

Award-Winning Coverage of Sustainable Construction, Products and Lifestyles

GREEN BUILDER®

March/April 2023 / www.greenbuildermedia.com



Our annual salute to the **best green innovations** and **brand leaders** includes smart controls, water heaters, heat pumps and more.



A man in a dark raincoat and hood stands in the rain, holding a small, fluffy white dog. He is looking off to the side with a concerned expression. The background is a dark wooden wall with a small circular vent.

WE RUN TOGETHER.

A large, industrial-style Trane air conditioner unit is shown in a dark environment with a strong green light. The unit has a 'TRANE' logo on top. To the left, there is a metal ladder structure. A solid blue rectangle is in the bottom right corner.

EVERY TRANE AIR CONDITIONER, FURNACE AND
HEAT PUMP IS ENGINEERED, BUILT AND TESTED
TO RUN, RUN AND RUN—JUST LIKE YOU.

2023

Brand Leader

**TRANE®***It's Hard To Stop A Trane.®*

WHAT IS TRANE'S VISION FOR A SUSTAINABLE FUTURE?

- At Trane Residential, we are committed to reducing our customers' carbon footprint while leading by example. Within our own operations, we are targeting carbon neutral operations by 2030.
- Our manufacturing sites achieved zero waste-to-landfill status ahead of our 2024 goal. Now every plant in Residential HVAC & Supply recycles just about every type of material, including all forms of plastic. The small amount that's left gets incinerated by a waste energy facility that generates electricity with the steam produced.
- We are focused on increasing opportunity for all, strengthening economic mobility and bolstering quality of life, including gender parity in leadership roles, creating a workforce reflective of the communities where we live and work, enhancing learning environments and accelerating student success while opening career pathways.

HOW DO TRANE'S PRODUCTS MAKE HOMES MORE SUSTAINABLE?

- We are reducing our customers' carbon footprint through recovery of used refrigerant; continuous low-emission product development; working with channel partners to increase adoption of high-efficiency and connected systems; and educating and supporting homeowners.
- As one example, Trane's XV20i Variable Speed Heat Pump heats and cools homes with one of the industry's most efficient systems, automatically adjusting to avoid temperature swings.
- By acquiring advanced adaptive thermostat technology, we have increased our energy efficiency capabilities by offering an Energy Savings option. The energy optimization technology reduces HVAC run times through cloud-based artificial intelligence. Through incorporation with our smart thermostats and mobile application, this technology delivers U.S. Environmental Protection Agency (EPA) validated energy savings of up to 10 to 20 percent and enables our smart thermostats to qualify for the EPA's Energy Star® certification.



WHAT ARE TRANE'S STANDOUT ESG INITIATIVES?

- We lead our industry in advocating for aggressive support for greener electricity grids, higher energy efficiency, and lower GWP refrigerants.
- We promote electric-powered solutions to reduce building emissions and minimize environmental impact while creating a comfortable home environment. Our high-efficiency solutions perform well above mandatory minimum efficiencies for all climates. This includes hybrid solutions – pairing an electric heat pump with a traditional furnace – in colder climates. For the hybrid solutions in regions where a furnace is still needed, we offer furnaces that can be 20% more efficient than the government-mandated baselines.
- We are leading the way with several programs that address the shortage of skilled labor, including the Trade Warriors™. During the 8-week training program, we're preparing America's service members for careers in the HVAC industry through training and job placement, while addressing our customers' number one challenge: finding, developing and retaining qualified technicians.

WE MUST MOVE SWIFTLY to Build Sustainable, Affordable Batteries

Homeowners and utilities need better energy storage now. But mining lithium is not the answer.

The biggest innovation story this past year wasn't the brief, tiny fusion experiment that dominated headlines, hinting at a distant future of limitless energy. Instead, it may have been a non-polluting, high-capacity battery breakthrough that could replace lithium. More on that shortly.

A few years ago, large-scale storage of energy seemed like a limited niche, a pricey way to energize off-grid homes. But the utility landscape has fractured. Major climate events, such as the Texas freeze, along with huge spikes in natural gas prices (remember how fracking advocates promised that gas was abundant and **would remain stable in price for decades?**) have shaken our confidence.

Actually, more than shaken. A perfect storm of utility privatization (leading inevitably to **corruption**), along with aging infrastructure has driven **energy prices double digits higher** in many regions. I can't count how many desperate (or angry) posts I've read on my Maine neighborhood chat board about unexpected increases in gas and electricity bills.

This lack of resilience brings the conversation back to alternate energy sources. The most logical first step for homeowners is solar power. But photovoltaics (PV)'s weakness has always been storage. The sun doesn't shine at night, and **sourcing Btu energy for heating from batteries** requires a hefty power bank.

For most manufacturers, that means lithium. It's a battery technology that has served us well, aside from the occasional **violent explosion** (there's a reason airlines don't want lithium batteries stored in our baggage). Mining for lithium **can be nearly as polluting as extracting fossil fuels**. Then there's cost: lithium-based batteries for household solar storage can double the cost of a PV installation.

This year, while pounding the floor of the NAHB International Builders' Show in Las Vegas, I came up empty on battery innovations. I found lots of other energy-saving products and services—many of them highlighted in this, our annual



Beyond lithium. Mining for lithium takes a high environmental toll. New battery technologies should consign it to history.

awards issue—but no storage miracles. It's a tough technical nut to crack.

However, they do exist. You have to look far and wide. For example, Research at Australia's University of Sydney **School of Chemical and Biomolecular Engineering** has made major strides in optimizing a salt-based battery. They've built one that lasts four times longer than lithium.

To put the performance of these batteries in scientific terms, this salt-based material exhibits an unprecedented reversible capacity of 505 mAh g⁻¹ over 1,000 cycles, with a low capacity fading rate of 0.05 percent per cycle.

What's more, these prototype batteries could be built with easy-to-access materials, recycled with minimal negative environmental impacts.

We have hit an energy glass ceiling that we can only shatter with better, more-affordable battery storage. Let's not invest in lithium mines and toxic metals, when tomorrow's cleaner, more-powerful batteries are just around the corner. **GB**



Matt Power
Editor-in-Chief

matt.power@greenbuildermedia.com

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WATERPLACE



E-ONE ELECTRIC FIREPLACE



RENEW BIOFUEL FIREPLACE

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Held virtually April 19-20
12 - 3 PM ET

At a time of profound challenges and new possibilities, we're experiencing transformative, systemic change. We're not just shifting preferences, we're exploding paradigms.

Join Green Builder Media for our seventh annual **Sustainability Symposium 2023: THE GREAT CONVERSION**, held virtually on April 19 & 20, as we address some of the major reckonings of our time.

Considered to be one of the most innovative and pioneering sustainability events of the year, our annual **Sustainability Symposium** is designed to elevate the national dialogue about intelligent solutions for a sustainable future.

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Global change starts with the courage to act

We've committed to reducing one billion metric tons of carbon emissions from our customers' footprint by 2030.

As a global leader in creating comfortable, sustainable, and efficient environments, it's our responsibility to put the planet first. We innovate and deliver solutions that are better for builders, homeowners and the environment. We're boldly challenging what's possible for a more sustainable world—one new home at a time.

Learn more about the Gigaton Challenge and the rest of our 2030 Sustainability Commitments at

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we provide mind-expanding information that catalyzes and inspires
commitment to sustainable living."

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RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	LG (Signature Kitchen Suite)	1.00	1	11	1
2	Whirlpool (Whirlpool, JennAir, Amana, KitchenAid, Maytag)	2.30	2	2	3
3	Bosch (Bosch, Gaggenau, Thermador)	2.90	3	15	2
4	Haiier (Haier, GE, Café, Fisher & Paykel, Monogram)	4.00	4	4	4
5	Samsung (Samsung, Daewoo)	6.00	4	3	11
6	Miele	6.80	7	5	5
7	Electrolux (Electrolux, Frigidaire, Westinghouse)	7.30	5	2	10
8	Liebherr	8.00	6	11	7
9	SubZero (Wolf)	8.40	6	5	1
39	Viking	9.00	6	5	5

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The industry's greenest products and building trends, as revealed by Green Builder's readers, market conditions and public sentiment.

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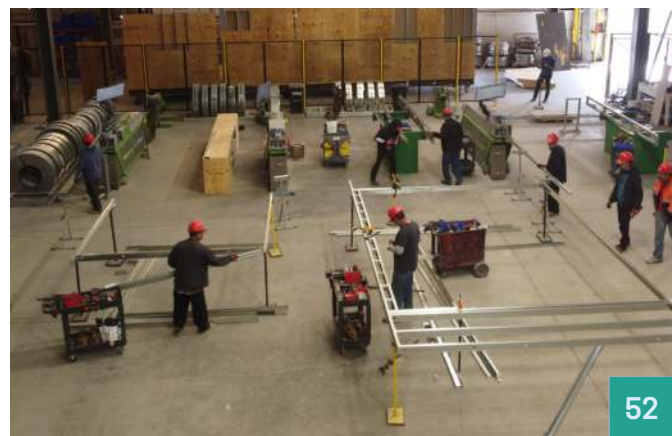
TRANSCEND: THE PROMISE OF HIGH-PERFORMANCE PREFAB

Builders facing a triple threat of labor shortages, soaring material costs and lingering supply chain issues can find solutions through innovations in prefabricated construction.

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Here's a new trick for cooler attics, energy savings and reduced heat gain in HVAC systems.



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"Sustainability can be described as intergenerational prosperity—that is, the outcome of ecological accountability." [PAGE 64](#)

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LG
Life's Good

WHAT IS LG'S VISION FOR A SUSTAINABLE FUTURE?

LG ELECTRONICS' climate action efforts focus on reducing the environmental impact of products throughout their entire lifecycle – from design and production, to packaging and transportation, to use and disposal – while cutting greenhouse gas emissions from LG operations worldwide.

LG is working toward carbon neutrality by cutting emissions from operations through measures such as highly efficient buildings, renewable energy, fleet electrification and carbon offset projects.

As the company pursues its goal for 100% renewable energy in worldwide operations by 2050, LG USA is leading the charge – meeting this goal in the United States in 2022. Science-based target initiatives support LG's aggressive 2030 goals for cutting greenhouse gas emissions generated during the use phase of refrigerators, washing machines and air conditioners. To reduce emissions in the value chain, LG has pledged to use 600,000 metric tons of recycled plastic in products by 2030, while reducing the use of virgin plastic throughout its operations.

HOW DO LG'S PRODUCTS MAKE HOMES MORE SUSTAINABLE?

In the United States, many of LG's sustainability efforts focus on tangible actions that homeowners and builders can take to move the needle. LG embraces the decarbonization movement and leads the way toward electrification with an array of products, ranging from induction cooktops and ranges to energy storage systems to advanced heat-pump-enabled clothes dryers, water heaters and HVAC systems. The LG ThinQ Energy platform integrates home energy management systems, smart connected appliances and demand-response capabilities for optimized energy conservation and enhanced grid resilience. Envisioning a sustainable world where Life's Good for the planet and all its inhabitants, we continue to pursue eco-minded solutions and ideas for a greener environment and develop products that provide access to convenient, valuable, and novel experiences for everyone.

WHAT ARE THE COMPANY'S STANDOUT ESG INITIATIVES?

- **LIFE'S GOOD AWARD:** LG recently presented its first Life's Good Awards. This global initiative seeks to uncover innovative solutions that embody LG's ESG vision of a Better Life for All, aiming to foster a brighter future for the planet and people.
- **SWIPE OUT HUNGER:** LG introduced a corporate social responsibility initiative at the intersection of energy efficiency and food insecurity. Believe it or not, one in three college students in the United States faces food insecurity. LG joined forces with Swipe Out Hunger to provide 120 ENERGY STAR certified LG fridges to food pantries on 60 college campuses. While saving energy and thus supporting university sustainability goals, these refrigerators will increase cold storage for campus pantries by 15% nationwide and support additional 500,000 meals.
- **SECOND LIFE CAMPAIGN:** The LG Second Life campaign initiated last year was our response to the growing need to educate people on the impacts of clothing waste. With millions of pounds of clothing ending up in U.S. landfills each year we wanted to inspire consumers to take responsible action through fabric care, donations and upcycling. With that goal in mind, LG hosted a multi-city mobile clothing drive tour, collecting over 11,000 pounds of used clothing. LG sorted, washed and donated the clothing to various local community beneficiaries in each market to support families in need of clean clothes.

HOMEBUYERS GET THE KITCHEN OF THEIR DREAMS. YOU GET ALL THE CREDIT.



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AURALINE® TRUE COMPOSITE NAMED SUSTAINABLE PRODUCT OF THE YEAR

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11-98463 03/23



Indoor air quality, environmental control and energy savings are back in the forefront of envirofriendly vendibles.

BY ALAN NADITZ

Sometimes, the road ahead takes a traditional turn. This year, **Green Builder's "Sustainable Products of the Year"** lineup leans heavily toward appliances and related fixtures—items found in every home but which are also known for their environmental impact.

Our 2023 troupe is going above and beyond in manufacturing items that encourage sustainability through innovative technology or an improved version of a traditional technique.





Alternative Energy

Fire Magic Electric Grill

Whether it's a lack of space or an owner's desire to move away from natural gas, Fire Magic's new line of electric grills offers a healthy way to cook food without relying directly on fossil fuels. The product's compact size makes it a good fit for nearly every patio, and firing it up is easy: As long as there is a 120-volt power plug nearby, you're in business.

The company's stainless steel electric grills have numerous features that make outdoor cooking as much fun—perhaps more so—as with their natural gas counterparts. Typical components include a fast preheat time, a large heating element for faster grilling at up to 700 degrees Fahrenheit, and a digital thermometer with thermostatic control and a meat probe for precision grilling.

Meanwhile, a version set for market release this summer includes a state-of-the-art control panel with *Bluetooth* technology for control of the grill from a smartphone.

FOR MORE INFORMATION: [FIREMAGICGRILLS.COM](https://www.firemagicgrills.com)



NetZero Fire Waterplace fireplace

An in-home fireplace can be great. But the ashes leftover from wood, and the natural gas needed for the "colorful" version isn't very sustainable. A surprise alternative comes from NetZero Fire's *Waterplace*, a fireplace that is carbon neutral, courtesy of H₂O.

You read that right. Using only water vapor, *Waterplace* creates ultra-natural, dancing "flames" that only a trained eye could discern as artificial. With a constant fuel supply provided by a water line, *Waterplace* can be installed virtually anywhere close to an electrical outlet. No venting is necessary, and there's no risk of damaging humidity or moisture buildup on surrounding surfaces. Indoor air remains free of burned smoke smell. And because the flames "burn" cold, there's no fire danger.

Units can be installed with various flame and log configurations—*Waterplace* currently has four—along with glass media and user-controlled color-changing LED lights. Flame patterns can be up to 20 feet long.

FOR MORE INFORMATION: [WWW.NETZEROFIRE.COM](https://www.netzerofire.com)



Appliances and Fixtures

Beko Compact Washer with RecycledTub

The *Beko Compact Washer with RecycledTub* is a Wi-Fi-enabled washing machine with state-of-the-art functionality and sustainability features, including a recycled tub made from 60 recycled polyethylene terephthalate (PET) bottles. Since 2017, the *RecycledTub* has eliminated more than 114 million PET bottles worldwide, a direct response to the tons of plastic that end up in U.S. landfills every year.

The washer includes a *Fast+* function, which senses the type of fabric and the amount of clothes, then optimizes the washing program to reduce wash cycle duration by up to 55 percent, saving water and energy. Also, steam introduced at the beginning of the cycle helps pretreat and loosen stains, for better cleaning.

Beko's new laundry products will combine with the rest of the brand's 2023 product portfolio to create the Beko Healthy Kitchen—an intersection of health, wellness and sustainability in the American kitchen, led by leading designers, and health and wellness experts.

FOR MORE INFORMATION: WWW.BEKO.COM/US-EN.COM



Broan Elite Convertible Under-Cabinet Range Hood

Broan-NuTone's *Broan Elite Convertible Under-Cabinet Range Hood* does what the company's *Alta* line is famous for: It provides a bold alternative to typical hood designs. The range hood features infrared controls, perimeter aspiration and non-dimming LED lighting. A handheld remote enables device control from anywhere in the kitchen.

The unit is equipped with the exclusive *Broan Captur* system, which combines advanced blower design with new filter technology. *Broan Captur*'s blower features a forward-positioned centric inlet to remove 98.5 percent of smoke and odor, and airborne pollutants caused from cooking.

Another system, *Broan Heat Sentry*, detects excessive heat and adjusts the blower speed to prolong the life of the product and provide proper ventilation. And, dishwasher-safe, hybrid baffle filters provide ultra-efficient grease removal with superior airflow. A filter clean reminder ensures they will always maintain a high level of capture. The unit comes in 30- and 36-inch sizes.

FOR MORE INFORMATION: WWW.BROAN-NUTONE.COM



GE Profile UltraFast Combo with Ventless Heat Pump Technology

The *GE Profile UltraFast Combo with Ventless Heat Pump Technology* offers a "one and done" technology that saves space, labor and energy. Instead of letting laundry linger between cycles, the washer automatically switches to dry. Combined time is less than two hours vs. the 130 minutes-plus with a washer and dryer.

The unit's ventless technology enables a machine to be installed anywhere with a water hookup and 120-volt power, such as a bathroom or closet. A *High-Airflow Ventless Drying System* delivers 50 percent more energy-efficient drying.

In addition, the machine's *Wi-Fi Connected with SmartHQ* technology provides the power to select detergents, download specialty cycles and initiate updates automatically through GE's *SmartHQ* app.

Plus, users may control and monitor laundry from anywhere, engage easy-to-use, customizable settings, receive remote status notifications and more.

FOR MORE INFORMATION: WWW.GEAPPLIANCES.COM

KitchenAid Undercounter Refrigerator

At first glance, all undercounter refrigerators appear alike. But KitchenAid breaks that new ground with this new model. This 24-inch unit operates for about \$33 a year, and offers technological aspects such as motion-activated LED lighting that turns on inside, allowing an inner view without opening the door, and a temperature monitoring system with sensor alert. If the system detects temperatures above 45 degrees Fahrenheit for more than four hours, an over-temp alarm and indicator light will alert that service is needed.

There is also a UV-protected thermal glass door to protect against damaging effects of light and heat, an open door alarm to prevent loss of cool air, and a stainless steel-crafted *PrintShield* finish that resists smudges and fingerprints, allowing more time for cooking and less spent cleaning up the kitchen.

A fully flush installation with hidden hinges provides a built-in look within cabinetry. The refrigerator's door opens up to 115 degrees, enabling easy access to food. The unit is ENERGY STAR certified.

FOR MORE INFORMATION: WWW.KITCHENAID.COM



LG Studio Induction Cooktop with Flex Cooking Zone

LG's Studio Induction Cooktop with 5 Burners and Flex Cooking Zone is capable of combining two of its induction elements to accommodate different sizes and shapes of cookware. Meanwhile, a dual element center burner—one large, one small—allows proficient cooking of any size meals.

The electric induction cooktop is also an alternative to natural gas, resulting in cleaner air indoors. The surface never gets hot, meaning no heat is lost into the home environment—a desirable feature during the summer. Lack of surface heat also means no risk of skin burns.

The cooktop is compatible with LG's *ThinQ* app, which allows Wi-Fi-enabled control of smart devices no matter where the user happens to be. *ThinQ* also enables use of time- and energy-saving features, such as smart recipes that offer step-by-step instructions on how to prepare a meal.

FOR MORE INFORMATION: WWW.LG.COM



Maytag *Pet Pro System*

Trying to remove pet hair from clothing often requires multiple washings, which is a waste of water and energy. Maytag's *Pet Pro System* combats that problem with a washer and dryer designed to pull fur, lint and debris out of clothing and bedding. The washer's specialized filter removes five times more pet hair than a conventional washer, while the dryer's no-heat, extended dry time and extra-large lint trap catches even more.

The washer includes a deep fill option for additional stain removal power, and a built-in water faucet for rinsing, spot treatment or soaking when needed. The dryer includes a steam dry option to remove wrinkles and static, and keep clothes looking fresh. The set comes in natural gas- and electric-powered versions.

Maytag notes that the system gives pet owners more time to enjoy their furry friends—the typical owner spends about four hours a week cleaning up from their pets.

FOR MORE INFORMATION: WWW.MAYTAG.COM

Niagara *Phantom One Piece* toilet

Niagara's new *Phantom One Piece* toilet blends its award-winning technology with a single-piece design to make an ultra-efficient product that helps customers reduce water consumption and alleviate high utility bills.

The *Phantom One Piece* includes Niagara's patented *Stealth Technology*, which has re-engineered the flush into a high-power, low-maintenance, virtually clog-free, water-efficient solution. The toilet has a vacuum-assist pull and a noise-cancelling tank. At 0.8 gallons per flush (GPF), the product is powerful enough to eject 1,000 grams of miso paste. It has an MaP Premium rating, is WaterSense certified and surpasses all industry drain line carry standards.

The toilet also displays a modern, sleek design that is ideal for residential, multifamily and hospitality properties. The elongated bowl has an Americans With Disabilities Act (ADA) height and includes a concealed trapway that's aesthetically pleasing and makes it one of the easiest toilets to clean.

FOR MORE INFORMATION: PRO.NIAGARACORP.COM/





Construction Equipment and Tools



Beck *LIGNOLOC* Wooden Nail System

Sometimes the old ways are best. With the *LIGNOLOC* Wooden Nail System, Beck has rethought fastening technology and brought back a sustainable, traditional fastener—the world's first shootable wooden nail—developing it to meet today's construction requirements and make it perfect for use in industrial manufacturing and ecological timber construction.

LIGNOLOC wooden nails are made from Central European beech from sustainable FSC forestry. Thanks to their mechanical properties, the nails can be shot into wood and wood-based materials using the specially developed *FASCO* pneumatic nailer without pre-drilling. The heat generated by friction when the nail is driven in causes the lignin of the wooden nail to weld with the surrounding wood and bond to them permanently.

The *LIGNOLOC* fastening system also generates 70 percent lower CO₂ emissions versus conventional systems. It is also the only fastening system that fully supports the requirements of the circular economy in terms of recyclability.

FOR MORE INFORMATION: WWW.BECK-FASTENING.COM

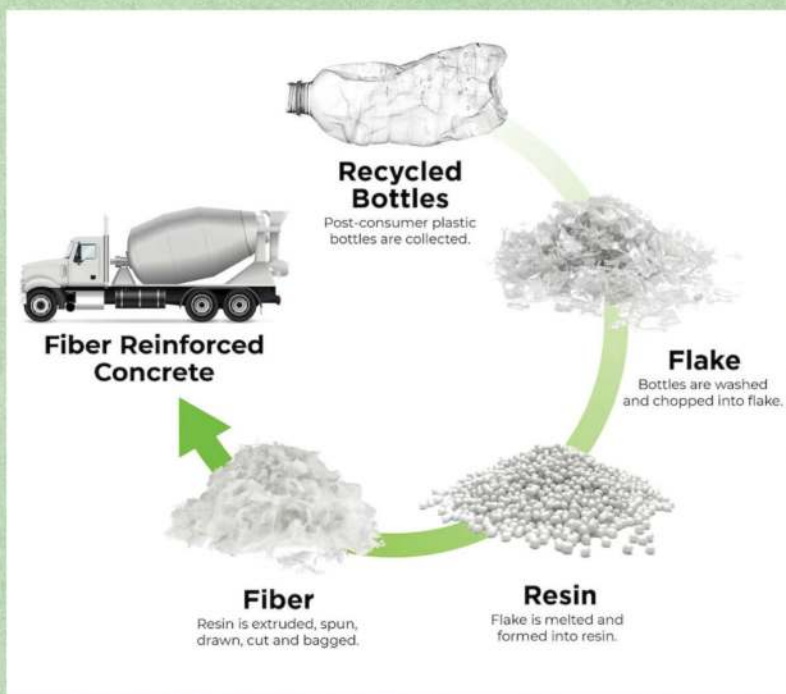
Euclid Chemical *PSI Fiberstrand REPREEVE 225* synthetic microfiber

Euclid Chemical's *PSI Fiberstrand REPREEVE 225* is a high-quality, synthetic microfiber that is certified and traceable, and made from 100 percent recycled materials, including post-consumer plastic bottles and pre-consumer waste. These provide a more-durable and longer-lasting concrete with reduced environmental impact.

The synthetic microfiber performance technology creates unique sustainability benefits for the concrete consumers and construction industry. For example, a 1,000-cubic-yard project could keep 4,725 bottles out of landfills and save the equivalent of 103 gallons of gasoline, 263 gallons of water, and 470 kilograms of CO₂ emissions. Meanwhile, one box of *PSI Fiberstrand REPREEVE 225* contains fiber manufactured from 190 bottles.

PSI Fiberstrand REPREEVE 225 can be easily added to a concrete mixture at any time prior to placement. It is ideal for a variety of applications, including pavements, slabs-on-grade, overlays and toppings, wall systems, foundations, shotcrete, precast and prestressed structures, composite steel decks and decorative concrete.

FOR MORE INFORMATION: WWW.EUCLIDCHEMICAL.COM



Huber Engineered Woods *EXACOR* underlayment

Huber Engineered Woods has created a flooring underlayment called *EXACOR* that's fast to install, with high structural strength and excellent fire resistance. It meets UL 528 fire assembly requirements. These inorganic, magnesium oxide panels come in three sizes and also help with soundproofing—a good fit for multifamily construction.

EXACOR panels are comprised of a cementitious material reinforced with an internal woven fiber mesh to provide jobsite durability and sound dampening essential for apartment, townhouse or multi-use projects. They offer an easy-application alternative to labor-intensive wet-laid gypsum underlayment for floor systems in multifamily or other wood-framed commercial projects.

Installed like traditional plywood or oriented strand board (OSB) panels—but about 30 percent faster—existing framing crews can install *EXACOR* panels, which eliminates the need for a specialty gypsum contracting crew on large jobs. This allows builders to reduce scheduling volatility by taking out one subcontractor coordination need.

FOR MORE INFORMATION: WWW.HUBERWOOD.COM



Volvo CE *L25 Electric* compact wheel loader

The *L25 Electric* compact wheel loader from Volvo Construction Equipment could be a builder's Swiss army knife—one with zero emissions, low noise and no fuel. The *L25 Electric* offers zero exhaust emissions and significantly lower noise levels, making it ideal for working indoors in populated areas and at night. And because it doesn't have an engine, there's no need for engine-related maintenance products like engine oil, oil filters, diesel particulate filters or diesel exhaust fluid.

Other advantages include the number of attachments it can support and its higher travel speeds compared to skid steers and compact track loaders. The vehicle's performance is comparable to or better than its conventional diesel equivalent.

The *L25 Electric* works several hours on a single charge, and it automatically turns off when not in use to save power. This is much more environmentally friendly than a diesel model that idles and continues putting off fumes when not being actively used.

FOR MORE INFORMATION: WWW.VOLVOCE.COM



Controls and Sensors

Airzone Aidoo Pro HVAC/IoT Interface

HVAC inverters and smart thermostats are great products, but they don't always work well together. Adding a smart thermostat to an inverter system may prevent key inverter features from working, reducing the unit's energy efficiency. Airzone resolves that discord with the *Aidoo Pro*, a simple-to-install system add-on that sits between the HVAC system and Internet of Things (IoT) control devices such as third-party smart thermostats, voice assistants and home automation.

The *Aidoo Pro* receives smart thermostat data via API, interprets it, and then sends the appropriate commands to the inverter unit via manufacturer-certified protocol. The inverter continues to function at a variable rate, preserving the system's superior comfort and efficiency.

The *Aidoo Pro* has manufacturer-certified HVAC protocols from all leading brands, including Daikin, Fujitsu, Hitachi, LG, Mitsubishi and Panasonic. Airzone also has dedicated API cloud integrations with the industry's leading smart thermostat solutions, including Nest, *ecobee* and *Honeywell*.

FOR MORE INFORMATION: [AIRZONECONTROL.COM](https://airzonecontrol.com)



Lennox S40 Smart Thermostat

The new *Lennox S40 Smart Thermostat* monitors sensors throughout the home and in all of its equipment and increases overall energy efficiency through *Schedule IQ* and *Smart Away* technology. *Smart Away* uses the GPS in a phone to detect when the user is leaving and automatically adjusts the temperature to a more energy-efficient setting. Once the owner returns home, the system resumes a normal schedule and comfortable temperature, ensuring that unique preferences are still met while saving energy and money.

The *S40 Smart Thermostat* also allows healthier, cleaner air through its air ventilation, purification and filtration capabilities. Additionally, the *Lennox Smart Room Sensor* provides accurate temperature and humidity readings to the *S40 Smart Thermostat* by telling it how to balance temperatures across the rooms where the sensor is placed.

Also, the *Lennox S40 Smart Thermostat* integrates with a range of smart home devices, from smart home systems like *Control4* to popular virtual assistants like *Amazon Alexa* and *Google Assistant*.

FOR MORE INFORMATION: [WWW.LENNOX.COM](https://www.lennox.com)



Nice/ELAN Control System

Nice/ELAN's smart home automation system intuitively controls indoor lighting, climate and even window shades with a single touch. The *Nice/ELAN 8.7500* software version includes a new lighting scheduler with 32 programmable periods—suitable for anything from turning on smart lighting when a user wakes up or returns home, to adjusting lights to set a perfect party mood.

Intelligent features include the ability to automatically anticipate a homeowner's needs for indoor temperatures, as well as controlling heating or cooling systems. Automation controls extend to the outdoors by maintaining pumps, lighting and even automated covers, making swimming pool, spa and other outdoor activities more enjoyable.

In addition, the software network's video recorder (NVR), thanks to a user-friendly interface, gives users the ability to manage the NVR and the cameras without the need to switch between the Nice/ELAN app to view live feeds and a surveillance app to review recorded footage.

FOR MORE INFORMATION: NA.NICEFORYOU.COM

Panasonic Swidget Smart Controls switch and inserts

Panasonic's multi-faceted *Swidget Smart Controls* switch can easily detect and remove contaminated air, via a plug-in insert—one of many designed for the product.

The unit's snap-in *Control + Temperature, Humidity and Motion Insert* sensor can interact with a home's bathroom ventilation fans to maintain proper humidity levels and prevent mold. The insert's motion sensor can control light switches or outlets when it detects occupancy and vacancy in a room. It can control the *Swidget*-wired device it has been inserted into or paired with across multiple households.

A *Swidget* device can also use a home's 2.4GHz Wi-Fi network to enable notifications, set schedules, create powerful automations and monitor energy consumption and costs. The user can activate *Amazon Alexa* and *Google Assistant* with voice commands.

FOR MORE INFORMATION: WWW.SWIDGET.COM



Schneider Electric Square D Energy Center smart electrical panel

Schneider Electric's *Square D Energy Center* smart electrical panel is solar and electric vehicle-ready right out of the box. Owners can easily add generators and batteries for reliable home power. The unit's compact footprint and sleek aesthetics easily saves wall space. Transfer switches, inverters, utility metering, and energy monitoring can be integrated with a single solution.

The overall *Square D Energy Center* system supplies whole-house surge protection, and control of a solar energy system even when the grid goes down. *Square D* allows monitoring of energy usage by the home's appliances. Schneider Electric's *Sense* app enables a homeowner to receive custom safety alerts, such as when garage doors open, and monitor overall energy use in real time.

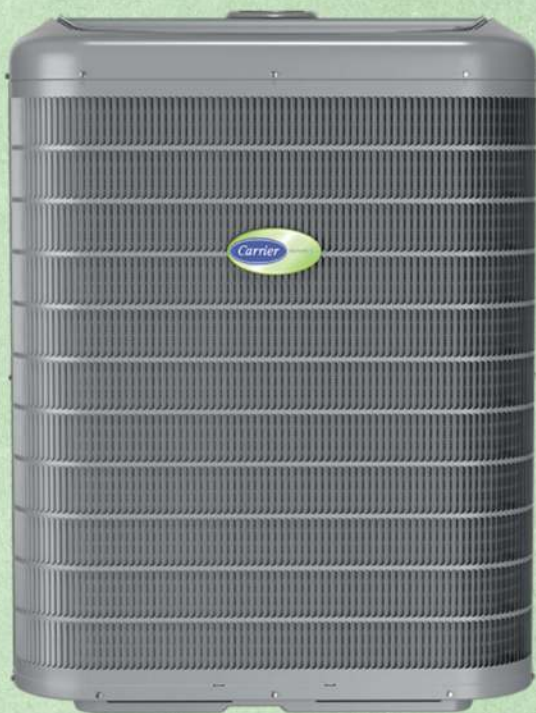
Meanwhile, builders can easily address changing building regulations, including California's Title 24 Building Energy Efficiency Standards. The unit's simplified install means lower expenses for the builder and homeowner.

FOR MORE INFORMATION: WWW.SE.COM





Cooling and Heating



Carrier Infinity 24 Heat Pump with Greenspeed Intelligence

Carrier's *Infinity* system and its top of the line heating and cooling products are well known. The *Infinity 24* heat pump takes that knowledge a step further via *Greenspeed* intelligence, which is created by pairing adaptable-speed technology with the *Infinity* System Control.

The unit's unique, variable-speed compressor allows it to literally adapt its output to the needs of the home. Adjustments between 25 percent and 100 percent capacity give the home only the amount of cooling or heating necessary. This allows the system to operate longer at steadier, lower capacities, ensuring greater energy efficiency and quiet operation, with tighter temperature control than standard systems.

In addition, the *Infinity 24* offers numerous benefits for technicians. Bluetooth technology is available on the outdoor unit, making it unnecessary to access outdoor unit diagnostic information inside the home. The equipment is compatible with an updated service tech app that includes the fault history of the unit, system parameters and interactive fault tree.

FOR MORE INFORMATION: WWW.CARRIER.COM

Ephoca AIO Wall-Mounted Pro heat pump

Homeowners who want (or need) a heat pump but are lacking for space can consider Ephoca's *AIO Wall-Mounted Pro*, a compact and easy to install unit that can fit in even the smallest apartments and houses. The slim and sleek machines can be mounted high or low with a factory-supplied bracket, making installation quick and simple. Special adapters enable the unit to be installed perpendicular to an outside wall, used with many louver styles, or even vented through an existing window frame with no construction required. And, an onboard touch controller simplifies use and installation.

An energy recovery ventilation (ERV) module adds fresh air and heat recovery to the *Wall-Mounted Pro*. No additional exterior vents are required, as the ERV module uses the same intake and exhaust vents. Treated and MERV 13 filtered fresh air is introduced into a room via a supply louver.

The AIO provides power for the electronically commutated motor (ECM) fans and electronics, so no additional energy source is required.

FOR MORE INFORMATION: WWW.EPHOCA.COM





HUG Hydronics In-Floor Heating System

With its *In-Floor Heating System*, HUG Hydronics makes acquiring that heat ultra easy. Instead of a wall full of plumbing, valves, expansion tanks and manifolds, the HUG Hydronics in-floor heating unit is the size of a suitcase and can be installed by the homeowner in about 1 hour.

The *HUG Hydronics In-Floor Heating System* replaces the complex maze of plumbing and pipes fixtures with a tank full of water and pumps, along with a control panel that knows when each part of the floor needs heat, and turns those pumps on. A hydronics control board can handle up to four thermostats.

The unit is also ready to pair with on-demand gas or electric water heaters; up to three heat sources at once can be selected for flooring warm water. Installation requires only everyday tools.

FOR MORE INFORMATION: WWW.HUGHYDRONICS.COM

LG Multi F MAX with LGRED Heat Pump

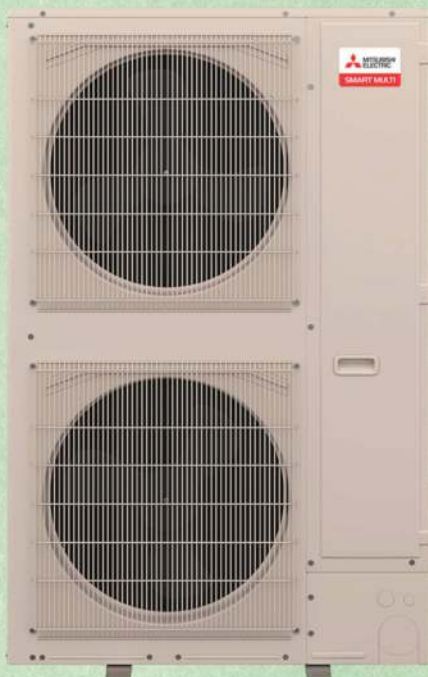
LG's *Multi F MAX with LGRED* offers a multi-zone heat pump system, available in 36K, 42K and 48K sizes, with a single outdoor unit that can connect up to eight indoor units.

LG Multi F MAX with LGRED heating technology provides continuous heating down to minus 13 degrees Fahrenheit and 100 percent of rated capacity at 5 degrees F. Ideal for residential and light commercial applications, the product is designed to allow individual indoor units to be placed in respective rooms, enhancing space comfort by enabling individual temperature settings, while avoiding over-cooling and/or heating, thus minimizing uncomfortable temperature swings.

LG's *Multi F* systems use a variable speed compressor, operating more quietly while using less energy. Additionally, the outdoor unit's compressor is mounted on vibration attenuating rubber grommets to avoid transmissions of vibrations to ensure the unit's noise level is low. The *LGRED Multi F* systems also feature a SEER rating of up to 21, qualifying them for ENERGY STAR certification.

FOR MORE INFORMATION: WWW.LGHVAC.COM





Mitsubishi Electric Trane Smart Multi HVAC system

Heating and air-conditioning system maker Mitsubishi Electric Trane HVAC US (METUS) has debuted its *SMART MULTI* lineup, which includes an outdoor model with improved energy efficiency and ultra-quiet operation. The unit is available in single-phase and new three-phase configurations.

The *SMART MULTI MXZ-SM* outdoor unit is available in 36, 42, 48 and 60 KBTU/H capacities. Several capacities are offered with *Hyper-Heating INVERTER (H2I)* technology, providing cold climate heating performance down to minus 13 degrees Fahrenheit. The *MXZ-SM* operates as low as 50 dB(A), which is quieter than a typical conversation. Efficiency ratings include SEER, up to 23.0, and HSPF up to 12.5. A range of control options are available. Seacoast protection (-BS coating) is standard.

The *SMART MULTI* lineup also includes various *M-Series*, *P-Series* and *CITY MULTI* indoor units. The *MXZ-SM* outdoor unit is compatible with ductless and ducted units from the indoor product lines.

FOR MORE INFORMATION:
WWW.MITSUBISHICOMFORT.COM

Rheem 120V ProTerra Plug-in water heater

Rheem's popular *ProTerra* heat pump water heater is now available in an industry-first 120-volt plug-in model. The heater is ideal for drop-in gas unit replacement and high-efficiency upgrades without the need to install a 240-volt electric service. It is available in dedicated and shared circuit models.

With the *ProTerra Plug-in*, homeowners don't have to choose between sustainability and hot water performance. Instead, they have a unit that installs easily, draws warmth from the air to help heat water, and is up to five times more efficient than standard natural gas models. *ProTerra Plug-in* also includes features such as an industry-largest compressor that delivers an ultra-fast heat pump water heater recovery, and an integrated mixing valve that allows storage of water at a hotter-than-average temperature without scalding a user.

Users can also control the water heater with a smart phone, handling items such as adjusting water temperature, tracking energy usage, and setting an Away/Vacation mode.

FOR MORE INFORMATION: WWW.RHEEM.COM



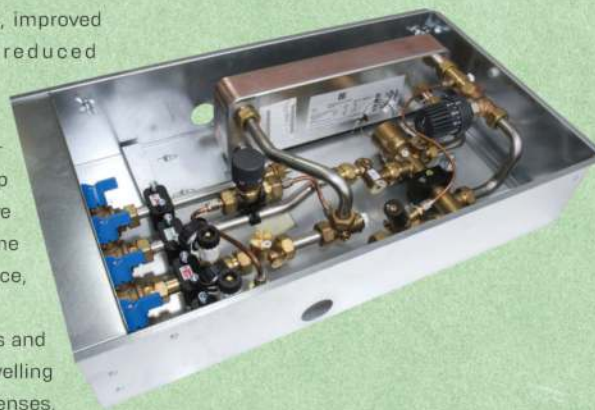
Uponor AquaPort

The first of its kind in North America, the Uponor *AquaPort* is a self-contained unit that converts a building's hydronic heating supply to on-demand domestic hot water. Ideal for multifamily low-rise, mid-rise, or high-rise applications, *AquaPort* eliminates centralized domestic hot water (DHW) and recirculation piping in a structure to provide numerous benefits, including energy and water savings, improved water quality, installation efficiencies and reduced maintenance.

Compared to traditional pipe-routing methods, incorporating *AquaPorts* can reduce hot-water energy use by up to 35 percent, eliminate up to 40 percent of unnecessary piping, and remove more than 50 percent of the total DHW volume in a building for improved system performance, efficiencies and hygiene.

The product's simplified design removes gas and electrical supply lines and venting in each dwelling unit to save on short-term and long-term expenses. Plus, it eliminates DHW supply and return piping for fewer piping supports, fire penetrations, insulation, and accessories required in a building.

FOR MORE INFORMATION: WWW.UPONOR.COM





Decking

TimberTech Advanced PVC Decking

Unlike traditional composite decking—which can look fake or like plastic—TimberTech Advanced PVC offers the beauty and feel of real wood species without the upkeep of sanding and staining.

The decking is made for performance: It is fade- and stain-resistant, will not splinter, rot or peel, and should last for decades. It's also a good option for homeowners in fire-prone areas, passing tests for slowing flame spread with a Class A Flame Spread Rating and WUI (Wildlife Urban Interface) compliance.

TimberTech Advanced PVC is roughly 60 percent recycled content, the highest percentage available in the PVC decking market today. It consists of post-industrial and post-consumer PVC waste, such as used vinyl siding from homes, old PVC pipe and window trim, and post-consumer vinyl flooring.

FOR MORE INFORMATION: WWW.TIMBERTECH.COM



Trex Transcend Lineage decking

Trex expands its famed *Transcend* line with *Lineage*, the company's coolest decking product—literally. Boards are engineered with heat-mitigating technology in the shell to reflect the sun and keep boards cooler than competitors' composite decking of a similar color, in similar temperatures. This new offering also features an elevated look with subtle, elegant graining that delivers a natural wood appearance without the environmental impact of deforestation.

The sustainable composition of the boards is 95 percent recycled and reclaimed materials, including a mix of polyethylene plastic film and industrial wood scrap. This new line contributes to the more than 1 billion pounds of upcycled materials used annually in the making of Trex decking.

Lineage boards are engineered with a proprietary, high-traffic formulation and ultra-durable integrated shell that resists stains, scratches and mold. They won't rot, warp, crack or splinter, and upkeep is hassle-free.

FOR MORE INFORMATION: WWW.TREX.COM





Doors, Walls and Windows



Aeroseal AeroBarrier Connect air sealing system

Complete air sealing of a home takes time—and even more if a retest is required. Aeroseal's *AeroBarrier Connect* helps handle both of those problems. The system seals all building envelope leaks of up to 0.5 inches, and as small as a human hair. Using a standard, single-point blower door test, *AeroBarrier* software measures the leakage in real time. Those measurements enable the user to dial in specific requirements and guarantee results.

A user—contractor or homeowner—has complete control over airtightness and can achieve any level required. At the end of the process, a final blower door test is run to verify the air sealing results. *AeroBarrier* then provides a Certificate of Completion that shows pre- and post-leakage.

Air sealing can be applied pre or post drywall (sheetrock). It will adhere to various building materials, including drywall, lumber (treated and untreated), metal, and oriented strand board (OSB). After the air sealing is complete, work can resume within 30 minutes.

FOR MORE INFORMATION: WWW.AEROSEAL.COM

JELD-WEN Auraline composite windows and patio doors

JELD-WEN has launched its line of *Auraline True Composite* windows and patio doors as a long-awaited alternative to vinyl and wood. The JELD-WEN product, as a true composite, blends a structural fiber, such as reclaimed wood fiber, with synthetic polymers and co-extruded color, to create a highly durable material that looks like wood but requires no painting and little maintenance.

Twice as rigid as vinyl, true composite installs cleanly and resists warping and sagging over time. The *Auraline* "next generation" composite offers slimmer sight lines for increased natural light visibility; architecturally correct design, for the look of contemporary wood windows; and co-extruded pigment for fade- and scratch-resistant color. Also, a JELD-WEN standard glass package is 38 percent more efficient than a basic package. The *Auraline* line is GREENGUARD and ENERGY STAR certified for its contribution to healthier and cleaner air, and energy efficiency, respectively.

FOR MORE INFORMATION: WWW.JELD-WEN.COM/EN-US





NEXGEN MAXTERRA MgO panels

NEXGEN MAXTERRA magnesium oxide (MgO)-based panels for sheathing, subflooring, and floor underlayment are eco-friendly products that are fire, water, mold, impact, rodent, and insect resistant. MAXTERRA panels are the ideal building material for areas of the U.S. that encounter hazardous conditions that destroy buildings, homes, and lives.

MAXTERRA works as a replacement for oriented strand board (OSB), plywood, underlayment and gypsum. The product can now be found in structurally insulated panels (SIPs), wall and ceiling board, flooring underlayment, fire rated assemblies and walls, shaft liner, sheathing, curtain walls, trim materials, fencing and more.

The product is also eco-friendly. The manufacture of concrete is the third-highest emitter of CO₂, while development of MgO-based materials is substantially lower. MAXTERRA also takes on Mother Nature, with the strength of MgO-based building materials being more storm resistant than legacy materials such as plywood sheathing and drywall. MgO-based building products are also stronger than other wood and gypsum-based building options, and can better survive earthquakes.

FOR MORE INFORMATION: WWW.NEXGENBP.COM

Turf Hues acoustics

Turf's newest line of acoustics, *Hues*, offers a palette of 32 color varieties that explores how color and sound work together to give architects and designers the tools they need to build inspiring spaces. *Hues* are used on Turf's 60 percent pre-consumer recycled PET felt, which produces a variety of tints and shades, providing nuance in richness.

The company's effective use of recycled materials creates products that are still durable, functional and of quality. Turf's acoustic solutions are 100 percent recyclable at the end of the product's life cycle. In addition to creating recyclable products out of recycled materials, any manufactured waste from Turf is recycled into high-energy-value fuel with less emissions than coal, creating a cleaner fuel source.

Turf also offers a reclamation program that takes back acoustic panels and responsibly disposes them; the company pays for the freight to help reduce the amount of material disposed of in landfills.

FOR MORE INFORMATION: TURF.DESIGN/HUES





Energy Management



Form Energy rechargeable iron-air battery

As concern over the environmental friendliness of lithium batteries grows, Form Energy has unveiled an iron-air battery system that stores renewable energy for up to 100 hours, at less than 10 percent of the cost of lithium-ion technology. Form Energy's battery system can be sited anywhere, even in urban areas, to meet utility-scale energy needs. They can complement the function of lithium-ion batteries to deliver the lowest-cost renewable and reliable electric system year round.

The battery's basic principle of operation is reversible rusting. While discharging, the battery breathes in oxygen from the air and converts iron metal to rust. While charging, the application of an electrical current converts the rust back to iron and the battery breathes out oxygen.

Form Energy calls the product a "first step to tackling the biggest barrier to deep decarbonization: making renewable energy available when and where it's needed, even during multiple days of extreme weather, grid outages, or periods of low renewable generation."

FOR MORE INFORMATION: WWW.FORMENERGY.COM



Savant Power System

If everything else in your home is smart, why not your energy? A *Savant Power System* delivers the benefits of smart power to every home. The owner can monitor a few main, power-hungry circuits or every one in the house. A user can set a schedule to power an electric vehicle (EV), put the home into *ECO Mode* to reduce costly time-of-use rates, or use smart power to extend the available hours of a local battery.

A homeowner can monitor energy consumption trends; manage power usage by automatically powering down other high-current devices while actively charging; and schedule charging to avoid peak utility rates. Progress can be reviewed over time and adjusted with the Savant app.

Savant Power System modules are installed in standard electrical panels, so no hard-to-find proprietary panel is required. Meanwhile, combining *Savant Power* with an integrated battery storage system, solar panels, and backup generator can also help overcome a weak energy grid.

FOR MORE INFORMATION: WWW.SAVANT.COM



JinkoSolar Eagle Encore System

The *Eagle Encore System* by JinkoSolar is an all-in-one solution that includes solar panels plus storage. It ensures availability of household power to run appliances, lights, security systems, HVAC and more during outages, including those that go on for weeks.

Eagle Encore features a single DC-coupled hybrid inverter which manages the power from both the solar and storage system. This reduces cost and inefficiencies introduced with systems utilizing multiple inverters, providing the best value for installers and homeowners. The system utilizes best-in-class Lithium Iron Phosphate (LFP) Li-ion battery technology.

There's also JinkoSolar's *Eagle Continental* solar panels, which utilize high-efficiency mono PERC technology for a module power of up to 400 watts. The entire system is covered by a single wrapped warranty backed by JinkoSolar.

FOR MORE INFORMATION: WWW.JINKOSOLAR.US



Indoor Air Quality

Armstrong StrataClean IQ Air Filtration System

Armstrong Ceiling & Wall Solutions has introduced the *StrataClean IQ Air Filtration System*, an in-ceiling unit that captures and eliminates 90 percent of airborne bacteria, viruses, odors, mold and other particulates using proven MERV 13 filtration.

The system has proven efficient at removing particles as little as 0.3 microns in size. One unit can filter the air in a 1,000-square-foot space every hour. Typical applications range from education, office and healthcare, to senior living, restaurants, retail and daycare centers.

The unit's 24-inch by 24-inch design allows for easy installation in any suspended ceiling system, making it simple to integrate into new construction or retrofit applications. The *StrataClean IQ* system meets the in-room filtration recommendations made by the EPA Clean Air in Buildings Challenge. The system is also part of the *Armstrong 24/7 Defend* portfolio of ceiling and wall products that contribute to healthier, safer spaces and cleaner air.

FOR MORE INFORMATION: WWW.ARMSTRONGCEILING.COM



Fantech *ECO-Touch Auto IAQ* controller

The *ECO-Touch Auto IAQ* controller automatically recognizes elevated volatile organic compounds (VOCs) such as from cooking, cleaning and perfume, and automatically ramps up ventilation rates to bring more fresh air inside while removing stale air to the outdoors. It also monitors relative humidity and will recognize an influx of moisture, such as that generated by a large family gathering, and adjust fresh air intake accordingly.

ECO-Touch Auto IAQ is a first-of-its-kind control system, with a set-it-and-forget-it operation that adjusts fresh air rates based on real-time VOCs, to operate with optimal energy efficiency. *ECO-Touch* can be considered the brains of the fresh air appliance, while the unit is the lungs. The *ECO-Touch IAQ* signals the fresh air appliance to "breathe."

In addition, a touchscreen controller provides easy identification of clean air status in the home at any time.

FOR MORE INFORMATION: WWW.FANTECH.NET



Exteriors and Siding



AZEK *Captivate* prefinished siding and trim

Captivate, AZEK Exteriors' new line of prefinished siding and trim, is made from approximately 30 percent post-consumer/post-industrial recycled PVC material, such as used vinyl siding from homes. The siding and trim combine AZEK-engineered polymers, *PaintPro* technology surface prep and automated painting with top-tier solar-reflective coatings, and environmentally controlled curing. The result: A finish superior to anything painted in the field.

The *Captivate* line includes a range of siding and trim profiles complementary to a variety of architectural design styles, including shingle siding that duplicates the look of natural cedar shingles; board and batten siding for accent areas or an entire elevation; and dozens of trim profiles for a complete, finished look.

The siding and trim's composition makes it naturally resistant to water and requires ultra-low-maintenance. It won't rot, splinter, soften, or warp like wood does when it absorbs moisture. The product's long-lasting nature makes it likely it will not end up in a landfill.

FOR MORE INFORMATION: WWW.AZEKEXTERIORS.COM

Fiberon *Wildwood* Composite Cladding

Fiberon *Wildwood* composite cladding brings performance and beauty to forward-thinking architectural designs, while utilizing materials that support important sustainability initiatives. *Wildwood* is made from 94 percent mixed recycled wood fiber and plastic content that would otherwise likely be destined for landfills, incinerators, or oceans. About half of what's in *Wildwood* comes from recycled wood—sawdust and leftover material that would otherwise be discarded. This saves more than 1 million trees every year.

The rest of the composite boards come from recycled plastic, including grocery bags and recycled packaging material. The average American family uses around 1,500 plastic bags each year. If not recycled, these plastic bags likely end up in landfills or the ocean. As many as 2,000 plastic bags can be used in the manufacturing of a single board, averaging 100 million pounds of recycled plastic each year.

Wildwood resists fading and is not affected by freeze-thaw cycles. Additionally, the material never needs sanding, staining or painting.

FOR MORE INFORMATION: WWW.FIBERONCLADDING.COM



StoneCoat *SMOOTH* and *CARVE* stone veneer systems

StoneCoat's stone veneer system utilizes limestone, an age-old binder that has the opposite effect; It absorbs CO₂ and reduces the overall concentration of greenhouse gases, to slow the rate of climate change. StoneCoat's stone veneer system is climate positive, and emits 90 percent less carbon than traditional Portland cement-based materials, making it six times better for the environment.

StoneCoat *SMOOTH* mimics the appearance of stucco with a solid finish and customizable color choices. StoneCoat *CARVE* is applied, then carved and molded into a pattern—mirroring the look of stacked stone. *SMOOTH* and *CARVE* are also ideal for home remodels and repairs. Both products adhere directly to brick, cement, stucco, metal and many types of stone.

Set times are as fast as 24 hours, allowing contractors to quickly move on to other projects.

FOR MORE INFORMATION: WWW.STONECOAT.COM



Tantimber (G Wood Pro) *ThermoWood Exterior Siding*

With the Amazon ever more endangered due to clearcutting, Tantimber *ThermoWood Exterior Siding* provides an alternative that protects the jungle's hardwood and reduces use of environmentally damaging petroleum-based wood imitations and hybrid products. The construction process takes sustainably sourced timber and, using natural methods of steam and heat, results in finished products that are incredibly durable.

All raw materials are sourced from FSC- and PEFC-certified forests, including U.S. forests. The modification process includes high-temperature drying, thermal modification and cooling, and moisture conditioning. The chemical-free, non-toxic process transforms the timber into stable and durable (Class 1 or Class 2) wood products that stand up to the most extreme environments.

Because of its low moisture content, Tantimber *ThermoWood Exterior Siding* products will not warp, expand or contract, twist, buckle or be a suitable food source for insects due to seasonal changes in temperature and humidity. As a result, it is virtually impervious to fungi and bacteria that can cause decay.

FOR MORE INFORMATION: WWW.GWOODPRO.COM



Flooring and Surfaces



Caesarstone *Porcelain* collection

Caesarstone has expanded its portfolio with the *Porcelain* collection, which marks a leap in technology, functionality, and design. The collection introduces three innovative properties that deliver high durability, strength and style, and are fully sustainable.

Porcelain has a high heat structure, a resilient surface enabling direct contact with high temperatures. A blend of natural ingredients secures ultraviolet (UV) resistance for indoor and outdoor use. There is also a fortified frame, an extremely hard surface that is incredibly resistant to scratches, pressure and rupture; and a forward design consisting of striking color schemes, bolder veins, palpable textures and magnified patterns and finishes.

Production of Caesarstone's *Porcelain* calls for the use of recycled water, which is then sent to an external supplier that uses it as a raw material for floor tiles. Meanwhile, Caesarstone's production facility has completed upgrades that have decreased electricity usage, such as minimizing power consumption and improving maintenance throughout the production process.

FOR MORE INFORMATION: WWW.CAESARSTONEUS.COM



Cambria *Brittanica* quartz countertop

Cambria showcases its sustainability efforts with its quartz countertop *Brittanica Block*, a product made almost entirely from recycled Cambria materials. *Brittanica Block* has been certified by SCS Global Services as containing 99 percent recycled content, pre consumer.

Brittanica Block features *Brittanica*, one of Cambria's signature designs, laid in parallel lanes with unique veining, patterns, and tonality set against a milky white background. The quartz product drives the company's sustainability efforts—informing its processes, infusing its products, and shaping its environmental and community stewardship.

Cambria is the leading producer of American-made quartz surfaces. The company's innovative designs are stain resistant, nonabsorbent, durable, safe, maintenance free, easy to care for, and backed by a transferable lifetime warranty.

FOR MORE INFORMATION: WWW.CAMBRIAUSA.COM



Florim USA *MILEstone Native* tile

Florim USA's *MILEstone* brand has introduced a second carbon neutral porcelain tile, *Native*. The *Native* collection gives ode to earth's natural purifier and core preserves—earth's trees. *Native* seeks to extract the organic beauty of wood by featuring six shades and tones emulating natural forestry such as pine, polar and teak.

Native follows up *Plaster 2.0*, which *MILEstone* introduced in 2021 as its first carbon neutral tile. The products contain up to 60 percent recycled content, lend to LEED and WELL certifications, and do not contribute to the negative impact of volatile organic compounds (VOCs) in building materials. To lower carbon emissions, more than 95 percent of raw materials used in production of *MILEstone* tiles are sourced within 400-plus miles of the Clarksville, Tenn. factory.

Florim USA is working toward becoming carbon neutral by 2030. The manufacturer is WELL and Green Squared Certified. It is one of the largest and most technologically advanced porcelain facilities in North America.

FOR MORE INFORMATION: WWW.MILESTONE Tiles.COM

The Abstra Collection by KOHLER WasteLAB

Kohler Co. has debuted *The Abstra Collection* by KOHLER WasteLAB, a series of bespoke brushed and matte tiles for residential and commercial installations, made from nearly 100 percent recycled waste materials. This is the second tile collection by KOHLER WasteLAB utilizing the company's pottery refuse to create sustainable products for the home.

KOHLER WasteLAB consists of designers, ceramicists and engineers at Kohler Co. that rely on factory waste as their primary medium and who have pioneered a way to leverage the pottery's wastewater stream for *Abstra's* tile body. Consisting primarily of pottery waste clay and glaze, the material is dewatered and processed into a usable base material.

Abstra follows the *Ann Sacks Crackle Collection*, the first nearly all-waste product-produced tile line by KOHLER WasteLAB in 2019. From 2019 through 2021, sales of WasteLAB tile have diverted more than 54,000 pounds of waste from landfills, as Kohler Co. works toward a net-zero status by 2035.

FOR MORE INFORMATION: WWW.KOHLERCOMPANY.COM



Vermont Natural Coatings PolyWhey 3500 Wood Floor Finish

Vermont Natural Coatings' *PolyWhey 3500 Wood Floor Finish* uses whey protein, a renewable resource and a byproduct of cheesemaking, to create an ultra-safe and durable finish for wood floors.

PolyWhey's single-component formulation means no wasted finish, and a fast drying time offers the ability to apply up to three coats in one day. A neutral odor allows for coating in occupied areas without disrupting residents or visitors. The product's superior mar- and scratch-resistance helps a floor stand up to heavy foot traffic. And, with no carcinogens or isocyanates, *PolyWhey 3500* has no flash point and will not contribute toward cancer or fire risks.

The coating complies with CDPH Standard Method v1.2, the nation's strictest emissions and indoor air quality testing. The product is available in matte, satin and semi-gloss.

FOR MORE INFORMATION: WWW.VERMONTNATURALCOATINGS.COM



Landscaping

E/One Grinder Pump DH071/DR071

When it comes to a certain sort of...housekeeping, the E/One model *DH071/DR071* simplex grinder pump station is an ideal choice for single-family homes: It can be installed in the yard or in the basement and provides 70 gallons of capacity.

The *DH071/DR071* grinder pump station consists of a pump and a tank with a dry accessway. The grinder pump uses integrated level-sensing pressure switches instead of floats—the core-style pump is compact and easily removed for service if needed. The *DH071* is the wired model, where a cable connects the motor controls to the level controls through watertight penetrations. The *DR071* is the radio frequency identification (RFID) model that uses wireless technology to communicate between the level controls and the motor controls.

Stations are available for indoor and outdoor installations. Outdoor stations accommodate a wide range of depths, suitable for both warm and cold climates.

FOR MORE INFORMATION: WWW.EONE.COM



Moen Smart Sprinkler Controller and Smart Wireless Soil Sensors

Moen has expanded its smart water technology to the outdoors with its new *Smart Sprinkler Controller* and *Smart Wireless Soil Sensors*. With a smartphone app, users can create custom watering schedules and control each zone independently so they can easily manage how much water each zone receives. They also can make seasonal adjustments, enable the weather-skip feature that automatically disables watering based on local weather data, and monitor water usage and estimated savings.

Outdoor water use accounts for a tremendous amount of water each day, mainly for landscape irrigation. The *Smart Sprinkler Controller* can reduce an average home's irrigation water use by up to 30 percent, saving the home up to 15,000 gallons of water annually.

The *Smart Sprinkler Controller* is the only controller compatible with Moen's *Flo Smart Water Monitor and Shutoff*, which connects to the home's main water line to monitor its entire water supply system for leaks and vulnerabilities.

FOR MORE INFORMATION: WWW.MOEN.COM



Roofing

CertainTeed *Solstice Shingle* solar roofing system

CertainTeed's *Solstice Shingle* packs powerful solar energy production into a sleek, low-profile roofing system. These high-efficiency solar shingles can produce about as much energy as conventional, roof-mounted solar. This helps homeowners save on home energy costs and reduce its carbon footprint. *Solstice Shingle* also offers clean energy without the bulky look of rack-mounted solar systems.

The *Solstice Shingle* seamlessly integrates with asphalt shingles or concrete tiles for a crisp look that accentuates the appeal of any home. CertainTeed warrants the entire system, including the installer's workmanship, for up to 25 years. When installed with CertainTeed asphalt shingles, the entire roof is protected by one company.

CertainTeed believes that solar should be a natural extension of a home. CertainTeed's mission is to make solar approachable and realizable, ultimately achieving this by presenting solar solutions as an actionable, enduring and stylish solution to advance the home and the planet.

FOR MORE INFORMATION: WWW.CERTAINTEED.COM



Westlake Royal Roofing Solutions *Unified Steel Stone Coated Roofing*

Between blazing summers and winter snowstorms—major enemies of roofing—homeowners are giving metal roofing a closer look. Westlake Royal Roofing Solutions' *Unified Steel Stone Coated Roofing* offers a stylish option. Stone coated metal shingles—such as Westlake's *Granite Ridge in Ironwood*—carry the appearance of a low-profile asphalt shingle, but all of the long-term durability of steel.

Unified steel panels are categorized as class 4 for impact resistance. This rating is among the best for roofing performance. Unified steels are warranted up to 2.5 inches of hail and wind up to 120 mph. This roofing material was also fire tested. Unified steel can be installed with a specific underlayment for a Class A fire rating.

This roofing material allows room for style but offers peace of mind with its high durability ratings. There are no weather limitations with these products; they can withstand fire, hail, and harsh winters. And they are 100 percent recyclable.

FOR MORE INFORMATION: WWW.WESTLAKEROYALROOFING.COM



Solar

QuietCool Gable Mount 24/7 Solar Attic Fan with Inverter

Hot weather can drive up an attic's temperature to 150 degrees or more. This can destroy the integrity of the home and roof because of humidity and moisture buildup. QuietCool Systems' Gable Mount 24/7 Solar Attic Fan with Inverter can help prevent that damage and cut air conditioning costs by up to 30 percent thanks to its solar power source.

Designed as plug and play, the Gable Mount's polycrystalline solar panel generates 2-4 times the output of the industry standard. It also has an AC/DC inverter to power the fan after nightfall, enabling 24-hour daily cooling.

Gable Mount includes a mechanical thermostat that determines when a fan should turn on or off—72 degrees Fahrenheit for off, 83 degrees F for on—an adjustment bracket with up to a 60-degree vertical tilt for maximum sunlight exposure, and a 30-foot cord for optimal solar panel placement.

FOR MORE INFORMATION: WWW.QUIETCOOLSYSTEMS.COM



SolarEdge Home Load Controller

SolarEdge Technologies has unveiled its *Home Load Controller*, a wireless device designed to optimize energy consumption by controlling heavy load home appliances. This latest addition to the *SolarEdge Home* ecosystem enables longer and smarter backup control.

Only the size of a card deck, the *Load Controller* is easy to install, and enables remote and automatic control items such as heat pumps, electric vehicle (EV) chargers, pool and well pumps, HVAC units and others. Homeowners can increase their solar power consumption by using excess energy that would otherwise be lost, and extend their battery backup time during grid outages.

The load controller seamlessly integrates with SolarEdge's user-friendly *mySolarEdge* app, which enables homeowners to control some of their heaviest energy loads directly from their smartphones. Owners can now schedule and track their solar energy production, battery storage, pool pump, HVAC unit, grid services, solar self usage, and more.

FOR MORE INFORMATION: WWW.SOLAREEDGE.COM



Honorable Mention

Beko French Four-Door Refrigerator with HarvestFresh

The *Beko French Four-Door Refrigerator* features *HarvestFresh*, a revolutionary three-color light technology in the crisper drawer that changes to blue in the morning, green at midday, and red at night. These changes mimic the sun's 24-hour cycle and preserves vitamins in vegetables longer.

FOR MORE INFORMATION: WWW.BEKO.COM/US-EN



BioMicrobics BioBarrier HSMBR (High Strength Membrane Bioreactor)

The *BioBarrier HSMBR (High Strength Membrane Bioreactor)* system simplifies the settling, screening, direct aeration and ultrafiltration of the wastewater treatment. The membranes and processes used act as an impenetrable physical barrier, and remove 99.9 percent of the contaminants.

FOR MORE INFORMATION: WWW.BIOMICROBICS.COM



Caregiver Smart Solutions Aging in Place Core Kit

The *Aging in Place Core Kit* uses smart sensor technology in the form of tiny, non-intrusive sensors to track a loved one's habits, movement and patterns. This provides family members with reassurance that things are fine, without use of invasive video cameras or wearable tracking devices.

FOR MORE INFORMATION: WWW.CAREGIVERSMARTSOLUTIONS.COM



DMF Lighting H Series Whole-Home Modular LED Downlighting System

The *H Series* is an energy-efficient, whole-home, modular LED downlighting system designed to last 50,000 hours at 70 percent lumen maintenance. Featuring a sustainable design, the unit has a single, compact, field-adjustable LED light module offering field-selectable lumens, and DMF Lighting's *Natural Warm Dim* technology.

FOR MORE INFORMATION: WWW.DMFLIGHTING.COM



Extreme Panel Technologies Structural Insulated Panels (SIPs)

These structural insulated panels (SIPs) save owners up to 60 percent on heating and cooling costs. Extreme Panel's SIPs can be used as a complete building envelope (roof, walls, floors and foundation), offering an ideal platform for energy efficiency, and fewer greenhouse gases emitted into the environment.

FOR MORE INFORMATION: WWW.EXTREMEPANEL.COM



Resideo Braukmann L5 WiFi Water Leak Shutoff Valve

Resideo's *Braukmann L5 WiFi Water Leak Shutoff Valve* connects to the main water supply and can automatically turn off the supply to the home if a leak is detected. This smart tool can be connected by a sensor cable or paired with future and existing Resideo *WiFi Water Leak & Freeze* detectors.

FOR MORE INFORMATION: WWW.RESIDEO.COM



Unified^{STEEL} STONE COATED ROOFING



SPECIALTY ROOFING THAT Rises Above It All

GRANITE-RIDGE Shingle is manufactured to the highest standards and designed to complement the beauty of the natural world. Unified Steel™ Stone Coated Roofing rises above it all to enhance the curb appeal and value of any home while providing durability, performance, and protection that will last.

To learn more visit us at [unifiedsteel.com](#)



GREEN BUILDER

SUSTAINABLE BRAND INDEX 2023

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

BY GREEN BUILDER STAFF

As the world went back to business in 2022, our readers went back to generating and providing services for the construction industry (and in many cases, for themselves). Our annual survey reveals what products were on the public's mind the most, from the best energy-saving appliances to the cars they like to drive on the job.

Results here evaluated brands using three distinct tools: our traditional survey data, market visibility or "mentions," and public sentiment. These are averaged to create a Brand Index Score and derive a company's final ranking among its peers.

Many of the big-name players are back within the familiar surroundings of the top five within their category, while others were bumped out of this year's top 10. A few 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.

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.

Ranking in terms of how favorably consumers see the company.



SENTIMENT



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.

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.

Accsys (Accoya)	Fox Blocks	PaperStone
Air King	GAF (Timberline)	Pella
Alarm.com	GE Lighting	Phillips
aluplast	Geberit	Plastpro
Amazon (Alexa)	Generac	PPG (Olympic)
American Standard	Gerber	Premier Building Systems
American Woodmark	Glidden	ProVia
AMICO (HYDRODRY)	GMC	R-Control/AFM Corp. SIPs
Andersen	Google (Nest)	RenewAire
A.O. Smith	GP (ForceField)	Resysta
Apple	Greenfiber	Rheem
AprilAire	Greenheck	Rinnai
Armstrong Flooring	Haier Group (Haier; GE; Café; Fisher & Paykel; Monogram)	ROMABIO
Atlas Roofing	hansgrohe	SBP USA Ventilation Systems
AZEK (TimberTech)	Hanwha Q CELLS	Samsung (Samsung; Dacor; SmartThings)
BASF	Honeywell	Savant Systems Inc.
Behr	Honeywell Home (Resideo)	Savoy House
Belkin (Linksys; Wemo)	Huber Engineered Woods (ZIP System)	Schneider Electric
Benjamin Moore	Hubbell (Progress Lighting; iDevices)	Sharp
Benjamin Obdyke (HydroGap)	Huntsman Building Solutions	Shaw Floors
Boise Cascade	Hyundai L&C (HanStone Quartz)	Sherwin-Williams
Bosch (Bosch; Gaggenau; Thermador)	IceStone	Sierra Pacific Industries (Sierra Pacific Windows)
Bradford White	IKEA	Simpson
Brilliant	James Hardie	SMA Solar Technology
Broan-NuTone	JELD-WEN	Snap One (Control4)
BuildBlock Building Systems	Jinko Solar	SolarEdge
Cabinetworks Group	Johns Manville	Sol-Ark
Caesarstone	K2 Stone	Stellantis (RAM) (formerly Dodge RAM)
CALI (Cali Bamboo)	Keene Building Products (Driwall)	Stiebel Eltron
Cambria	Kelly Moore	Sub-Zero (Wolf)
Carlisle Construction	Kingspan	Sunnova
Materials (Insulfoam; Carlisle Polyurethane Systems)	KlipTech (EcoClad)	SunPower
Carrier	Knauf	Sunrun
Ceramica Fioranese (Ceramic Tiles of Italy)	Kohler	Sylvania
CertainTeed (CedarBoards)	KraftMaid	Systemair (Fantech)
Chevy	Lauzon	Takagi
ClimateMaster	LEDVANCE	TAMKO Building Products (Envision Decking)
ConnectSense	Lennox	Tesla (Tesla Solar)
Cornerstone Building Brands (Ply-Gem Siding)	Leviton	Therma-Tru
Cosentino (Silestone, Dekton)	Liebherr	Thomas Lighting
CRAFT	LIXIL (GRÖHE)	TOTO
Creative Mines	LG (Signature Kitchen Suite)	Toyota
Cree Lighting	Logix	TP-Link
Crossville Tile	LP	Trane (RunTru; American Standard)
Crystal Cabinet Works	LP Building Solutions (SmartSide)	Tremco (Dryvit)
Daikin (Goodman)	Lutron Electronics (Caseta by Lutron)	Trex
Decra Metal Roofing	LUX	TruMetals (Custom-Built Metals)
Delta (Delta Breez)	LX Hausys (Viatera)	TruStile
Delta Electronics	Marvin	TYPAR (BuildingWrap)
Delta Faucet Co. (Brizo)	Masonite	Uponor
Dörken (DELTA)	MasterBrand	Valspar
Dow	Merillat Cabinetry	Vesync Co. (Etekcity)
Dunn Edwards	Miele	Viance
DuPont (Tyvek HomeWrap, Weathermate)	Milgard	Viking
DuPont Surfaces (Corian Quartz, Solid Surface)	Moen	Vine
DuxxBak Composite Decking (formerly Green Bay Decking)	Mohawk	Visual Comfort & Co. (Generation Lighting)
Eaton Lighting (HALO)	MoistureShield	Weather Shield
ecobee	Mullican Flooring	Wellborn Cabinet
ECOS	Mercedes-Benz	West Fraser
EcoStar	Navien	Westlake Royal Building Products (Cultured Stone, Eldorado Stone, Zuri, DaVinci Roofscapes, TruExterior, Kleer Lumber)
Electrolux (Electrolux; Frigidaire; Westinghouse)	NCFI Polyurethanes (InsulStar)	Weyerhaeuser (Trus Joist)
Emerson (Sensi)	Niagara	Whirlpool (Whirlpool; JennAir; Amana; KitchenAid; Maytag)
Enphase	Nice North America (Nortek Security & Control; ELAN; Abode)	Wilsonart
Enviroshake	Nissan	Wood-Mode
Essential Cabinetry Group	Noritz	Wyze
Fiberon	Nudura	York
First Solar	Nu-Wool	Zehnder
Forbo Flooring	Oro	Zola
Ford	OutBack Power	
Formica Group	Owens Corning	
	Panasonic	

APPLIANCES

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	LG (<i>Signature Kitchen Suite</i>)	1.00	1	1	1
2	Whirlpool (<i>Whirlpool, JennAir, Amana, KitchenAid, Maytag</i>)	2.30	2	2	3
3	Bosch (<i>Bosch, Gaggenau, Thermador</i>)	2.90	3	5	2
4	Haier (<i>Haier, GE, Café, Fisher & Paykel, Monogram</i>)	4.00	4	4	4
5	Samsung (<i>Samsung, Dacor</i>)	6.00	4	3	11
6	Miele	6.80	7	8	6
7	Electrolux (<i>Electrolux, Frigidaire, Westinghouse</i>)	7.30	6	7	10
8	Liebherr	8.00	8	11	7
9	SubZero (<i>Wolf</i>)	8.40	9	6	8
10	Viking	9.00	9	9	9

TOP CHOICE

There's no doubt who ranks first in sustainability imaging among appliance makers. LG topped all three survey components—and is the only company among any category winners to do that—largely due to its ever-advancing and continually popular *Signature Kitchen Suite* brand and consistent emphasis on energy efficiency and performance.



LG

THE GOOD WORD

DuPont's always-strong name recognition moved it into the top spot among building wrap manufacturers last year, and kept it at No. 1 this year. TYPAR, usually ranked at the lower end of our survey, used best-ever word of mouth and product marketing to finish second.



DuPont

BUILDING WRAP

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	DuPont (<i>Tyvek HomeWrap, Weathermate</i>)	3.6	1	3	8
2	TYPAR (<i>BuildingWrap</i>)	3.9	4	6	3
3	Kingspan	4.0	4	4	4
4	Huber Engineered Woods (<i>ZIP System</i>)	5.3	2	5	12
5	Owens Corning	6.1	7	1	6
6	Tremco	6.4	3	7	13
7	GP (<i>ForceField</i>)	8.6	6	8	14
8	Dörken (<i>DELTA</i>)	8.7	11	15	2
9	Benjamin Obdyke (<i>HydraGap</i>)	8.8	7	13	11
10	AMICO (<i>HYDRODRY</i>)	9.6	9	12	10
10	Keene Building Products (<i>Driwall</i>)	9.6	12	9	5



American Woodmark

CABINETS AND SHELVING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	American Woodmark	1.6	1	2	4
2	IKEA	2.1	2	1	6
3	KraftMaid	4.3	4	4	7
4	Cabinetworks Group (Advanta, Echelon Cabinetry)	4.4	3	6	8
5	MasterBrand	4.8	5	3	9
6	Wellborn Cabinet	5.3	5	7	2
7	Crystal Cabinet Works	7.0	9	5	1
8	Merillat Cabinetry	7.1	7	8	5
9	Wood-Mode	7.2	7	9	3
10	Essential Cabinetry Group	10.4	10	11	11

VARIETY SELLS

With a wide range of eco-friendly cabinetry brands designed to offer something for everyone, American Woodmark has finally reached the top of the industry and public's minds. IKEA also retains its image as a green leader, and has begun some new sustainability initiatives in the past few months.

COUNTERTOPS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	DuPont Surfaces (Corian Quartz, Solid Surface)	2.7	1	4	9
2	Cambria	3.1	2	5	4
3	Cosentino (Silestone, Dekton)	4	3	3	13
4	Caesarstone	4	4	2	10
5	Hyundai L&C (HanStone Quartz)	6.1	5	10	1
6	Wilsonart	6.3	7	6	3
7	Formica Group	7.6	10	1	13
8	LX Hausys (Viatera)	8.0	9	8	2
9	PaperStone	8.6	6	14	8
10	IceStone	9.9	8	15	6



DuPont Surfaces

NO. 1 AGAIN

Another year, another top finish for DuPont Surfaces. The countertop surface maker (and its previous namesake, Corian) has been perceived as a sustainable brand in the industry for years. The continued popularity of its sustainably made *Solid Surface*, *Quartz* and *Endura* lines can probably be thanked for keeping that strong positive reputation in the market.

DECKING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Trex	1.1	1	1	2
2	AZEK (TimberTech)	2.9	3	2	5
3	DuxxBak Composite Decking (formerly Green Bay Decking)	5.7	4	7	12
4	CALI (Cali Bamboo)	6.2	2	13	11
5	Westlake Royal Building Products (Cultured Stone, Eldorado Stone, Zuri)	6.6	7	5	9
6	MoistureShield	7.3	8	4	13
7	Viance	7.4	5	10	14
8	Resysta	7.9	6	14	1
9	Fiberon	8.3	11	3	8
10	TAMKO Building Products (Envision Decking)	8.8	9	8	10

STILL PERFECT

In terms of overall sustainability, it's 13-0 for Trex, the only company in the history of our survey to never finish less than No. 1. This year, the decking giant can do almost no wrong, earning the public's trust after years in the middle of the pack.



Trex

DOORS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Therma-Tru	1.6	1	2	4
2	Masonite	1.8	2	1	3
3	Simpson	3.6	3	4	6
4	ProVia	4	5	3	1
5	Plastpro	4.7	4	6	5
6	TruStile	5.3	6	5	2



Therma-Tru

OPEN AND SHUT

The gang's all here—again. Last year's top doormakers are also this year's, with Therma-Tru leading the way for a fifth consecutive year. Almost every company has a sustainable angle to brag about, from lumber certification to re-use of water and materials in manufacturing.



Mohawk

TWO OF A KIND

Mohawk and Armstrong Flooring continue to battle for bragging rights, with the former claiming the top spot this year (and in 2021 and 2019) after Armstrong won it in 2022, 2020 and 2018. The reason? Strong word of mouth. But both companies need to work on their sentiment scores.

FLOORING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Mohawk	2.6	2	1	11
2	Armstrong Flooring	3.9	3	2	15
3	CALI <i>(Cali Bamboo)</i>	4.1	1	9	8
4	Shaw Floors	4.3	4	3	10
5	Crossville Tile	6.2	5	10	2
6	Mullican Flooring	6.6	6	8	6
7	Forbo Flooring	8.2	9	5	13
8	Ceramica Fioranese <i>(Ceramic Tiles of Italy)</i>	8.8	7	15	1
9	CRAFT	9.6	8	13	9
10	Lauzon	9.8	10	11	5

HOT WATER SYSTEMS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Rheem	1.5	1	1	8
2	A.O. Smith	2.2	2	2	4
3	Bosch	4.1	5	3	3
4	Bradford White	4.2	3	5	9
5	Navien	4.5	4	6	3
6	Rinnai	6.1	8	4	1
7	Stiebel Eltron	6.5	6	8	5
8	Noritz	7	7	7	7
9	Takagi	8.3	8	9	8

INTO HOT WATER

There's nothing better for business than making sure people know who you are and what you do. Rheem and A.O. Smith have that formula down. But they can take a lesson from Rinnai when it comes to ensuring that you're winning hearts and minds on social media..



Rheem

HVAC

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Trane (RunTru/American Standard)	1.9	1	3	4
2	Carrier	3.5	4	1	8
3	Lennox	4	3	4	10
4	LG	4.8	2	9	9
5	Bosch	5.6	4	7	11
6	Rheem	6.2	7	5	5
7	Panasonic	6.7	6	8	7
8	York	9.3	9	12	3
9	Uponor	9.7	11	10	1
10	ClimateMaster	10.2	8	13	15
10	Daikin (Goodman)	10.2	14	2	12



WEATHER GUARDS

Trane’s consistent innovation and good service record continues to deliver. Except for Daikin, which returns to the top 10 after missing out last year, the new list of HVAC makers is the same as it was in 2022.

LEADING AUTHORITY

Among insulation manufacturers, there’s Owens Corning, and then there’s everybody else. The company continues to widen its lead over competitors in product recognition and popularity. The also-ran pool keeps changing: Out from last year are CertainTeed and Applegate Insulation; in are Dow, NCFI, and Nu-Wool.



Owens Corning

INSULATION

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Owens Corning	2.1	1	2	9
2	Huntsman Building Solutions	5.7	4	9	6
3	Greenfiber	6	2	12	12
4	Carlisle Construction Materials (Insulfoam; Carlisle Polyurethane Systems)	6.3	3	14	3
5	Johns Manville	6.8	7	5	11
6	NCFI Polyurethanes (InsulStar)	8.2	8	11	1
7	Dow	9	9	7	15
8	BASF	9.1	11	4	13
9	Nu-Wool	9.4	5	16	16
10	Knauf	9.5	13	3	8

BRAND LOYALTY?

Last year's winner, Eaton Lighting, drops to the middle of the pack, while Philips returns to the top after an off year. The difference? Level of effectiveness when marketing their respective lighting products. But both companies need to improve their lower-end corporate images.



Philips

LIGHTING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Philips	2	1	2	8
2	Cree Lighting	3.4	3	4	4
3	GE Lighting	3.8	2	5	11
4	Sylvania	4.8	4	6	6
5	Eaton Lighting (HALO)	6.4	5	7	13
6	Hubbell (Progress Lighting)	7	11	1	1
7	Thomas Lighting	7.5	6	12	3
8	Visual Comfort & Co. (Generation Lighting)	7.6	7	8	10
9	LEDVANCE	8.5	8	10	7
10	Savoy House	8.9	9	11	2

PAINT AND COATING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Sherwin-Williams	1.3	1	2	1
2	Benjamin Moore	2.7	2	4	3
3	Behr	2.9	3	3	2
4	PPG (Olympic)	4.9	6	1	10
5	Valspar	5.1	5	5	6
6	ECOS	5.8	4	9	7
7	Kelly Moore	7.7	7	10	5
8	Glidden	8	9	6	8
9	Dunn Edwards	8.1	8	8	9
10	ROMABIO	8.5	10	7	4



Sherwin-Williams

CLASSIC MIX

You wouldn't think Sherwin-Williams could improve after finishing in the top three in each category in 2022, but the paint manufacturer pulled it off. The top scores in product recognition and public appeal, and runner-up mark in popularity, stem in part from an increased focus on non-VOC products.

PHOTOVOLTAIC SYSTEMS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Tesla <i>(Tesla Solar)</i>	1.4	1	1	5
2	First Solar	2.7	3	2	3
3	SunPower	3.9	4	3	6
4	Panasonic	4.5	2	8	9
5	Sharp	7	5	10	10
6	Sunrun	7.1	8	7	2
7	CertainTeed	7.4	6	9	11
8	JinkoSolar	7.6	9	5	7
8	Hanwha Q CELLS	7.6	7	11	1
10	Sunnova	8.2	10	6	4



Tesla

NEW FUTURE?

Seven wins in eight years isn't too shabby for Tesla Solar, which has finally moved past the controversy involving the parent company's purchase of what was once SolarCity. Over the past few years, the public has increasingly embraced the new entity's potential and available services.

THE NATURAL ORDER?

Kohler returned to its natural leadership role in sustainability, with clear messaging and new offerings. Last year's surprise winner, Niagara, dropped back to its traditional positioning this year. Kohler, American Standard, Moen and TOTO typically hold the top five, where they have resided since 2017.



Kohler

PLUMBING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Kohler	1.6	1	2	4
2	American Standard	3.0	2	5	3
3	Moen	3.7	3	3	10
4	TOTO	3.8	4	4	2
5	Delta Faucet Co. <i>(Brizo)</i>	3.8	4	1	11
6	Gerber	6.5	7	6	5
7	Niagara	7	6	11	1
8	LIXIL <i>(GROHE)</i>	7.6	8	7	7
9	hansgrohe	8.9	10	8	5
10	Geberit	9.3	9	10	9

REVOLVING ROOFTOP

Aside from Owens Corning, roofing’s main players continued to swap spots. But efforts to stand out were offset by weak public opinion, and vice versa. It also reflects a shift back toward composite shingles, running against the demand for concrete and clay versions over the past two years.



Owens Corning

ROOFING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Owens Corning	2.6	2	2	8
2	GAF (Timberline)	3.1	4	1	4
3	EcoStar	3.2	1	8	2
4	Atlas Roofing	4.7	3	5	14
4	Westlake Royal Building Products (DaVinci Roofscapes)	4.7	5	4	5
6	CertainTeed	5.2	6	3	7
7	Decra Metal Roofing	8.7	9	9	6
8	TAMKO Building Products	9	10	7	9
8	Enviroshake	9	7	15	3
10	TruMetals (Custom-Bilt Metals)	9.2	8	11	11

SIDING

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Westlake Royal Building Products (Cultured Stone, Eldorado Stone, TruExterior)	2.6	1	3	11
2	CertainTeed (CedarBoards)	3.8	3	4	8
3	James Hardie	3.9	4	2	9
4	LP Building Solutions (SmartSide)	4.8	5	1	15
5	K2 Stone	5.5	6	5	4
6	KlipTech (EcoClad)	7.2	2	14	18
7	Tremco (Dryvit)	8.2	7	8	16
8	Cornerstone Building Brands (Ply-Gem Siding)	9.4	11	6	10
9	Creative Mines	9.6	8	15	3
10	Accsys (Accoya)	11.6	13	11	5



Westlake Royal

SIDE SHOW

Westlake Royal, CertainTeed, James Hardie and LP are the industry’s most highly regarded siding manufacturers, but they’re not public favorites. Strong word of mouth is keeping them in the spotlight. Watch out for K2 Stone, with consistent scores across the board and a solid public standing.

SMART HOME TECHNOLOGY

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Amazon (Alexa)	1.4	1	1	5
2	Google (Nest)	2.8	2	3	7
3	Samsung (SmartThings)	3.8	3	4	8
4	Apple	3.9	4	2	9
5	Belkin (Linksys)	6.1	6	8	1
6	Savant Systems Inc.	6.9	5	12	3
7	Alarm.com	7.9	7	9	10
8	Honeywell	8	9	5	11
9	Nice North America (Nortek Security & Control; ELAN; Abode)	8.1	7	11	6
10	Snap One (Control4)	8.8	11	6	4



Amazon

TROUBLE AHEAD?

Amazon and its Alexa-related line continues to benefit from its worldwide reach and household name status. But recent reports say the retail giant's smart products have peaked in popularity, opening the door for Google, Samsung and Apple, who have lurked in Amazon's shadow for nearly a decade.

THINKING SMART

Lutron Electronics didn't top any of our survey categories, but solid work performance overall helped the company hold off TP-Link and Leviton. Lutron's line of smart dimmers isn't likely to lose steam anytime soon, so staying at or near the top is feasible.

SMART SWITCH

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Lutron Electronics (Caseta by Lutron)	2.8	3	2	4
2	TP-Link	3	4	1	3
3	Leviton	3	1	5	9
4	ConnectSense	4.5	2	9	6
5	Belkin (Wemo)	5.6	7	3	5
6	Brilliant	6.1	5	10	1
7	Hubbell (iDevices)	6.7	6	8	7
8	Schneider Electric	7.4	9	4	8
9	Vesync Co. (Etekcity)	7.9	8	7	10
10	Orro	8	10	6	2



Lutron

CONTROVERSY SELLS?

Fans of Tesla's solar components continue to shrug off partial owner Elon Musk's antics, as the company hits No. 1 for a second year. Tesla's growing product recognition and decline in everyone else's paints a mixed picture of where this industry is headed in 2023.



Tesla

SOLAR COMPONENTS

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Tesla	1.2	1	1	3
2	Delta Electronics	4.3	4	5	4
3	Generac	4.6	3	6	10
4	Kohler	4.9	2	8	13
5	SolarEdge	5.6	7	3	5
6	Schneider Electric	5.7	4	7	12
7	Enphase	6.7	10	2	1
8	Sol-Ark	7.7	6	13	2
9	OutBack Power	8.2	8	9	7
10	SMA Solar Technology	8.9	11	4	11

STRUCTURAL

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Premier Building Systems	2.8	1	6	4
2	Boise Cascade	4.1	4	2	11
3	West Fraser	4.5	3	5	12
4	R-Control/AFM Corp. SIPs	5.5	2	10	13
5	BuildBlock Building Systems	6.7	7	8	1
6	LP	7.4	11	1	5
7	Logix	7.5	6	11	6
8	Weyerhaeuser <i>(Trus Joist)</i>	7.9	5	13	10
9	Fox Blocks	8.9	10	7	8
10	Nudura	9.6	14	3	3



Premier Building

CHANGING TIMES

While Premier Building Systems and Boise Cascade maintain their traditional spots at or near the top, this year's list features some new or revitalized blood. West Fraser and LP need to polish their presence among peers and the public, but the top 10 in general is in a better state than in 2022.

THERMOSTAT

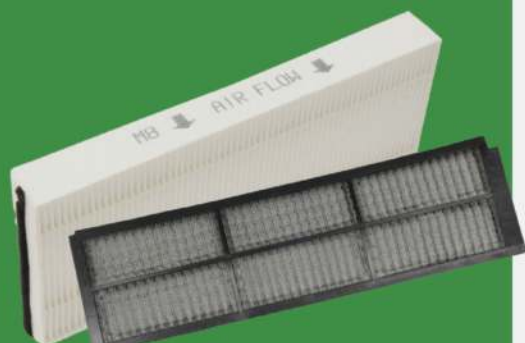
RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Google (Nest)	1.3	1	1	4
2	ecobee	3.3	3	4	3
3	Honeywell Home (Resideo)	3.5	3	3	8
4	Carrier	4.2	5	2	6
5	Schneider Electric	4.6	2	8	10
6	Bosch	5.6	6	5	5
7	Wyze	6.5	7	7	2
8	Emerson (Sensi)	7.3	8	6	7
9	LUX	8.2	9	9	1
10	Vine	9.9	10	10	9

THE NEST GENERATION

Google's Nest brand has rebounded nicely in the past two years, evolving into a product that people enjoy and like to inform others of. But with our top 10 maintaining their survey positions and market shares, overall growth is showing signs of leveling off.



Nest



Panasonic

THIN AIR

Panasonic and Delta Breez remain the overall leaders, but it's important to note that many of these top 10 brands are encountering negative sentiment online. Is this the normal "troll" effect, or something they want to address, before it impacts their overall brand image?

VENTILATION

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Panasonic	2	1	2	8
2	Delta (Delta Breez)	2.5	2	1	10
3	Air King	3.7	3	6	1
4	AprilAire	4	4	4	4
5	Broan-NuTone	4.5	5	3	6
6	SBP USA Ventilation Systems	5.5	5	6	7
7	Systemair (Fantech)	7.4	7	9	5
8	Greenheck	7.7	10	5	2
9	Zehnder	8.1	8	8	9
10	RenewAire	8.7	9	10	3



Andersen

LEADING UNDER PRESSURE

When promoting products and generating word of mouth, Andersen and Pella are doing everything right. Like other popular brand categories, however, they're getting a lot of negative chatter on social media, something that could catch up with them over time. For newcomer aluplast, it's the opposite: Little is said, but people who use the products like what they see.

WINDOW

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Andersen	2.9	1	1	20
2	Pella	3	2	2	12
3	Weather Shield	5.5	3	10	7
4	Sierra Pacific Industries <i>(Sierra Pacific Windows)</i>	5.9	4	8	11
5	JELD-WEN	6.4	7	3	13
6	Zola	7.8	4	15	9
7	Milgard	9.2	8	9	17
8	aluplast	9.7	6	20	1
9	Marvin	9.9	13	5	6
10	ProVia	10.8	12	11	3

WORK VEHICLES

RANK	COMPANY	INDEX AVG	SURVEY DATA	MENTIONS	SENTIMENT
★	Toyota	1.7	1	3	2
2	Ford	2	2	1	5
3	Chevy	2.7	3	2	3
4	Nissan	4.6	4	7	1
5	GMC	4.9	5	5	4
6	Mercedes-Benz	6	7	4	6
7	Stellantis (RAM) <i>[formerly Dodge RAM]</i>	6.1	6	6	7



Toyota

CHIPS AWAY

Toyota took the top spot this year. The company's sales slipped in 2022, but it sold 8 million more cars than Ford, despite an industry-wide computer chip shortage. Ford's bright spot is its electric vehicle division, led by the *Mustang Mach E* SUV, for which sales rose 45 percent from 2021.



Team effort. The skilled labor shortage gets some relief from prefab manufacturing, but employees are still needed to keep the factory production line going. CREDIT: GARY HORNBACH/DVELE

TRANSCEND

HOME  EVOLVED

The Promise of High-Performance

Prefab

BUILDERS FACING THE TRIPLE THREAT OF LABOR SHORTAGES, SOARING MATERIAL COSTS AND LINGERING SUPPLY CHAIN ISSUES CAN FIND SOLUTIONS THROUGH INNOVATIONS IN PREFAB CONSTRUCTION.

BY MICHELE LERNER

Every builder recognizes the challenges posed by product and people shortages, along with the need to build more-resilient, durable, energy efficient homes to face the impacts of climate change. Prefab housing hasn't always been viewed as the solution, but then again, factory-built homes haven't always resembled what's available now.

"In general, prefab is just thought of as a faster and cheaper way to build houses, but that's the wrong mentality," says Kurt Goodjohn, CEO of Dvele, a California-based prefab homebuilder. "We've invested in creating a product that's the most resilient and energy efficient it can be. Ultimately, we're creating a superior product that can be produced at scale."

Dvele and Green Builder Media partnered to develop

// THIS ISN'T YOUR GRANDFATHER'S PREFAB. THIS IS MORE LIKE A PRECISION ENGINEERED CAR. //

Transcend Communities, which will feature self-powered net-zero energy homes with solar arrays, battery storage, all-electric systems and appliances, resilient and durable. The first Transcend demonstration home, under construction now in the Dvele factory, will be installed this spring in the San Juan mountains of Colorado.

"This isn't your grandfather's prefab," says Sara Gutterman, CEO of Green Builder Media. "This is more like a precision engineered car."

Attitudes about prefab houses vary by generation, according to Green Builder surveys, with less than half of baby boomers willing to live in a prefab house compared to 100 percent of Gen Z consumers.

"The massive housing shortage can't be solved without manufactured housing," Goodjohn says. "Transcend Communities solve the energy transition to all-electric power, and climate issues because of the resilience of the home designs, the manufacturing process and the materials used."

FACING THE TRIPLE THREAT

Labor shortages have plagued the construction industry since long before the pandemic. According to Gutterman, they are anticipated to get worse as workers age out, with fewer younger people to replace them.

"Prefab solves some of this issue, because you need fewer workers in the factory and at the onsite installation, and the building process is expedited," Gutterman says.

The ability to order materials in bulk and store them in the factory provides cost and distribution benefits. Dvele can order supplies when they're available or when their price improves, even if there isn't an immediate need. As Dvele scales up, it will benefit from better buying power for materials, according to Goodjohn.

"Cost reduction is already happening, because there's less waste using our precision manufacturing system," Goodjohn says.

TECH IMPROVEMENTS FOR A BETTER-BUILT HOUSE

While prefab houses offer the benefit of being built in a contained environment—which naturally precludes issues arising from weather and moisture—Dvele's systems also provide a high degree of quality control.

"We inspect every element of each house as we go, which makes it easier to catch any issues," says Brandon Weiss, co-founder and chief innovation officer of Dvele. "On a building site, if one person doesn't show on the right day or someone misses an issue, it may not be noticed for weeks or even years."

In addition, Weiss says, no one on a building site has the level of attention to detail that is available through the software Dvele



Next generation greatness. Technology improvements over the past decade make today's prefab homes stronger, more resilient to climate change and extremely energy efficient compared to previous iterations of manufactured homes. CREDIT: GARY HORBACH/DVELE



Hip to be square. Software generates design details that result in precisely cut modules during the manufacturing process. CREDIT: GARY HORNBACH/DVELE

uses to design and build their homes.

“The software provides a digital twin of the minutiae that goes into every house as it’s built,” Weiss says. “Nothing gets covered up. If we need to change something, it can be done with a digital push of a button.”

One of the biggest technological changes that makes Dvele stand out is that the design of each home is extremely data rich, Goodjohn says.

“The data flows directly into the manufacturing process to automate production from the design,” Goodjohn says. “We’re focused on making further progress in automation as we grow.”

Software and computer speeds have seen rapid improvements over the past decade, with 3D modeling and virtual reality enhancing the design process, Goodjohn adds.

Dvele’s houses exceed all codes and are built to an extremely high set of performance standards, Weiss says.

“We’re performance-centric, so we run diagnostics on every individual project to monitor the performance for homeowners and for long-term improvements,” he says.

Goodjohn refers to the *Dvele IQ* system, which monitors health and wellness attributes such as indoor air quality, moisture, humidity, radon and energy use, as the “check engine light” on your house.

“We’ve incorporated this intelligence into the home, with predictive maintenance that notifies homeowners when they should take action,” Goodjohn says. “[And, there are] automated features that provide better indoor air quality as needed.”



Clean thinking. Pristine conditions in Dvele’s factory provide environmental benefits and quality outcomes. CREDIT: GARY HORNBACH/DVELE



Indoor advantage. Factory-built homes avoid exposure to elements that can add moisture and potentially allow the growth of mold on internal components, as well as prevent damage to items such as wood flooring. CREDIT: GARY HORBACH/DVELE

A ZERO WASTE GAME

"Reduce, reuse, recycle" is the mantra at Dvele's California factory, where the design and manufacturing process minimizes wasted material, says Weiss. Every part of the Transcend demonstration home, as well as all other Dvele houses, is designed and tweaked if necessary to meet exact measurements. Precision manufacturing through automation and constant inspection of each stage of the factory building process reduces waste, which is then sorted for recycling and reuse.

"You can hold the amount of waste we generate in one hand—and this is for a 2,000 square foot house," Goodjohn says. "We use all recycled steel to build, too."

While Dvele's Transcend demonstration house is being built in the company's first factory, which is leased, Dvele is building a new factory that is anticipated to be complete in 2024.

"Our focus since we started has been on the product rather than where we make it," Weiss says. "But our next factory will be net positive for energy, net positive for water and run with fully clean energy."

Ideally, all Dvele houses will eventually be delivered by electric vehicles (EVs). But that technology isn't in place yet, Goodjohn says. Still, the environmental benefits of Dvele's technology are evident.

"Our prefab foundation system, made with structural steel and automation, has 80 percent less embodied carbon than a concrete foundation," Goodjohn says. "Our homes use 83 percent less energy than a new stick-built home."



Anti-carbon construction. The steel foundation for a Dvele home has 80 percent less embedded carbon than concrete. CREDIT: GARY HORBACH/DVELE



Metal minded. Structural steel is a crucial element of Dvele's designs for Transcend Communities. It provides resilience and durability, and is fire resistant and pest resistant. CREDIT: GARY HORBACH/DVELE



DETAILS MATTER

Dvele's homes for Transcend Communities are designed with a conservation-first approach, according to Goodjohn. Next, materials are carefully chosen for resilience, consistency, energy efficiency and health.

"The steel structural system is the backbone of the homes for Transcend Communities because metal is fire resistant and pest resistant," Goodjohn says. "We're creating a home that's going to last longer and be more energy efficient."

The houses in Transcend Communities include duplicate systems for higher performance, such as two drainage planes so water and moisture can't get into the house. Also, each home has solar power with battery storage.

"We use materials that are climate specific for fire resistance, seismic resilience and to prevent damage from rain and hurricane force winds," Weiss says. "Homeowners in other locations benefit as well from those features because they increase the overall quality of the construction."

In addition to exterior materials, Dvele's houses are built with appropriately installed insulation, with no exposure to the elements, Gutterman says. Water filtration systems extend throughout the house.

"The 'house as a system' integration of each home with the *Dvele IQ* system solves an issue that our surveys have found frustrates people: the lack of communication between various pieces of smart home technology," Gutterman says. "The Dvele platform is set up and streamlined from the beginning."

FROM OLD SCHOOL TO NEW RULES

Traditional crafters of stick-built houses may be considering panelized walls and other modular components, but the easier scenario is for them to work with prefab companies for the entire house.

"Builders are more likely to embrace prefab partners rather than attempt to build with components on their own," Weiss says. "We want to partner with developers who will secure the land, improve it with infrastructure and then work with us to install prefab foundations and prefab houses on their sites."

Many builders are more open to changing the way they build homes because of the challenges of labor and material shortages and delivery issues, Gutterman says.

"These problems push them off schedule, which costs them money," she says. "Developers who are adopting prefab recognize that it can solve these issues, protect their timeline and offer a more-secure way of building with fewer onsite complications."

The concept of Transcend Communities, Goodjohn says, is to bring scale and a greater impact from partnerships with developers.

"The opportunity is massive because of the extreme shortage of homes in this country," he says. "We want to provide a healthier, superior living experience to people in micro communities that are self-sustaining." **GB**

FIRST COST VS. FULL COST HOME VALUES

While building at scale and ever-evolving technology will gradually bring down the cost of Dvele's prefab houses, the initial goal is focused on long-term durability and performance rather than immediate affordability. Buyers, real estate agents, lenders and appraisers typically look first at the price per square foot metric, but homeowners would be wise to consider the full cost of ownership instead, Gutterman says.

"When you look at the total cost of ownership, high-performance homes deliver a better value because your operating costs are so much lower, especially with a net zero, all-electric, solar-powered house such as the Transcend demonstration home, which also has battery storage," Gutterman says. "First-time buyers may look at a lower price point and believe they're saving money, but they neglect to consider that it could cost them \$400 or \$500 a month to heat and cool that house. Compare that to a house with a mortgage payment that's \$300 per month higher, but the monthly utility bill is under \$100."

Gutterman also points out that a better-built house will withstand weather issues and won't need repairs, both of which provide long-term savings.

"Buyers of high-performance homes are also likely to be eligible for tons of rebates for energy efficient heat pumps, induction cooktops and more," Gutterman says.

Less is much more. One inch of R-6 polyisocyanurate sheet foam on top of a waterproofing membrane can lower the surface temperature of the attic side OSB by 30-40 degrees.



VALUE INSULATION

Here's a new trick for cooler attics, energy savings and reduced heat gain in HVAC systems.

BY STEVE EASLEY

As summer approaches, we're back to a common reality: Keeping comfortable costs money. More than 90 percent of all new U.S. homes have air conditioning, but in places where electric costs are high, summertime air conditioning bills can surpass those for heating, even in cold climates.

There's a good reason: recycled warmth. For example, the amount of heat from the sun that strikes a

1,200-square-foot roof is about 250 British thermal units (BTUs) per square foot, or 300,000 BTUs per hour. This absorbed heat eventually gets re-radiated into the attic space, causing attic temperatures to easily reach 130 to 140 degrees Fahrenheit. That heat gets conducted and sucked into leaky, poorly insulated duct work. To make things even worse, a high-mass, heavy roof with concrete tile absorbs the sun's heat all day long and re-radiates it into the attic well into the night, further driving up air conditioning costs.

WHY HAVE WE ALLOWED OUR BUILDING PRACTICES TO BE SO INEFFICIENT?

The usual reasons: lack of building science knowledge and money. For decades, most new homes have been built on slab foundations, resulting in heating and cooling equipment almost always ending up in the attic—the absolute worst place to put it. Heat always flows from hot to cold, and the greater the temperature difference, the faster the flow. The temperature of air-conditioned air passing through ductwork is about 55 degrees; the temperature in the attic can easily be twice as much. That heat is conducted and leaks through the ductwork, and it heats the air you have already paid to cool. That is a tremendous temperature difference for your A/C to overcome.

Studies from the California Energy Commission found that the surface area of duct work for a typical home is about 40 percent of a home's floor area. Some basic heat transfer math, for a 2,000-square-foot home, shows that attic heat conducted into R-2 insulated duct work is about 30,500 BTUs per hour, or more than 2.5 tons of air conditioning load!

Even with today's code requirement R-8 duct work, the additional heat load is 8,000 BTUs per hour, or 0.67 tons. This is why smart energy experts want HVAC equipment and ducts out of the attic and into conditioned spaces. But finding room for HVAC units and ductwork in living spaces can be challenging and cost more.

Another option is non-vented or sealed attics where spray foam is applied to the underside of the roof deck. These attics

are usually within 5 degrees of that of the living spaces, making this an efficient but more-expensive option.

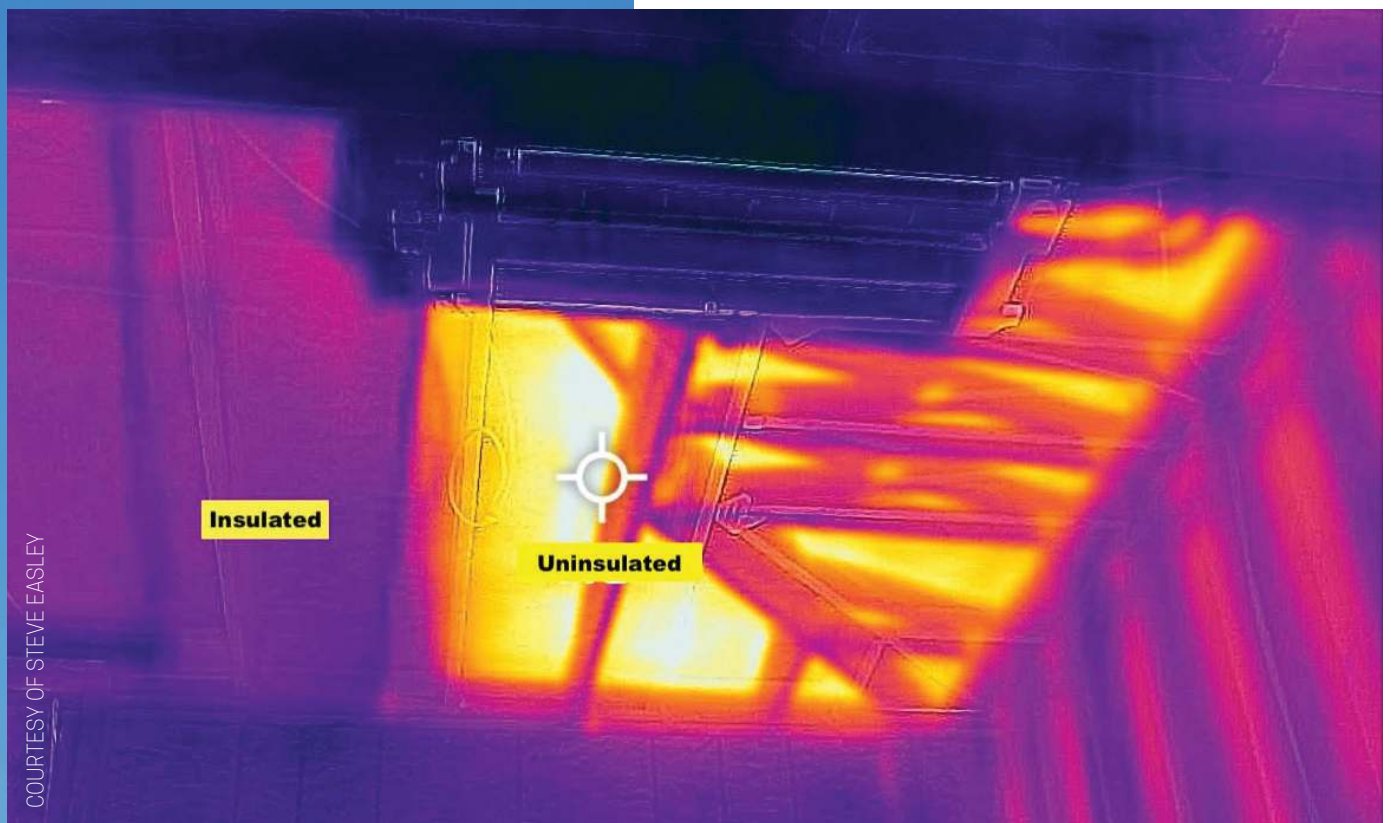
WHAT IS A LESS-EXPENSIVE OPTION TO REDUCE ATTIC HEAT GAIN INTO ATTIC DUCTS?

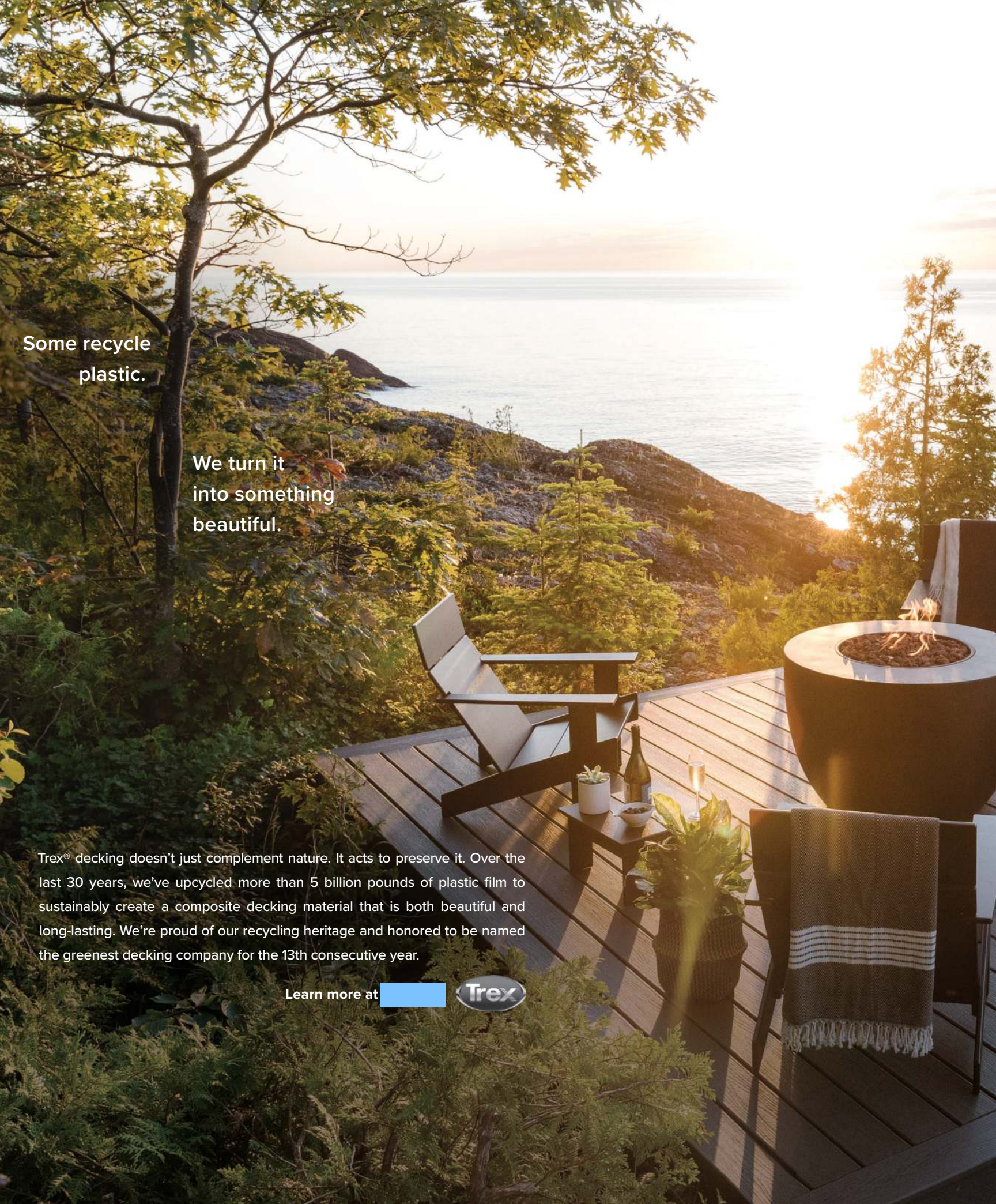
In my own real-world tests, I used a less-expensive option that provides close to the same result. Applying 1-inch R-6 polyisocyanurate sheet foam (Dow Thermax) on top of a waterproofing membrane and OSB roof deck lowered the surface temperature of the attic side OSB in a vented attic by 30-40 degrees.

It's always important to check with the roofing manufacturer that the system you select is compatible with this system. The California Title 24 energy code has had above-deck roof insulation as an option since 2016 for high-performance attics. I suspect 1 inch of extruded polystyrene R-5 Styrofoam would yield similar results.

The image below clearly shows the difference between the roof deck insulated to R-6 at left and no insulation on the right.

For my **Scottsdale Revision House** project, we installed 1 inch of *Thermax* over the OSB roof sheathing and roofing membrane in conjunction with a non-vented attic, creating R-54 insulation over the pitched roof areas. I expect that this will perform very well, significantly reducing my cooling loads and costs. I am also using a low-mass, metal, ventilated shingle roof which does not store much heat, thereby reducing continued heat gain into the attic after the sun goes down. **GB**



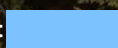


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lg.com/us/business/builder/download/LG-Builder-Appliance-Catalog-Vol-2-DIGITAL-6-15-22.pdf

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LG HVAC

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<https://www2.lghvac.com/discover-lg-chillers>

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NetZeroFire.com

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SmartHealthyAir.com

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ProVia

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provia.com/why-its-great-to-partner-with-provia

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Rheem

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Rheem.com/water-incentives

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Sustainability Symposium 2023: The Great Conversion

Held Virtually April 19-20

greenbuildermedia.com/sustainability-symposium-2023-the-great-conversion

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Trane HVAC—A 2023 Brand Leader

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<https://www.trane.com/residential/>

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Trane Technologies

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**COMING NEXT ISSUE****The Great Conversion**

As we transition from fossil fuel dependency to a clean, renewably powered lifestyle, where can we look for inspiration and information? This is new territory, and time is short. Let's smooth the pathway to net zero living.

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AS SEEN ON
HOLMES
FAMILY RESCUE



The Simplicity of Sustainability



Ron Jones
Co-Founder and President
Green Builder® Media
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Let me start with the assertion that the people and societies who exhibit the most happiness and contentment are those whose lives involve the least complexity and the stress that goes along with it. Based on almost everything I have read or viewed over the years, as well as a lifetime of personal observations, I am convinced that true quality of life goes hand in hand with one's proximity to, and relationship with, the natural world. Time after time, studies show that health and general wellbeing, not to mention greater life expectancy, are traits common to those who live sustainably, self-sufficiently and close to nature. Few would dispute the benefits of growing at least some of your own food, for example, and of living with naturally clean air and water, of having less congestion, noise and pollution, and less dependency on mechanized transportation.

Each of us is entitled to our own metrics for determining what "quality of life" means. But measuring yours by the number of driving minutes needed to reach the source of your morning "almond double latte" or the various fast-food outlets available in your quest for the easiest family dinner on your commute after work, are indicators that you might want to reconsider.

Sustainability can be described as intergenerational prosperity—that is, the outcome of ecological accountability. It requires that we interact with the natural environment with integrity. This means that we honor and respect all of the resources that bless us with abundance, and that we recognize that the world does not exist for our benefit alone. It also implies a certain frugality; that surplus production should represent the opportunity to establish savings, not just increased consumption.

One undeniable outcome from the recent pandemic is that many people who previously toiled in office settings and similar situations have discovered that they can simplify their lives by working from home. Imagine that your travel to

What if we devised the mechanisms that would provide those with modest means a chance to earn equity, and pave the path to home ownership and entrepreneurial enterprises?

work and back home each day took two hours round trip, five days a week. What would it be like to spend those 10 hours in your garden or orchard, or playing with your children and pets? Could you use those hours for more exercise, reading or hobbies? What if you could devote a portion of those hours to volunteering to help others? What could you do with the dollars you saved on fuel costs, maintenance and so on?

RETHINKING THE HOMESTEAD ACT

I am in complete support of the national initiatives to rebuild our highways and bridges, upgrade the country's electrical grid, and make desperately needed improvements to our water supplies and public transportation systems. But I would like to make a radical suggestion: What if we also committed some of those resources to creating a platform that would encourage a return to rural living in America—a return to the land, so to speak, for those who want it?

What if we established programs that would underwrite local projects to revitalize communities and reclaim deserted storefronts, residential properties and small-scale farmsteads, making it possible for individuals and like-minded neighbors to conduct their lives at a gentler pace and on a scale that is less frantic and stressful? What if we devised the mechanisms that would provide those with modest means a chance to earn equity, and pave the path to home ownership and entrepreneurial enterprises?

I ask simply, why not? **GB**

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