventilated door can be installed in a wide variety of interior environments, including single and multifamily residential housing, commercial spaces, hotels, schools, and healthcare facilities.

FOR MORE INFORMATION: WWW.VANAIRDESIGN.COM

AirCycler/Awair CONNECT Responsive Ventilation System

Residential ventilation control manufacturer AirCycler and residential and commercial indoor air quality monitor maker Awair have partnered on the *CONNECT Responsive Ventilation System*, designed to make indoor air healthier for homeowners and installation more efficient and safer for builders and installers. The system offers the smart features that people expect: indoor and outdoor air quality monitoring, automatic ventilation response to poor-air quality events, airflow monitoring to ensure proper system operation, and easy management.

Additional features include AirCycler's *CONNECT* dashboard, which allows companies of any size to access a proprietary dashboard for remote monitoring and troubleshooting of installed systems, access to pre-saved system configurations for fast installation and programming onsite, and options for plug-n-play installs that don't require the use of a mobile app.

This whole house ventilation and air quality monitoring system doesn't require dedicated ductwork, costly equipment or regular maintenance to ensure adequate operation or maintain code-required ventilation. Like other AirCycler and Awair devices, *CONNECT* looks and operates as automatically and discreetly as everyday heating and cooling systems.

FOR MORE INFORMATION: WWW.AIRCYCLER.COM



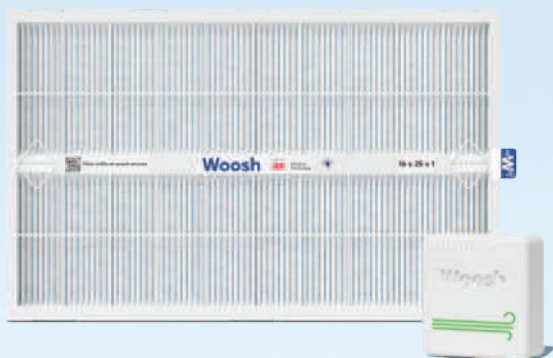
Woosh Air Woosh Smart Air Filter

Fresh off a successful appearance on Shark Tank in 2023, the newly launched Woosh Air has combined an innovative smart filter frame and 3M Filtration Technology to elevate air quality in the home. The self-named product (*Woosh*) uses sensors and Wi-Fi connectivity to continuously monitor air quality and seamlessly integrate with the home's thermostat, creating a whole-household air purifier. *Woosh* also alerts homeowners when the filter needs replacing, eliminating guesswork.

When there's a drop in air quality, *Woosh* alerts the smart thermostat, which then automatically activates the HVAC fan to circulate clean, filtered air throughout the home. *Woosh* easily pairs with popular thermostat brands such as Sensi, Nest, Honeywell, Ecobee and more.

Woosh's 3M Filtration Technology-driven filter is MERV 13 rated and fully foldable for easy storage and insertion. It excels in trapping unwanted particles including dust, pollen, pet dander, smoke, fine particulate matter (PM2.5), bacteria and viruses. The frame is reusable, and filter refills are available from the Woosh Air website. The Woosh Air app is downloadable from the Google Play Store and App Store.

FOR MORE INFORMATION: WWW.WOOSHAIR.COM





Insulation



Nu-Wool Premium Cellulose Insulation

When it comes to eco-friendly insulation, Nu-Wool's vision is simple: Make a product that is good for the home, the environment and the pocketbook. The result is the company's *Premium Cellulose Insulation*, which Nu-Wool bills as one of the greenest products in the marketplace.

Made of 86 percent recycled content—65 percent of which is post-consumer recycled paper—*Premium Cellulose* requires less fuel to heat and cool structures, generates minimal product waste during application, does not off gas or cure like other insulation materials, has a lower carbon footprint, and lasts the lifetime of the structure. Sprayed in place using Nu-Wool's WALLSEAL system, the insulation is installed in wall cavities, eliminating the voids and air pockets common with other insulation materials. The product's high installed density results in reduced air movement through the insulation, creating more-comfortable, draft-free structures.

The all-natural *Premium Cellulose* emphasizes Nu-Wool's 75-year-old philosophy. The company processes more than 20,000 tons of recycled paper into insulation products each year. That's 20,000 tons of paper that does not end up in landfills. Even the product bags are recyclable, meaning there is no packaging waste.

FOR MORE INFORMATION: [HTTPS://NUWOOL.COM](https://nuwool.com)

SIS Panels Studulate

Designed to stop thermal bridging, SIS Panels' *Studulate* takes an inside job and eliminates bridging from within the building envelope. *Studulate* is a product lineup of insulated 2-by-4 and 2-by-6 studs. By fusing 2-inch rigid insulation to dimensional lumber, an insulated 2-by-4 stud is the same dimension as a traditional 2-by-6. The same is true of an insulated 2-by-6 and traditional 2-by-8, respectively. Cavity insulation, utilities, window frames, and more can remain unchanged, offering a seamless integration process. *Studulate* can be used on both the top and bottom plate, ensuring a complete thermal break.

Studulate has four insulation options: EPS, GPS, Polyiso, and Phenolic, which offer R-values of R-13 to R-22. Custom options include polyethylene terephthalate (PET) insulation by Armacell, which is converted from recycled PET bottles into long-life, high-value insulative foam core materials. Armacell has used 2 billion recycled bottles so far and has saved 90,432 metric tons of CO₂ emissions in the process.

While achieving net-zero standards may demand additional steps and materials such as insulated sheathing, *Studulate* provides ample insulation to meet evolving energy codes, bridging the gap to net zero-ready standards.

FOR MORE INFORMATION: [WWW.SISPANELS.COM](http://www.sispanels.com)



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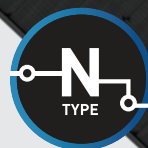
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LOOK TO JINKOSOLAR FOR THE WIDEST RANGE OF MODULE AND STORAGE SOLUTIONS



Landscaping



Weatherables Savannah Vinyl Privacy Fence

Vinyl isn't always viewed as the most-sustainable of products. But Weatherables and its *Savannah Vinyl Privacy Fence* caught our attention. The product is 85 percent recycled PVC, as a part of fencing that is overall 100 percent recyclable material and totally bisphenol A (BPA) free. *Savannah Vinyl* is also easy to maintain, with no painting, staining or sealing ever required—another environmental benefit.

Savannah Vinyl is durable—the six-foot and shorter vinyl privacy panels can withstand gusts of up to 130 miles per hour—the equivalent of hurricane-force winds. Part of this stems from being a heavier, stronger product. A *Savannah* privacy fence weighs about 20 pounds more than competitors and is about 50 percent thicker. Weatherables extrudes its vinyl at its own factory, using a closed-loop water system to reduce water waste.

Over the past 5 years, the company's actions have kept more than 50 million pounds of PVC out of landfills. That's enough PVC to install a 6-foot *Savannah* privacy fence from Groveport, Ohio to Denver.

FOR MORE INFORMATION: WWW.WEATHERABLES.COM

Unilock EcoTerra pavers

Unilock's *EcoTerra* pavers are an environmentally friendly option to traditional cement. This revolutionary binding agent reduces CO₂ emissions by up to 15 percent, and its use saves 27 trees for every 1,000 square feet of pavement, versus traditional pavers. *EcoTerra* is entirely cement-free in the facemix; With no limestone or cement reaction, these products have the benefit of being efflorescence-free.

Meanwhile, *EcoTerra* pavers retain their vibrant colors to keep outdoor spaces visually stunning for years. They are also denser, featuring closed pores that help repel water and prevent dirt and stains from penetrating the surface. This characteristic makes them structurally superior and easier to clean and maintain. *EcoTerra* pavers' high compressive strength (>12,000 psi) makes them more durable and longer-lasting than traditional paving products, while their low absorption rate (< 5 percent) helps with freeze-thaw climate effects.

Finally, with *EcoTerra* pavers, home builders and developers can offer clients who prioritize sustainability a product that truly aligns with their values.

FOR MORE INFORMATION: [HTTPS://CONTRACTOR.UNILOCK.COM](https://contractor.unilock.com)



Invisible Structures *Gravelpave2* paver

Gravelpave2 by Invisible Structures is an advanced porous paving solution that combines sustainability with strength and versatility. Made using 100 percent recycled plastic, *Gravelpave2* helps divert 1.5 million pounds of plastic from landfills annually.

Featuring a trademark ring-on grid design, *Gravelpave2* delivers a compressive strength of 15,940 pounds per square inch (psi)—nearly five times that of concrete. This configuration creates 92 percent void space that, when filled with aggregate, allows for rapid drainage and filtration of environmental toxins through bioremediation while preventing puddling.

Whether used in residential landscaping elements like ADA-compliant paths and walkways or in slow-speed vehicular areas like driveways, parking lots and fire lanes, *Gravelpave2* excels in effectively managing runoff. In application, it can also help reduce the heat island effect that many homeowners who live in urban areas experience. The porous paving's material strength and flexibility prevent rutting or uplifting during ground contraction and expansion, enabling it to endure extreme temperatures, rainfall and freeze thaw cycles. With an expected lifespan of more than 60 years, this porous paving is built to last.

FOR MORE INFORMATION: WWW.INVISIBLESTRUCTURES.COM



Irrigreen e-Commerce Platform

Irrigreen is the first and only all-digital irrigation system that prints water instead of spraying it, using 50 percent less water than traditional systems. Leveraging patented inkjet printing technology, *Irrigreen* precisely prints water in the exact shape of landscaping, eliminating wasteful overlap and overspray.

The manufacturer, also known as *Irrigreen*, has launched its e-commerce platform. Customers can now purchase products online in pre-packaged bundles or through a custom lawn mapping tool. The new e-commerce component allows customers the flexibility to design and customize an irrigation system according to their lawn's specifications. *Irrigreen* also offers the option for complementary design and customization of the product with a specialist.

Irrigreen is DIY-friendly and connects to IoT, allowing users to set up and control the system remotely and monitor how much water is being used and when. *Irrigreen* also connects to hyper-local weather data to predict when to run the system for optimal efficiency. A robotic sprinkler head controls the water stream with software to allow for an even coat of water.

FOR MORE INFORMATION: [HTTPS://IRRIGREEN.COM](https://IRRIGREEN.COM)



Roofing and Siding



Fiberon *Wildwood* composite cladding

Fiberon's *Wildwood* composite cladding is made from 94 percent mixed recycled wood-fiber and plastic content that is otherwise destined for landfills and incinerators. *Wildwood* is perfect for architects who want a long lasting, nearly maintenance-free, sustainable alternative to traditional wood cladding, offering a solution for projects that require the beauty of wood with long-term warranted performance.

Wildwood features an open-joint profile and is available in a variety of board lengths and widths for added design flexibility. It also features a durable composite core that ensures exceptional resistance to rotting, cracking, insects and decay. It will cut and install very similar to real wood without the hassle and does not require the same staining and painting maintenance that wood requires.

Thanks to its water-resistant character, the cladding is ideal for rainscreen applications and is available in a wide range of sizes. In addition, Fiberon's *Cladding Visualizer* can help create the ultimate outdoor living area. It can be used to preview *Wildwood* in a variety of scenes—from front walls to garage doors.

FOR MORE INFORMATION: WWW.FIBERONCLADDING.COM

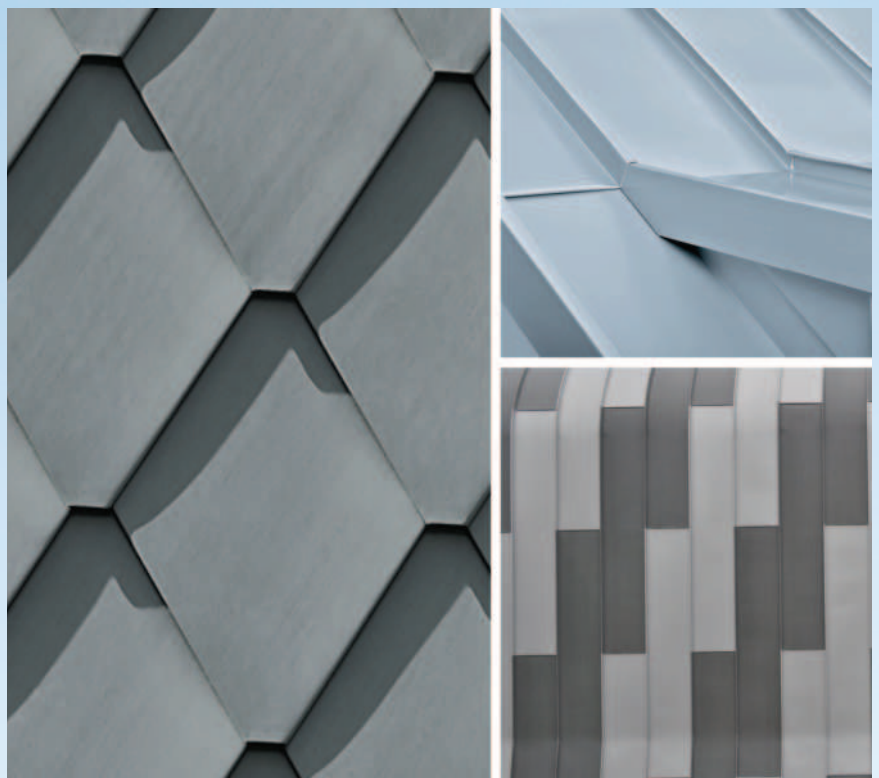
RHEINZINK America *RHEINZINK-prePATINA ECO ZINC*

RHEINZINK's *prePATINA ECO ZINC* and other architectural zinc products are now produced using 50 percent less CO₂. This is the first architectural zinc material in the world to reduce an already small carbon footprint by more than half. To power this process, the electric energy needed is largely generated from renewable sources, including water and wind power. *RHEINZINK-prePATINA ECO ZINC* material production generates significantly less carbon than any other architectural zinc manufacturing process.

The emission in the entire manufacturing process is only 1.85 kilograms (kg) of CO₂ per kg of zinc. This conversion rate prevents more than 36,000 tons of CO₂ emissions per year. This is equivalent to the carbon emissions of a small town of 4,500 people.

Along with a reduced environmental impact, *RHEINZINK-prePATINA ECO ZINC* products maintain a consistent, high quality, value and performance, plus a proven resiliency, 100 recyclability and 100-plus year lifespan. *RHEINZINK-prePATINA* architectural zinc has been Cradle to Cradle (C2C) Certified at the Bronze level since 2009. The C2C certification and additional supporting documentation help design and building teams meet the U.S. and Canada Green Building Councils' LEED criteria.

FOR MORE INFORMATION: WWW.RHEINZINK.US.COM



James Hardie Building *Hardie Artisan Lap Siding*

James Hardie's *Hardie* fiber cement products have a lower carbon footprint and lower environmental impact over their lifecycle than traditional heavyweight building products. The *Hardie Artisan Lap Siding* continues that trend, requiring minimal maintenance, allowing homeowners to spend more time enjoying their homes. Moreover, the durability of Hardie products means a long service life and potentially less-frequent replacement when compared to other materials.

Carbon emissions are released throughout a building's lifecycle, from the manufacture of building materials to its construction, operational life and deconstruction. Unlike many other building materials, fiber cement products like *Hardie Artisan Lap Siding* capture carbon dioxide (CO₂) from the environment over their operational lifetime, when cement absorbs and reacts with CO₂ from the air.

Hardie siding and trim products are built to withstand the harshest weather conditions and resist damage from fires, floods and other natural disasters. Additionally, only Hardie fiber cement exterior products, including *Hardie Artisan Lap Siding*, are designed specifically for optimal performance in any climate zone.

FOR MORE INFORMATION: WWW.JAMESHARDIE.COM



LP Building Solutions *LP SmartSide Trim & Siding*

LP SmartSide Trim & Siding are carbon-negative, lightweight primed products that can help reduce waste, providing customers with sustainable siding solutions. *LP SmartSide Trim & Siding* are classified as carbon-negative exterior cladding items, which means they store more carbon in the product than is released during raw material sourcing, manufacturing and customer distribution.

The siding's carbon-negative technology starts with sourcing a hardwood tree species called trembling aspen, which quickly and naturally regenerates from its root systems, keeping forests healthy and sustainable. As these materials move into production to become trim and siding products, *LP SmartSide* facilities efficiently use 99 percent of the log in the finished product or as renewable energy in manufacturing.

LP SmartSide Trim & Siding stores 10 times more carbon and emits 54 percent less greenhouse gas during production than fiber cement-based products. Benefits such as these help provide builders and homeowners with options for selecting more responsible, climate-friendly building solutions that can benefit the environment over the long term.

FOR MORE INFORMATION: [HTTPS://LPCORP.COM](https://LPCORP.COM)



Solar

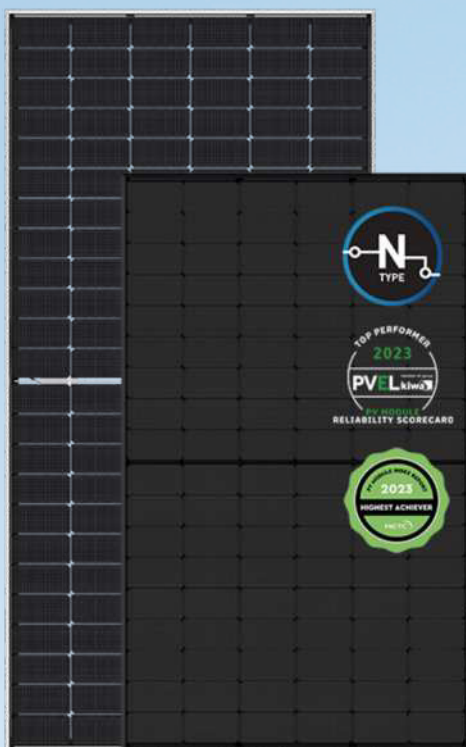
World4Solar *HelioWing Hurricane Edition Solar Power System*

Severe weather is an arch enemy of solar canopies. World4Solar is combatting the problem with its *HelioWing Hurricane Edition Solar Power System*. It's designed to withstand wind speeds of up to 175 miles per hour without snow load, as well as endure a snow load of 5,400 pascals (about 113 pounds of force per square foot)—double the strength of conventional systems. This makes it a game-changer for residential homes in coastal areas prone to tropical storms and hurricanes.

World4Solar's *HelioWing* series is already an industry leader when it comes to ease of install, cost savings, aesthetics and performance of compact photovoltaic systems. The *HelioWing Hurricane Edition* ups the ante. It ensures resilience in extreme weather and offers versatility in its application. The solar canopy can be discreetly integrated as a pool pergola, garden cover or carport. Customers have the option to enhance their system by adding an inverter, electric vehicle charger, and batteries up to 25 kWh, making it a comprehensive energy solution.

It can also function as a standalone solution or connect to the local power grid for earning energy generation credits.

FOR MORE INFORMATION: WWW.WORLD4SOLAR.COM



JinkoSolar *Eagle (Tiger Neo) N-type TOPCon module*

JinkoSolar's *Eagle (Tiger Neo) N-type TOPCon* module is its most-efficient and reliable solar panel yet. The *N-type TOPCon* converts about 23 percent of sunlight into solar power, compared to about 20 percent with other cell types. The *N-type* is 11 percent better at generating energy under low light conditions than conventional modules, there is more power productivity per watt over 30 years than with Passivated Emitter and Rear Contact (PERC) cells, and its yearly degradation rate is a mere 0.4 percent, meaning it will still be almost 88 percent functional after three decades.

Mother Nature's not as much of an issue either. For example, the *N-type TOPCon* generates only 0.29 percent less power per degree Celsius as the temperature rises—a key factor for owners in warm climates. Overall, a more-efficient power cell makes for a lower carbon footprint.

JinkoSolar is committed to achieving net zero emissions of greenhouse gasses (GhG) among the value chain by 2050. Several of its manufacturing facilities use 100 percent clean energy; the company aims to power all of its factories with renewable energy by the end of the decade.

FOR MORE INFORMATION: WWW.JINKOSOLAR.COM

Water Management



Hydraloop H300 greywater recycler

As water shortages become more widespread, conservation methods are crucial. The Hydraloop H300 gives greywater a second tour of duty. The device recycles up to 95 percent of shower and bath water and 50 percent of washing machine water, which ultimately enables reuse up to 45 percent of total in-house domestic water. Hydraloop-treated water is clean, clear, safe and certified for toilet flushing, washing machines, garden irrigation and/or swimming pool top off. The H300 can also treat condensation from tumble dryers, heat pumps and air conditioning units.

Hydraloop's environmental impact goes much further. Device operators see up to a 45 percent savings on tap water consumption; up to 45 percent savings on wastewater emissions; significant energy savings by using residual heat; and carbon footprint reduction because 45 percent less tap water is transported to and from wastewater facilities, and 45 percent less energy is needed for wastewater treatment.

The Hydraloop H300 has a volume of 80 gallons, and a cleaning capacity of up to 95 gallons per day, depending on user behavior.

FOR MORE INFORMATION: WWW.HYDRALOOP.COM

Hayward Tristar XL variable-speed pump

Hayward's TriStar XL is one of the company's "Big Four" variable-speed pumps. TriStar XL (along with TriStar 950/900, MaxFlo VS 500 and the Super Pump VS 700) optimizes energy efficiency without compromising performance. Quieter operation, better filtration and lower hydraulic stress on other pool pad products are a plus, while dynamic control of pump speed in conjunction with water features can produce dramatic backyard effects that add to the ambiance of the pool and backyard living space.

TriStar XL allows users to choose settings that produce more efficiency with the same exceptional priming, an increased weighted energy factor (WEF) rating, and increased flow rates (GPM). As with Hayward's entire suite of pool products, TriStar XL can reduce pool owners' energy usage by 90 percent, chlorine usage by 50 percent and water usage by 92 percent.

Hayward offers a full line of energy-efficient and sustainable residential pool equipment, including pumps, filters, heaters, cleaners, sanitizers, LED lighting and water features—all of which are digitally connected through Hayward's intuitive, IoT-enabled SmartPad.

FOR MORE INFORMATION: [HTTPS://HAYWARD.COM](https://hayward.com)



Rachio 3 Smart Sprinkler Controller

Automation can save a lot of time—and water. The Rachio 3 Smart Sprinkler Controller from Rachio enables a homeowner to easily schedule and control an inground irrigation system, water plants the right amount, and even build smart watering schedules informed by weather patterns, sun exposure, plant type, soil condition, season and more.

Rachio 3 has earned the EPA WaterSense label as a result of proven water savings. Controllers are tested and certified to water a minimum of 20 percent more efficiently than conventional sprinkler controllers. Most users save 50 percent on their outdoor watering with Rachio. Users can track their watering history with Rachio's free app and receive regular communications on how much water they have saved.

The controller integrates with Amazon Alexa, Google Home, and other smart home devices so that sprinklers can be controlled via voice commands. This expands accessibility for users with mobility or vision challenges and makes it easier for everyone to have beautiful and productive landscapes at home.

FOR MORE INFORMATION: [HTTPS://RACHIO.COM](https://rachio.com)

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GREEN BUILDER

SUSTAINABLE BRAND INDEX 2024

When our readers think about green building, here's what comes to mind first.

BY GREEN BUILDER STAFF

With all the financial and political chaos of the past year, surveying readers about their views on sustainable product manufacturers would seem like a challenge. People have their minds on other things. But respondents to our annual Brand Index heartedly delivered choices on everything from the best energy-saving appliances to the cars they like to drive on the job.

Results in three distinct categories—our traditional survey data, market visibility or “mentions,” and public sentiment—are averaged to create a Brand Index Score and derive a company's final ranking among its peers.

Unlike past years, most of the big-name players are back within the top 10 in their categories, although a few newcomers made the grade. Several lesser-known companies are on the way to becoming household names. Overall, our survey shows where a company is doing well, and which improvements could round out category excellence. See full results of the Green Builder Brand Index survey at www.greenbuildermedia.com.

KEY

Final Brand Index scores were determined by weighted averages of the following three measures:



SURVEY DATA

How our readers ranked each company's sustainability, relative to other companies on our list.



MENTIONS

Ranking in terms of number of positive mentions by customers who have used or have heard about the product, or resulting from product marketing.

Ranking in terms of how favorably consumers see the company.



SENTIMENT

NOTES

*If a sequential number is missing (or two brands get a “7” score, for instance), it's because two of the top 10 brands tied.

** In some categories, we collected data for more than 10 brands. Only the top 10 overall scores are listed for each product category.

AHF Products	Hubbell	Toyota
Air King	Huber Engineered Woods	Trane
Allura	Huntsman Building Solutions	Tremco
Amazon	IceStone	Tremetal's
American Standard	IKEA	Trex
American Woodmark	Interface	TruStile
Andersen	James Hardie	Typar
A.O. Smith	Jeld-Wen	Valspar
Apple	JinkoSolar	Viance
AprilAire	Johns Manville	Viking
Applegate Insulation	Kelly Moore	Vine
Atlas Roofing	Kichler	Weather Shield
AZEK	Kingspan	Wellborn Cabinet
Barrette Outdoor Living	Kohler	West Fraser
Behr	K2 Stone	Western Forest Products
Benjamin Moore	LEDVANCE	Westlake Royal Building
Benjamin Obdyke	Lennox	Weyerhaeuser
Blue Planet	Leviton	Whirlpool
Boise Cascade	LG	Wilsonart
Bosch	Liebherr	Windsor Windows & Doors
Bradford White	Loxone	Wood-Mode
Broan-NuTone	LP Building Solutions	York
Brilliant	Luna Wood	Zehnder
BuildBlock Building Systems	LUX	
CabinetWorks Group	Marvin	
Caesarstone	Masonite	
CALI	MasterBrand	
Cambria	Mercedes-Benz	
CanadianSolar	MI Windows and Doors	
Carlisle	Miele	
Carrier	Mitsubishi Electric HVAC	
CertainTeed	Modern Mill	
Chevrolet	Moen	
ClimateMaster	Mohawk	
Cooper Lighting Solutions	Navien	
Cornerstone Building Brands	Neolith	
Cosentino	Niagara	
Craft Flooring	Nissan	
Creative Mines	Nobilis	
CREE	Noritz	
Crossville Tile	Nu-Wool	
Crystal Cabinet Works	Owens Corning	
Dacra	Panasonic	
Daikin	PaperStone	
Dal-Tile	Pella	
Delta Faucet	Philips	
Delta Millworks	Plastpro	
Dow	PPG	
Dravet	Premier Building Systems	
Dunn Edwards	ProVia	
DuPont	Renewaire	
ecobee	Rheem	
ECOS	Rinnai	
EcoStar	Rockwool	
Electrolux	ROMABIO	
Emerson	Roseberg Forest Products	
Enviroshake	Samsung	
Eurotek	Savant Systems	
Fantech	Savoy House	
Fiberon	Schneider Electric	
First Solar	Shaw	
Ford	Sherwin-Williams	
Formica Group	Sierra Pacific Industries	
Foxconn	Simpson Strong-Tie	
GAF	Snap One	
GE Lighting	Soler & Palau USA	
Geberit	Ventilation	
Generac	Sonnen	
Gerber	Span	
Glidden	Stellantis (RAM)	
GMC	Stiebel Eltron	
Google	SubZero	
GP	Sunnova	
Green Bay Decking	SunPower	
Greenfiber	Sunrun	
Greenheck	Sylvania	
Grohe	Takagi	
Haier	TAMKO	
hansgrohe	Tesla Solar	
Hanwha Q Cells	Therma-Tru	
Henry	Tiles of Italy	
Honeywell Home	TOTO	

APPLIANCES

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	LG (Signature Kitchen Suite)	1.8	1	3	3
2	Whirlpool (Whirlpool, JennAir, Amana, KitchenAid, Maytag)	2.9	2	2	5
3	Haier (Haier, GE, Profile, Café, Fisher & Paykel, Monogram)	4.3	6	4	1
4	Bosch (Bosch, Gaggenau, Thermador)	4.4	3	5	7
5	Samsung (Samsung, Dacor)	4.9	4	1	8
5	Miele	4.9	5	7	4
7	Viking	6.00	8	6	2
8	Electrolux (Electrolux, Frigidaire, Westinghouse)	6.8	7	3	6
9	SubZero (Wolf)	9.00	9	2	11
10	Liebherr	9.8	10	4	9

REPEAT PERFORMER

The good times continue at LG. Although it didn't sweep the top spot in all three categories like it did in 2023, the appliance giant is still perceived by the public as the greenest company and lands at No. 1 again. Thanks to popular products such as its *Smart Induction Cooktop*, LG has placed in the top 3 for this category for 5 years in a row.



LG

RETURN TO FORM

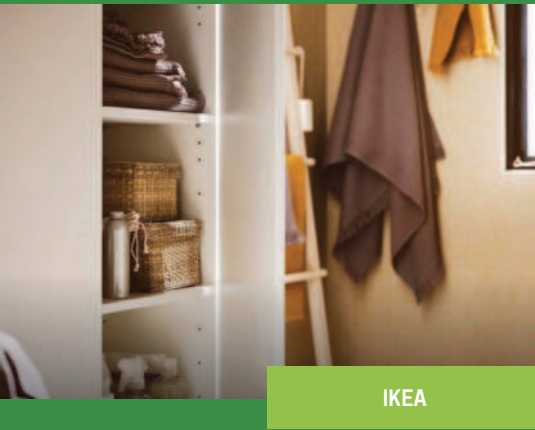
After dropping to the middle of the pack for a couple years, Owens Corning gets the word out about *Pink Wrap* and other popular products and returns to No. 1 for the first time since 2021. The company's public image could use some polish—its sentiment score is in the bottom one-third of the survey group—but overall, it's a bright day for the king of Pink.



Owens Corning

BUILDING WRAP

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Owens Corning (PinkWrap)	3.0	2	2	12
2	DuPont (Tyvek HomeWrap, Weathermate)	3.8	1	6	14
3	Benjamin Obdyke (HydroGap)	4.0	4	5	1
4	Kingspan	4.2	5	1	9
5	Huber Engineered Woods (ZIP System)	5.7	7	4	3
6	Typar (TYPAR Building Wrap)	6.0	3	12	6
7	CertainTeed (CertaWrap)	6.1	7	3	10
8	LP (WeatherLogic)	8.6	6	13	11
9	Henry (Blueskin, WeatherSmart)	9.4	9	9	13
10	Tremco (EnviroDri)	9.6	10	7	15



STILL THE ONE

Chalk it up to the poor sustainability story offered by most U.S. cabinet makers. IKEA, which hits No. 1 for the second time in four years and seventh in the past 10. The retailer remains a favorite with shoppers and builders—it hasn’t ranked lower than fourth in any Brand Index categories since 2019—and recent “People and Planet” initiatives haven’t hurt its image, either.

CABINETS AND SHELVING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	IKEA	1.3	1	1	4
2	Cabinetworks Group <i>([KraftMaid, MasterCraft, Merillat, Medallion])</i>	3.0	2	4	6
3	American Woodmark	3.5	3	3	8
4	MasterBrand <i>(Aristokraft, Decora, Diamond, Omega)</i>	3.7	4	2	7
5	Wellborn Cabinet	4.7	5	5	2
6	Wood-Mode	6.5	6	8	5
7	Crystal Cabinet Works	6.6	7	7	3
8	Nobilia	6.7	8	6	1

COUNTERTOPS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	DuPont Surfaces <i>(Corian)</i>	2.8	1	3	13
2	Cambria	4.5	4	4	9
3	Cosentino <i>(Eco, Dekton, Silestone)</i>	4.5	3	7	6
4	Formica Group	5.8	2	15	1
5	Neolith	6.7	9	2	7
6	Caesarstone	6.8	7	5	11
7	IceStone	7.3	5	9	16
8	PaperStone	8.1	5	16	3
9	Wilsonart	8.6	8	11	5
10	Dal-Tile <i>(Daltile)</i>	9.7	1	3	13



ROOM FOR IMPROVEMENT?

Make it three in a row for DuPont Surfaces, which has used sustainably made product lines such as *Solid Surface, Quartz and Endura* to stay on top. But it’s not all good news for the countertop maker, which continues to languish in the bottom half of our sentiment ratings—a sign that the company really needs to showcase its sustainability efforts.

DECKING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Trex	2.1	2	1	6
2	AZEK (TimberTech)	2.3	1	2	11
3	Barrette Outdoor Living (MoistureShield, DuraLife, Evernew)	3.7	3	4	7
4	Fiberon	6.6	8	3	9
5	Western Forest Products (TRUESTYLE)	7.1	8	5	8
6	Viance	7.2	5	13	3
7	CALI (Cali Bamboo)	7.3	4	11	16
8	Green Bay Decking (DuxxBak)	7.9	7	8	13
9	Westlake Royal Building Products (Zuri)	8.1	8	6	15
10	Modern Mill	9.1	6	15	10

UNBEATEN AGAIN

Make it 14-0 for Trex, the only company in the history of our survey to never finish less than No. 1. Like in 2023, the decking giant can do almost no wrong. However, it has lost a few points with the public even though Trex won several national sustainability awards from Newsweek, Lowe’s and Investor’s Business Daily.



POSITIVE NEGATIVITY

A new Brand Index category, Energy Storage is led by Tesla, which seems to capture the consumer imagination even when reviews are emotionally mixed. Other brands appear to be gaining traction, including Panasonic, with its *Evervolt* battery system.

ENERGY STORAGE

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Tesla	1.3	1	1	4
2	LG	2.4	2	3	3
3	Panasonic (EVERVOLT)	4.3	3	8	1
4	Generac	4.4	5	2	8
4	Blue Planet	4.4	4	6	2
6	Canadian Solar	5.5	6	4	7
7	JinkoSolar	6.3	7	5	6
8	Sonnen	7.4	8	7	5



Therma-Tru

DÉJÀ VU

For doormakers, this year is just like the old one, and that's a good thing. All of 2023's top companies are in the same position in 2024, with Therma-Tru leading the way for a sixth consecutive year. Results are also mixed as usual. For example, Therma-Tru has the industry's pulse but lacks in public opinion, while TruStile has consumers' hearts but remains comparatively unknown.

DOORS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Therma-Tru	2.2	1	4	4
2	Masonite	2.6	2	3	5
3	Simpson	3.0	3	2	6
4	ProVia	3.0	4	1	3
5	Plastpro	4.7	5	5	2
6	TruStile	5.5	6	6	1

FLOORING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	AHF Products <i>(Armstrong Flooring)</i>	2.4	1	3	9
2	Mohawk	4.0	3	5	7
2	CALI	4.0	2	8	4
4	Shaw	5.8	5	6	10
5	Crossville Tile	6.5	8	2	11
6	Dal-Tile <i>(Marazzi)</i>	6.9	10	1	6
7	Craft Flooring	7.1	6	11	2
8	Interface	7.2	8	4	12
9	Tiles of Italy	7.7	4	13	14
9	Delta Millworks	8.5	6	12	13

STEPPING UP

The competition goes on. Armstrong Flooring, a brand of AHF Products, is No. 1 for a second straight year, while Mohawk is the runner up. Combined, these companies have been the top two since 2018. CALI joins the duo, thanks to a strong overall market presence. The industry continues to praise all three manufacturers' sustainability efforts. Shaw and Crossville Tile hold steady to round out the top five.



Armstrong

HOT WATER SYSTEMS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Bosch	1.5	1	1	6
2	Rheem	2.0	2	2	2
3	Rinnai	4.3	5	3	4
4	A.O. Smith	4.5	4	4	9
5	Bradford White	4.7	3	7	8
6	Noritz	5.6	6	5	5
7	Stiebel Eltron	6.7	7	6	7
8	Takagi	7.8	8	9	3
9	Navien	7.9	9	8	1



Bosch

HOT COMMODITY

The comeback is complete for Bosch, which lands at the top of the hot water category just two years after sitting near the bottom. That success stems from popular products such as the Bosch *Tronic Point-of-Use Water Heater*, which has been praised for its low price, portability and efficiency. Meanwhile Rheem, gave a strong second-place showing.

TRIED AND TRUE

For a fourth straight year, Owens Corning ranks No. 1 among insulation makers. The company remains one of the most-trusted and publicly promoted entities, but is in the middle of the pack in terms of public sentiment. It's the opposite for Greenfiber, which finished as runner up this year—a fourth consecutive Top 3 appearance—but it's tough to challenge the long and trade-friendly narrative of Owens Corning.



Owens Corning

INSULATION

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Owens Corning	1.6	1	1	7
2	Greenfiber	5.3	2	12	5
3	Kingspan	5.4	7	2	6
4	Rockwool	5.5	3	11	4
5	Huntsman Building Solutions	6.0	4	8	12
6	CertainTeed	6.9	7	6	9
7	Nu-Wool	8.4	5	13	15
8	Johns Manville	8.5	11	3	10
9	Dow	8.6	10	5	11
9	Applegate Insulation	8.6	5	14	14
10	Carlisle (Insulfoam EPS; SealTite Spray Foam)	8.9	9	9	8

HIGHER PRINCIPLES

After a fourth-place finish last year, LG climbs to No. 1 in this ultra-competitive niche, while powerhouses Trane and Carrier each drop a notch. Mitsubishi Electric returns to the list for the first time since 2021. These companies' placements in the upper half of the chart demonstrate that they are known to buyers, but the hierarchy of brands is not yet entrenched.



LG

HVAC

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	LG	1.5	1	1	6
2	Trane (RunTru/American Standard)	3.7	2	6	7
3	Carrier	3.9	3	4	9
4	Bosch	4.7	5	3	8
5	Lennox	5.2	4	8	4
6	Mitsubishi Electric HVAC	5.5	6	2	13
7	Daikin (Goodman)	6.7	7	5	10
8	Rheem	7.4	8	7	5
9	York	9.2	10	10	2
10	ClimateMaster	9.5	8	12	11

LIGHTING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Philips	1.3	1	1	4
2	GE Lighting (SAVANT)	2.7	2	3	6
3	Sylvania	4.4	3	8	2
4	Cooper Lighting Solutions	5.3	4	7	8
5	Savoy House	6.0	5	9	3
6	CREE	6.4	6	6	10
7	Kichler	6.9	8	4	9
8	Loxone	9.0	7	12	12
9	Hubbell (Progress Lighting)	9.1	10	10	1
10	LEDVANCE	9.4	12	5	7



Philips

ENDURING SHINE

Philips being knocked out of the Lighting category's top spot a couple years ago might have been a fluke. Once again, the manufacturer has a sizable lead over its main competitor—whichever company that happens to be from year to year—without any major product changes. It's a case of not messing with a winning formula, keeping builders and consumers happy.

PAINT AND COATING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Sherwin-Williams	1.6	1	1	7
2	Benjamin Moore	3.1	3	3	4
3	Behr	3.3	2	6	3
4	Valspar	4.1	5	2	5
5	ECOS	5.5	4	10	1
6	PPG (Olympic)	6.2	5	8	8
7	Glidden	6.3	7	5	6
8	Kelly Moore	6.4	7	4	10
9	Dunn Edwards	8.4	9	7	9
10	ROMABIO	8.9	10	9	2



Sherwin-Williams

TOUGH TIMES AHEAD?

Swap Valspar, ECOS and PPG around and you have a rerun of last year’s list. Sherwin-Williams remains the dominant leader—that’s six out of seven years for the “climate and carbon thinking” group of out Cleveland. But higher product pricing, decreased consumer spending and a shaky housing market have dimmed the paint industry’s bright image and could make 2024 a challenging year for all.

PIPE DREAMS

It’s status quo for Kohler, our usual No. 1 company in the plumbing category. The industry still respects it, and Kohler’s brand appears to be the one that comes to consumers’ minds first. But public sentiment doesn’t line up with builder perceptions. It might be time for some positive PR. Meanwhile, runner-ups Moen and American Standard remain in the top five, where they have held positions of honor since 2017.



Kohler

PLUMBING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Kohler	1.6	1	1	7
2	Moen	2.8	2	4	4
3	American Standard	4.1	4	5	2
4	Delta Faucet Co. (Brizo)	4.7	2	8	11
5	hansgrohe	4.8	6	2	6
6	Niagara	7.0	5	10	10
6	Grohe	7.0	10	3	1
8	Geberit	7.4	8	7	5
9	TOTO	7.8	6	11	9
10	Gerber	8.4	9	9	3

POWER PLAN

The sun still shines on Tesla Solar, which captured its eighth No. 1 in nine years by continuing to offer products that appeal to construction professionals and consumers, even when the solar panel and roofing industries are treading water in terms of market growth and profitability. Also, in general, companies known for solar leasing and installation seem to stand out for trades more than panel manufacturers.



Tesla

PHOTOVOLTAIC SYSTEMS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Tesla (Tesla Solar)	1.4	1	1	5
2	First Solar	2.5	3	2	1
3	SunPower	3.6	3	4	6
4	Panasonic	3.8	2	8	2
5	Sunnova	5.9	5	7	8
6	Sunrun	6.4	7	6	4
7	CertainTeed	6.6	6	9	3
8	JinkoSolar	7.2	8	5	9
9	CanadianSolar	7.9	10	3	10
10	Hanwha Q Cells	9.1	9	10	7

ROOFING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Owens Corning	2.2	2	1	7
2	GAF (Timberline)	3.0	3	3	3
3	EcoStar	3.1	1	8	1
4	Atlas Roofing	4.9	4	5	10
4	Westlake Royal Building Products (DaVinci Roofscapes)	5.4	6	1	15
6	CertainTeed	6.8	8	4	8
7	Tremetol's (Custom-Bilt Metals)	7.6	7	10	4
8	Enviroshake	8.3	4	15	14
8	Dacra	8.7	10	7	6
10	TAMKO	9.1	10	6	13



Owens Corning

ROOFTOP REWARDS

Owens Corning, with its powerful name recognition, leads this category for the second year in a row. Close on the heels of the two asphalt (with cool roof tech) leaders are EcoStar's recycled composite product and metal roofing from Atlas Roofing. Experts predict that residential U.S. roofing could increase by as much as 8 percent through 2025, to about \$15 billion overall.

SIDING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	LP Building Solutions <i>(SmartSide)</i>	3.0	2	5	3
2	Westlake Royal Building Products <i>(Cultured Stone, Eldorado Stone, Telesteria, Cedar Renditions, Celect)</i>	3.4	1	9	1
3	James Hardie	5.4	4	8	6
4	K2 Stone	5.6	8	2	2
5	Delta Millworks	6.8	3	12	14
6	Creative Mines	8.5	6	14	7
7	Allura	8.6	10	6	8
8	Dravet	8.9	11	4	11
9	Luna Wood	9.0	8	11	9
10	Cornerstone Building Brands <i>(Ply-Gem)</i>	9.1	13	3	4



WEATHER WARRIORS

LP Building, Westlake Royal and James Hardie remain the industry’s most highly regarded siding manufacturers, and they’ve definitely made inroads into gaining the public’s trust after less-than-stellar marks in 2023. K2 Stone continues to grow in market share and may one day be one of the first businesses recommended by builders. And, say hello to Delta Millworks, which debuts in the survey at No. 5.

NEW TECH, NEW FAVORITES

There’s nothing like starting at the top. Leviton, which cracked the top 10 for the first time among Smart Home Tech providers, goes a step further in our inaugural Smart Panels category, which includes switches. The industry likes the green energy management and wall controls system maker enough to place it at No. 1, even if consumers don’t quite know what to think yet.



Leviton

SMART PANELS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Leviton	1.6	1	2	4
2	Schneider Electric USA	2.2	3	1	1
3	Savant Systems	2.7	2	4	3
4	Span (Span Panel)	3.5	4	3	2

FLATLINED

Amazon continues to lead this segment comfortably, while Google, Samsung and Apple are maintaining pursuit but making little headway. Google in particular is feeling a sting, with a lower sentiment score dropping the company outside the top 10 after several years of improvement. Overall, the lack of movement among most manufacturers—except for newcomer Leviton—could be the result of reduced discretionary spending by consumers.



Amazon

SMART HOME TECHNOLOGY

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Amazon (Alexa)	1.3	1	1	4
2	Google (Nest)	2.9	2	2	11
3	Samsung (SmartThings)	3.8	3	4	8
4	Apple	4.2	4	3	9
5	Honeywell	6.1	6	5	10
6	Leviton	6.9	5	11	6
7	Foxconn (Belkin, Linksys, Phyn, WeMo)	7.6	8	7	7
8	Savant Systems	8.1	7	12	3
9	Snap One (Control4)	8.6	10	8	2
10	Brilliant	9.4	9	13	1

STRUCTURAL

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Weyerhaeuser (Trus Joist)	2.5	1	2	13
2	Simpson Strong-Tie	4.1	4	3	8
3	West Fraser (Norbord, Ainsworth)	4.7	5	1	14
4	Premier Building Systems	5.0	2	12	2
5	Boise Cascade	5.4	3	7	15
6	Western Forest Products	7.3	7	9	4
7	BuildBlock Building Systems	8.1	6	14	3
8	LP Building Solutions	8.7	11	5	6
9	GP	9.3	12	5	6
10	Roseberg Forest Products	9.7	7	13	16



Weyerhaeuser

TRADES YES, CLIENTS NOT SO MUCH

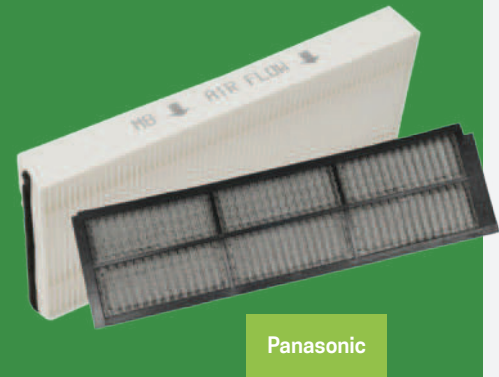
The revolving door continues, with Weyerhaeuser taking over No. 1 after one-year stints by Premier Building (2020 and 2023), Weyerhaeuser (again, in 2022), and Boise Cascade (2019 and 2021), our last consecutive year winner. All three companies are well respected—17 Top 5 finishes out of 18 from 2019–24—but for some reason, staying on consumers’ good side has been difficult from year to year.

THERMOSTATS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Google (Nest)	1.2	1	1	3
2	Honeywell Home (Resideo)	3.0	2	4	6
3	Bosch	4.0	3	5	7
4	ecobee	4.4	5	3	5
4	Carrier	4.4	4	6	2
6	LUX	5.6	7	2	8
7	Emerson (Sensi)	5.8	6	7	1
8	Vine	7.6	8	8	4

STILL IN CONTROL

Google continues a Thermostats stranglehold, with its Nest brand carrying the company to No. 1 for a third year. Thanks to ease of use, the industry and public still adore the product: Overall opinion scores are the highest and its Brand Index Score is third-largest among manufacturers in any of our 2024 surveys. Competitors continue to jockey for position and maintain public interest from year to year.



FLYING HIGH

Since 2020, there's been Panasonic, and then everyone else. While not always the least-criticized IAQ products maker within our Brand Indexes, the company's award-winning, ENERGY STAR-certified lines help maintain its high profile. All four parts of Panasonic's Healthy Indoor Living Solutions—energy recovery ventilators, *Swidget* smart controls, atmosphere and inline fan solutions, and ventilation and purification—remain first choice within the industry.

VENTILATION

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Panasonic	2.9	1	6	5
2	AprilAire	3.8	5	2	2
3	Delta (Delta Breez)	4.0	3	7	1
4	Air King	4.6	2	9	7
5	Broan-NuTone	4.7	4	5	8
6	Fantech (SystemAir)	4.8	7	1	3
7	Zehnder	4.9	6	3	4
8	Renewaire	7.8	8	8	6
9	Greenheck	8.1	10	4	9
10	Soler & Palau USA Ventilation	9.4	9	10	10



Renewal by Andersen

MISMATCHED EMOTIONS

Talk about bizarre: Placing No. 1 seven times in 10 years—including back-to-back for 2023 and 2024—and among the top three annually since 2015, makes Renewal by Andersen legendary within the industry. But there’s a troubled view of the company’s final product and customer service by consumers. They’re not alone. Marvin and Pella also face heavy criticism from the public.

WINDOW

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Renewal by Andersen	2.7	1	1	18
2	Cornerstone Building Brands <i>(Ply Gem, Simonton, Atrium, American Craftsman, Silver Line)</i>	5.5	5	4	13
3	Weather Shield	5.6	5	7	5
4	Sierra Pacific Industries <i>(Sierra Pacific Windows)</i>	6.1	5	9	4
5	MARVIN	6.2	3	10	14
6	Pella	6.3	2	12	15
7	Jeld-Wen	6.4	8	2	10
8	Windsor Windows & Doors	6.6	3	15	3
9	MI Windows and Doors <i>(MITER Brands; Milgard)</i>	8.1	9	5	12
10	Eurotek	11.2	10	17	1

WORK VEHICLES

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Toyota	1.8	1	2	6
2	Ford	2.2	2	1	7
3	Chevrolet	3.4	3	5	1
4	Nissan	4.1	4	4	5
5	Stellantis (RAM)	5.2	5	6	4
6	Mercedes-Benz	5.3	7	3	2
7	GMC	5.4	5	7	3



Toyota

CHALLENGING TIMES

Toyota and Ford are still at it. Except for 2021, these two have been consumers’ choice for best work vehicles, swapping places nine times since 2015. Toyota, known for stylish, economical and long-lasting cars, had to endure a series of recalls in 2023. Ford, which heavily promoted electric vehicles over the past three years, is now moving into hybrids to attract clean energy- and fossil fuel-preferring car buyers.



All photos by Samantha Carlin

NO ROAD TOO FAR: FROM FACTORY TO FOUNDATION

TRAVEL ALONG WITH VISION HOUSE TRANSCEND AS IT MAKES ITS
GRAND JOURNEY TO THE MOUNTAINS OF COLORADO.

BY SAMANTHA CARLIN

In a picturesque corner of southwest Colorado, nestled amid the breathtaking landscapes of the Rocky Mountains, a groundbreaking moment is unfolding. A Dvele home, a paradigm of modern luxury and sustainable living, is making its grand entrance. The arrival of VISION House Transcend to this scenic property signals a transformation in the way we conceive, construct, and experience our living spaces.

The VISION House Transcend speaks to the company's versatility and adaptability. Dvele prefabricated modular homes are not just structures; they are living experiences tailored to meet the unique

needs and aesthetics of their owners while creatively blending cutting-edge technologies and practices with sustainability.

All products included were meticulously selected to showcase integrated, energy efficient, safe and healthy living. The pre-fabrication process addresses labor, costs and shortages that have plagued the building industry.

With floor-to-ceiling windows from Arq-espacio framing panoramic mountain and river views, expansive open spaces, and eco-friendly features, VISION House Transcend offers a harmonious blend of luxury and sustainability.



Roadblock. Obstacle number one: a narrow, curvy driveway vs. an oversized module.

NAVIGATING CHALLENGES

The pre-fab modules were carefully crafted in a controlled environment at the Dvele factory in Loma Linda, Calif. When complete, the modules were transported across several states by two different trucks and arrived on site in Lake City, Colo., ready to be set and stitched together.

However, multiple transportation delays, December snow, and a long, narrow and steep dirt driveway tested the boundaries of what was possible.

First, a crane impressively sped up the curvy, slippery road. The driver, admitting to only taking challenging, mountainous jobs, says “this was nothing” when complimented on his skill.

But this was only the first step. There was still a long day ahead.

A small group of spectators anxiously waits on top of the hill for the first module to start the final leg of its journey. The group paces back and forth, trying to get the best view of the action happening at the end of the driveway.

“It’s moving!” we all exclaim, and we race to get a closer look. However, the excitement was short lived, as the truck got hung up on the first and tightest corner. Thankfully, a grater was waiting at the top from a grating of the road earlier in the morning. The grater was able to back down the hill and pull the truck and module upward—only to reach another impasse.



Special delivery. The link-belt crane and skilled driver were instrumental in the last step of Transcend’s journey.



Ascendant beauty. The home site overlooks the Lake Fork River in remote Lake City, Colo., with impressive views of the San Juan Mountains. VISION House Transcend was purposefully positioned and designed to enhance guests' connection with nature.

The beautiful pine and aspen trees were too dense where the driveway leveled out. Thankfully, the team had planned for this and quickly pulled a chainsaw out from under the module and cut the obstructing branch free, allowing the journey to continue.

Slowly but surely, the module inched its way safely to the previously set foundation.



Prep time. The Dvele team came to the site in the summer to prepare the foundation for the modules to rest on.

LIFT THAT HOUSE!

It was time for the crane to step in. After the crew securely strapped in the home, the crane was attached and started lifting the module. The tricky path included a ground-mounted solar array and several towering trees. No matter the route, the process seemingly took only a few minutes. To our surprise, it was by far the quickest and most seamless part of the process.



Up and at 'em. A crane was brought in to handle the task of lifting and placing pieces of Transcend into their proper locations.

The Dvele team lined up the home with the help of the crane's minute movements to get the perfect match between the module and the foundation. As the crane released its upward tension on the straps, the module stood on its own, ready for its partner's arrival.

Given that it was getting close to three in the afternoon, we were

skeptical that the second module would be placed before the sun set behind the mountains. However, to our surprise, the second, smaller module steadily made it up the driveway, this time sans the grater's help.

Within half an hour, the crane had already lifted the second module and gently set it in place next to the first one. As the sunlight dwindled, the team worked to get both modules permanently secured on the foundation.



Connection complete. The modules reach their final resting place on top of a steep riverbed.

Finally, the process was complete, and the near-finished home was set in place. Dvele impressively ships their modular homes, complete with almost everything finished and installed.

INDOOR EXCITEMENT

When we finally walked in, we were graced by the already installed cabinets from Norelco Cabinets, appliances from Samsung, Arq-espacio windows, Caesarstone countertops, flooring by CRAFT, built-in speakers from Sonos, and already finished walls complete with Rockwool insulation.



Grand entry. The expansive modern kitchen boasts plenty of storage and counter space, but the best feature has to be the view.



Clean air cooking. This all-electric home features a sleek induction cooktop from Dacor for precise and healthy cooking.

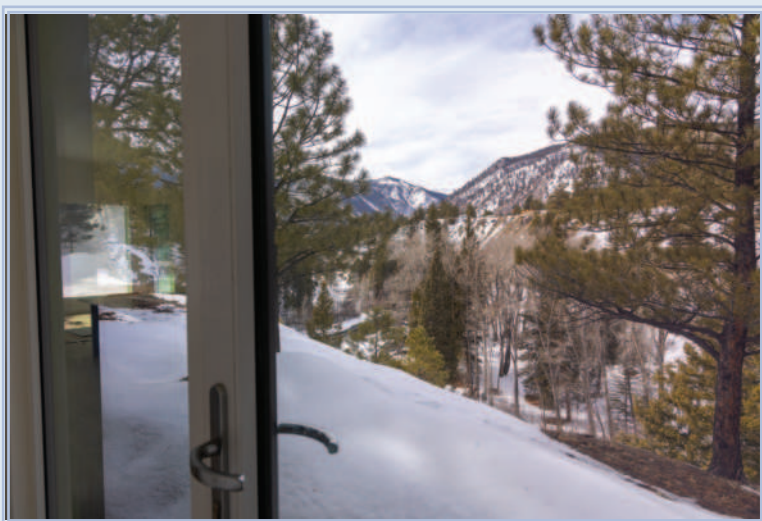
The electrical system, plumbing system, Uponor's radiant heating and cooling system, and ducting for Broan-NuTone's IAQ solutions are all nicely tucked behind the walls, ready to be hooked up.



Atmospheric excellence. Broan-NuTone's efficient energy recovery ventilation (ERV) system keeps the home comfortable and healthy.



Task completed. There is little to no work to be done to finish the bathrooms.



Doorway to pleasure. An entire wall of windows opens up the priceless views of the Lake City valley.



Watchful eyes. Somehow fearless of the machinery and loud noises, a local deer stopped by for a look at this unique construction process.



Inside view. The new owner, Sara Gutterman, enters the home for the first time.

Walking to the bathrooms, we were impressed to see the toilets, sinks and fixtures from Grohe, shower glass, tile from Daltile and doors from TruStile.

PUTTING IT ALL TOGETHER

Dvele enlists a unique process of securing all the components and reinforcing the strength of the entire module during manufacturing in their facility, making this home more resilient to the elements and longer lasting than many on-site-built homes.

This pre-fabrication approach reduces the number of trades-people needed at the remote site and allows Dvele to streamline the process in the factory. This saves time, cost, waste and overall environmental impact.

As this remarkable home settles into its new environment, it serves as a profound reminder of the role our living spaces can play in fostering a more sustainable world. The VISION House Transcend is not just a place to live; it's a vision of what a home can and should be in an age where sustainability is no longer a choice but a necessity. **GB**

Product and support for Transcend is being provided by these partners.



HOUSING 2.0

DISRUPTIVE INNOVATION, PART III: THE HOME OF THE FUTURE...WITH CERTAINTY

Understanding the future for housing is simply a matter of connecting the dots between the market-ready innovations and crises they mitigate.

BY SAM RASHKIN

This is Sam Rashkin's latest in a series of articles based on his second book, "Housing 2.0: A Disruption Survival Guide." It is intended as a roadmap for high-performance builders to become the most successful in the industry.

User experience (UX) optimization ensures a product that exceeds buyer expectations with best practices that also extract cost savings by eliminating waste, optimizing simplicity, and integrating systems. There are three elements: Mass customization, which integrates world-class expert solutions into optimized building blocks that cost less through their use on many projects; digitization, which creates virtual twins of mass-customized homes that are UX optimized and include automated bill of materials and construction instructions that enhance productivity and reduce costs; and offsite construction substantially, which reduces reliance on a decreasing workforce for trades while using advanced factory production methods and systems for superior productivity and quality.

These innovations have been sitting on the sidelines for too long and can no longer be ignored. The process begins with every builder transitioning to a UX optimization business model that delivers better homes for lower cost.

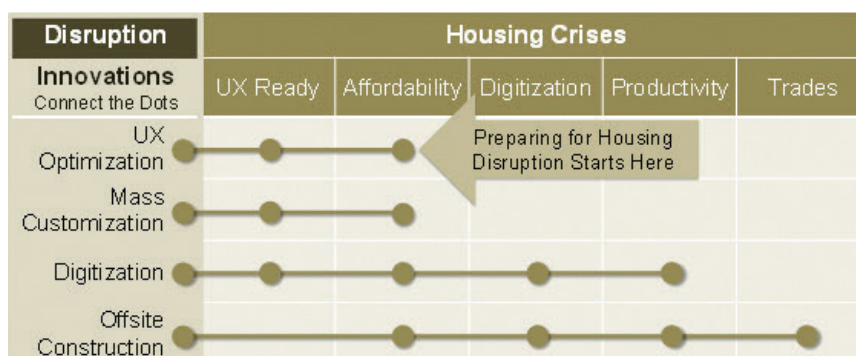


Figure 1: Housing crises mitigated by market-ready innovations

As these innovations are adopted, a clear version emerges for "What" the home of the future looks like with certainty. And not surprisingly, it tracks the latest disruption in the automobile industry to faster, better, and cheaper electric vehicles (EVs). This includes:

- **Replacing obsolete 100-plus-year-old platforms.** Just as EVs replace the century-old internal combustion engine with battery-powered electric motors, housing will replace 100-year-old fossil fuel equipment with advanced electric technology. Meanwhile, 150-year-old framing technology will be replaced with advanced offsite enclosures. In both cases, these new platforms provide the foundation for compelling faster, better and cheaper performance.
- **Loading up with tech.** EVs are fully integrated with advanced technology, including controls, cameras, sensors, smart components, and batteries all linked to smart phone operation. Similarly, all-electric homes will include these advanced technologies integrated with onsite or offsite renewable energy. The resulting performance benefits are too compelling to ignore: a whole new level of comfort, convenience, safety, health, resilience, durability and entertainment, and freedom from costly energy bills.

- **Ensuring a superior UX.** Just as EVs provide a transformative UX relative to design, performance and quality, the housing industry must follow suit with new zero-energy homes (ZEHs). In addition, location is uniquely critical to housing, which therefore must also optimize the community experience. The outcome will be homes that live, work and last better.
- **Curating expert packages.** EVs feature simple choices to customize the exterior and interior across multiple product lines that dramatically lower total cost of ownership. While there will always be a significant market for custom homes, the housing industry must follow suit with mass-customized solutions for mainstream home buyers. The results are ample consumer choice, as well as lower cost, stress and complexity in product configuration.
- **Own the customer for life.** Where EVs include simple and paperless transactions along with ongoing online services for desired upgrades, so will the housing industry. This ensures companies own their customers for life with services that continually improve the UX, cultivate a value-based relationship, and provide ongoing revenue streams.

HOW INNOVATION HAPPENS: CROSSING THE CHASM

Important note: I'm not delusional. Remember, I have already conceded that the housing industry is profoundly resistant to change. This is because of the following roadblocks to innovation:

- **Extreme fragmentation.** There are tens of thousands of builders and trades, which results in a complex web of enterprises delivering new homes. This creates substantial challenges adopting innovation related to complexity, burden and cost.
- **Variable cost business model.** Builders minimize fixed costs by relying on trades to provide the labor, materials, tools, and equipment needed to construct homes. This is done to minimize carrying costs during down cycles and maximize resources available for land acquisition. There is no product without land. As a result, there are minimal to no resources available for meaningful investments in innovation, even among large national builders. One study—"Business Research and Development and Innovation: 2008-2010," from the U.S. National Science Foundation—found that the research and development investment as a percent of revenue was more

than 15 times less for residential construction than the median for 17 other representative industries (0.4 percent vs. 6.7 percent).

- **Low risk tolerance.** As discussed earlier, builders are regularly confronted with a huge array of risk factors that are totally outside their control. This creates what is often a crippling resistance to change. When engaging builders, I can hear them thinking, "I'm so overwhelmed, I'm just staying with what I know." Some come right out and say it to me. As a result, any additional real or perceived risk with innovation is too often a bridge too far.

Any attempt to introduce significant innovation into the housing industry must start with a healthy appreciation for this daunting challenge. Personal success-leading national programs were significantly informed by research on effective market transformation in the technology sector. One outstanding resource helped me understand that the commonly depicted smooth exponential growth curve for technology market diffusion is a myth. Instead, there is a deep chasm blocking the smooth transition from early adopters to mainstream users (see Figure 2).

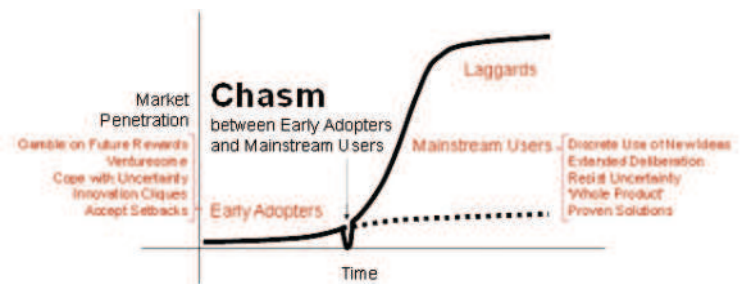


Figure 2: Market diffusion chasm between early adopters and mainstream users

The reason for this chasm is the completely opposite market behavior tendencies for mainstream users compared to early adopters including:

- Discretely using new ideas rather than gambling on future rewards
- Extensively deliberating about the unknown rather than being venturesome to embrace change
- Resisting rather than coping with uncertainty
- Requiring "whole product" solutions rather than being willing to resolve challenges using new technologies with innovation cliques
- Needing proven tried-and-true solutions rather than being willing to accept setbacks

This insight helps explain extensive personal observations of housing innovations routinely failing to tip past the inflection point on the path to exponential growth. The outcomes are complete failure (Katterra and Entekra are prominent examples of offsite companies that recently went out of business), or flatlining at a few percent market penetration, as shown by the dotted line in Figure 2 (e.g., modular construction, structural insulated panels, pre-cast concrete foundations, geothermal heat pumps).

The four housing innovations presented in this article have also struggled to cross this chasm, which I attribute to the following failed market diffusion strategies:

1. **Lack of a compelling UX to get past discrete use of new ideas and extended deliberation. This includes:**
 - Missed opportunities to invest added cost in world-class expert solutions and features that are "sure thing" for transformative UXs, which can be more than offset with right-sizing, simplicity, waste reduction, systems integration and mass customization.



A winning combination. The user experience (UX) optimization includes ways to eliminate waste, optimize simplicity, and integrate systems via mass customization, digitization, and offsite construction. CREDIT: ISTOCK/MARCUS MILLO

- Designs not aligned with offsite production constraints to minimize waste and cost.
- Misalignment of standard CAD software with offsite construction plant software needed to run automated systems, resulting in duplicative digitization costs.
- Not integrating world-class designs and advanced technology in mass-customized products with offsite construction and digitization services.

2. Lack of “whole product” options and proven solutions. Examples include:

- Offsite construction options that only provide partial enclosure solutions rather including materials and labor for foundation, walls, roof, openings, building science control layers (air, thermal and moisture), systems (mechanical, electrical, plumbing), and smart home technology.
- But offsite construction options do not include enhanced warranty coverage and services that are uniquely possible with their inherently greater quality control processes.

Based on this analysis, critical housing innovations too often fail to reach mainstream builders. In particular, the innovations are dead-on-arrival if they impose any risk of losing hard-earned trade relationships or require significant added burden and costs for training, coordination and negotiation of reduced scopes of work. A new housing business model is required to cross the chasm.

HOW HOUSING INNOVATION HAPPENS: THE INNOVATION AGGREGATOR BUSINESS MODEL

No one thought it was remotely possible that a start-up car company could compete with the big players. An impressive list of failures backed up this belief (e.g., Tucker, DeLorean, Fisker, Bricklin, Treser). Then, Tesla came along and disrupted the automobile industry with a completely new business model. This includes the all-electric platform, extraordinary performance, enhanced product mass customization, comprehensive technology package linked to smart phone operation, simplified transaction process, and ongoing services.

There are several players within and outside the housing industry that are in a position to “Teslarize” homes by taking the ultimate consumer product to a whole new UX level. This includes large national builders, a new entity I call Digitization as a Service companies (DaaSCOs), or large offsite companies. Each of these entities can deliver at scale to other builders or directly to consumers. Figure 3 shows how the innovation aggregator business model works.

It starts with the five crises exerting severe pain (on the left). Then, moving left to right, the aggregator would provide a completely turn-key solution for home builders that removes the pain with a superior product at lower cost. The innovation aggregator services include:

- A world-class expert product development team that includes design, technology, health, zero energy, quality systems, and community planning.
- A large offering of UX and offsite construction optimized designs, fully digitized into exterior and interior building blocks that can be mass-customized into diverse options for homes or entire communities.
- A full array of builder services, including design, construction documents, bill of materials, virtual walkthroughs, and offsite “whole product” solutions.

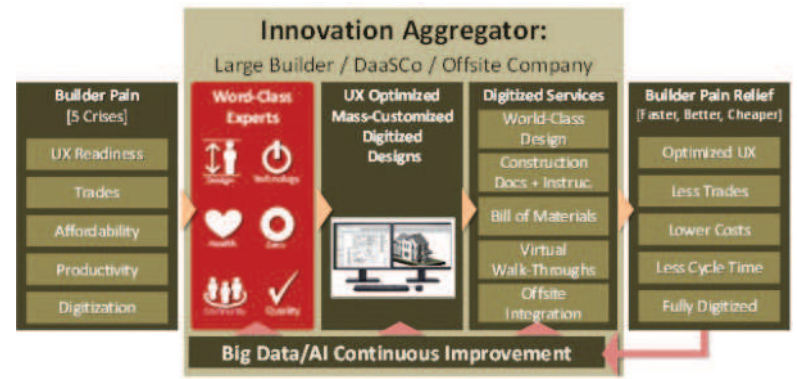


Figure 3: Crossing the chasm with the innovation aggregator business model

- Self-learning continuous improvement implemented by applying AI to data collected from smart technology integrated into all sold homes and ongoing services.

The full details for deploying an innovation aggregator business model are the subject of a much longer article that is still under development. For readers who are interested in learning more about an actual example, I encourage reading about the Swedish offsite home building industry in the last chapter of “[Housing 2.0: A Disruption Survival Guide](#).” These builders have captured 85 percent of the new home market with a business model that closely aligns with the innovation aggregator described above. I look forward to ongoing work with key players in the U.S. housing industry who embrace innovation, and sharing more on this subject as key milestones are achieved.

WRAPPING UP

As a matter of full disclosure, I’m completely biased. I love housing and believe it may be the most important of all business endeavors. After all, this is where people spend 70 percent of their lives. What product can have a greater impact on the human experience?

This has led to a long career where I’ve had a unique opportunity to passionately observe the industry I love across the entire country. This includes the privilege of leading two national certification programs that have transformed the housing industry to high performance: ENERGY STAR Certified Home and Zero Energy Ready Home (ZERH). The wonderful bonus has been extensive engagement with thousands of builders, home energy raters, building science experts, architects, and manufacturers, all of whom have inspired a much larger understanding of changes ahead for the industry.

This article summarizes the results from my “Housing 2.0” book and workshops. The unique guidance at the core of this program is an extensively vetted framework for adapting to disruptive changes looming ahead rather than being left behind. The exciting outcome is an industry that delivers high-performance homes faster, better and cheaper. It can be done; it will be done. If you don’t do it, someone else will. **GB**

Sam Rashkin’s two-decade career as a licensed architect includes serving on national steering committees for the U.S. Green Building Council (USGBC)’s LEED for Homes, Green Builder Media’s Green Builder Guidelines, the Environmental Protection Agency (EPA)’s WaterSense label, and EPA’s Indoor airPLUS label. He has partnered with Green Builder Media to develop the [Housing 2.0 program](#), which empowers building professionals to design and construct higher-performance, healthier and more-sustainable homes at a fraction of the cost.

The Housing 2.0 program is sponsored by JinkoSolar, LP Building Solutions, Mitsubishi Electric, Panasonic Healthy Indoor Solutions, Schneider Electric, and Sunnova.

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Information Architecture

Artificial Intelligence is already making its mark on the construction industry. There's more to come.

BY TERRY BEAUBOIS

As an architect who moved to Palo Alto, Calif. (before this area became known as “Silicon Valley”), I experienced the gradual development and success of many of the new technologies that have transformed every industry, including the greater building industry (GBI), in the following decades. At a presentation that I gave at a national

A smart century. Artificial Intelligence, which is becoming a household word, will soon become a word for households.

building industry convention back in the early days, the first question I was asked was, “Why would an architect want to use a computer?” This was a valid question at the time. But it’s difficult to imagine not using a computer in our work today—it became a requirement that work for federal projects be done in computer-aided design (CAD) many years ago. And now,

there are a number of nations exploring the idea of eventually requiring the use of Artificial Intelligence (AI) for all buildings submitted for review and approval in their countries, which has led me to explore the use of AI in our industry.

WHAT IS ARTIFICIAL INTELLIGENCE?

As the questions over the years became “what is email?”, “what is a website?”, and currently, “what is artificial intelligence?”, I enjoyed introducing new technologies and addressing the benefits that they can have across the GBI—especially those with a green building focus. In fact, a large portion of the work that I do is not just the architecture of buildings, but “Information Architecture,” helping companies produce technology beneficial to the GBI. Over the decades, I’ve enjoyed doing this with NASA, Adobe, Apple and a number of other companies and universities. I’m currently beta-testing some AI products that help these entities develop products with uses in the GBI in mind.

So, what is AI? My current answer is that it’s a technology that will provide us with “great assistance at remarkable speed, regarding the management of the work that we do every day, that currently takes an incredible amount of our time”—with increased efficiency and accuracy. That will be a major benefit as AI becomes more mature and useful to us in our everyday work.

Another aspect of AI: “AI isn’t one thing.” The technology is being applied separately in many areas, in many ways: “voice-to-text,” text to images, etc. AI will also continue to contribute amazing benefits to medicine, healthcare, and other industries.

The fact is that many of our clients are already using AI in some form, and in the future they may expect that people in the building industry will be using it. They may even be selecting which companies they hire based on their use of AI. The possibility that use of AI may be a requirement to get a building permit in the future in some jurisdictions is what motivates me to explore AI and to identify its future benefits to the GBI.

WHERE DOES IT HELP?

Here are some of the areas where AI can assist the GBI:

- Design and planning
- Construction management
- Building materials and systems
- Predictive analytics
- Automation
- Health and safety
- Customer service
- Quality control
- Sustainability
- Facility management

I’m not the only one with an interest in AI. In January, the National Institute of Building Sciences (NIBS) held a meeting on the use of AI in the GBI: “The Intersection of AI and Building Sciences: A new era of Intelligent Infrastructure.”

This was a transitional moment for the U.S. building

industry. Discussion and demonstrations of the technology were given. The response was an overwhelming sense of interest in really exploring what AI can accomplish across the entire building industry.

THE DANGERS OF AI

So much has been written about the dangers of AI that I would be remiss if I didn’t acknowledge the questions and concerns of “AI being used for bad things.” Briefly, I’ll just say that blaming AI for doing bad is the equivalent of saying that cars are bad because they can be used for a bank robbery. The intentions of the users of the technology determine what the technology is used for. The technology itself does not determine that. And because AI can be used for so many good things, it is prevailing. AI can help all people who choose to use it to advance their own profession, educational setting or trade.



Instructional aide. AI can help the building industry with its design and planning, construction management, predictive analytics, and more. CREDIT: ISTOCK/GORODENKOFF

AI AND GREEN BUILDING

AI will be a significant contributor to information management in the areas of green building and sustainability. Many of the topics that Green Builder Media CEO Sara Gutterman mentions in her awareness-raising presentations can be assisted by AI. (Please visit Sara’s blog at <http://tinyurl.com/29ecphjf> for more.)

If your reaction to Sara’s presentations is “how are we going to do all this?”, think it over. AI will be assisting us with the ability to address these issues in our own businesses and more! **GB**

Terry Beaubois is CEO of BKS: Building Knowledge Systems, in Palo Alto, Calif. He can be contacted at tbeaubois@gmail.com.

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Reflecting on DESIGN and CONSTRUCTION Week



Ron Jones
Co-Founder and President
Green Builder® Media
ron.jones@greenbuildermedia.com

The NAHB International Builders' Show (IBS) wasn't our first rodeo—far from it. Our Editor-in-Chief, Matt Power, and I were trying to recall how many we had each attended when I reminded him that our first face-to-face meeting came in the Houston Astrodome when the show was held there in 1995. (Not sure if either of us had been to any earlier.)

What's perhaps most striking about this latest experience, this time in Las Vegas and now referred to as Design & Construction Week, is that with all the advances that have been made in building science, products, performance and design, the mindset of the industry is right where it was 30 years ago.

Email invitations began to arrive in early February from various PR and marketing agencies representing residential construction companies that wanted those of us in the media to visit their exhibits in the vast convention center halls. I decided to have some fun and see just how sincere all the messaging was. It seemed that almost everyone made sustainability claims in their pitches.

Each time I would get a new invite, I would respond. While I was interested in seeing new products and hearing about new services for the building community, I really wanted to know about their sustainability commitments and their environmental, social, and corporate governance (ESG) initiatives. I identified it as my "Bustin' Greenwash Tour."

Not surprisingly, I did not hear anything more from many of them. I had to chuckle when one particular representative, who had pitched me to come by and see a new plumbing part that is made from recycled plastic bottles, reported that their client would pass on that opportunity but still hoped I would stop in to see their widget.

But several others embraced the chance to shine light on their sustainability programs and achievements, and a couple even offered to share ESG reports that are already in place or under development. I'll be following up with those company reps in coming weeks and I'm eager to learn about the organizations

that are leading these kinds of efforts.

But not all activities were happening in show booths. Each day before, during and after the three days of the event, my inbox was flooded with blogs and announcements from NAHB that promoted everything imaginable connected to D&C Week, as well as their ongoing advocacy campaigns happening across the country.

One such statement that caught my eye was a typical association propaganda piece with a list of the features home buyers want in new homes. A prominent item was energy efficiency. On the day I received it, I was contacted by energy efficiency proponents in Colorado who asked if I could testify against a bill in the state Senate that called for rollbacks in residential energy requirements for new homes.

Fortunately, despite the best efforts of homebuilder association lobbyists, the bill, which had NAHB fingerprints all over it, never made it out of committee. Sadly, similar rollback initiatives have been making their way into the legislative agendas in several other states as well.

Never accused of smart timing, the association also released a statement on the shrinking square footage of typical new U.S. homes—currently at about 2,400 and expected to fall to 2,000 in the near future. Ironically, NAHB also endlessly promoted its annual behemoth show home, a shameful hoax they have dubbed "The New American Home." It clocks in at more than 7,700 square feet, or three to four times what an actual new home measures in America.

At the end of the day, that program is a juicy cash cow that the association uses to lure companies in the building products sector into the inner circle and then milk them for major bucks. One would think that those successful manufacturers would be too savvy to be suckered into the game, but once they're on the inside, they fear losing their place to one of their competitors and they're stuck.

Widgets may come and go, but it seems that hypocrites and bullies are forever. **GB**

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