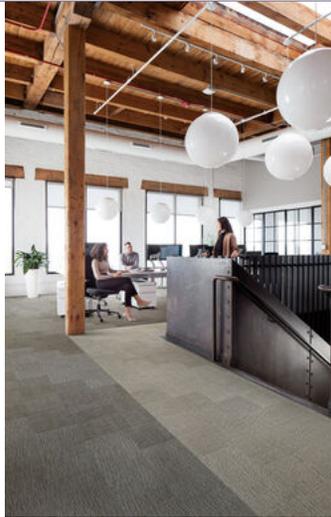PRODUCT REVIEW

BuildingGreen Announces Top 10 Products for 2021

Product Reviews (/product-reviews)

These innovative products reduce carbon emissions and include negative embodied carbon carpet, repurposed EV battery storage, carbon sequestering aggregate, and more.

by Brent Ehrlich (/author/brent-ehrlich)

(/sites/all/modules/bg_content/templates/imagemodal.php?
image=https://www.buildinggreen.com/sites/default/files/articles/Interface_Zen%20Stitch-800px.jpg&nid=58524)

Interface CQuestBio- and CQuestBioX-backed carpets are carbon negative, according to their environmental product declarations.

Photo: Interface

Every year for the past 19 years, BuildingGreen has selected ten green building products that significantly improve upon standard "business-as-usual" practices. This year's products address our most pressing challenge: reducing the environmental impacts of greenhouse gases. The following products do so by sequestering carbon, conserving energy and resources, and reducing emissions, fundamentally changing our building systems.

This year's BuildingGreen Top 10 winners:

- BlocPower Lease Program
- Blue Planet Carbon Capture
- Davies Office Furniture
- Embodied Carbon in Construction Calculator (EC3)
- Halton M.A.R.V.E.L. Demand-Controlled Kitchen Ventilation
- Interface Carpet Tiles with CQuestBio and CQuestBioX Backings
- Osram Quantum Dot LEDs
- RAB Lighting's Lightcloud Outlet
- RePurpose Energy Battery PODs
- Trina Solar Vertex PV Panels

BlocPower Lease Program

Why we chose this product: BlocPower installs heat pumps and other energy-efficient equipment with no money down, providing a means for property owners to save energy and improve tenant comfort—perennial challenges in lower-income communities.

Perfection is often the enemy of the good when it comes to retrofitting old buildings for energy efficiency. In an ideal world, these buildings would be sealed and insulated before addressing HVAC systems or adding renewable energy, but in many areas of the U.S., the financial means are not available to make these upgrades. The results: wasted energy, more carbon in the atmosphere, and uncomfortable tenants.

BlocPower offers a 15-year lease program on heat pumps, renewable energy, and other systems with no money down. By replacing old oil-fuel boilers and other inefficient HVAC equipment with heat pumps, building owners have saved 20% to 40% on their annual energy bills while significantly reducing energy consumption and corresponding greenhouse gas emissions.

BlocPower uses proprietary software to analyze and track the entire process, including leasing, project management, and monitoring of projects. The installed systems come with a performance guarantee and maintenance program, minimizing risks to building owners.

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Blue Planet Carbon Capture

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image=https://www.buildinggreen.com/sites/default/files/articles/blue%20planet%20aggregate.jpg&nid=58524)

Blue Planet converts CO_2 from industrial sources into calcium carbonate aggregate, inexpensively storing carbon while creating a marketable carbon-based product.

Photo: Blue Planet Ltd.

Why we chose this product: Blue Planet uses a chemical process to convert CO_2 from industrial sources into calcium carbonate aggregate. Unlike expensive geologic capture and storage, this process creates a marketable carbon-based product.

Currently, there is no market for carbon and little incentive to reduce carbon emissions at the source. Capturing CO_2 and creating the infrastructure for geologic capture (such as deep-well injection) is expensive and impractical for many industries. Purifying CO_2 at the source is also costly with limited building product applications outside of concrete curing (Carbon Cure (https://www.buildinggreen.com/product-review/carboncure-capturing-carbon-concrete-blocks), a 2013 BuildingGreen Top 10 product, incorporates CO_2 into its CMUs and ready-mix concrete products).

Blue Planet captures unpurified CO_2 at the source and converts it to artificial limestone/calcium carbonate. As a result, up to 44% of the Blue Planet aggregate is made up of converted CO_2. According to the company, a cubic yard of concrete using Blue Planet aggregate can sequester more than 1,000 pounds of CO_2, and for every ton of concrete, a half ton of CO_2 is sequestered.

Blue Planet can also use recycled concrete as a raw material, saving it from being landfilled. The process has another bonus: once the cementitious materials have been dissolved from the waste concrete, it leaves behind clean aggregate that can also be marketed and sold.

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Davies Office Furniture

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Davies Office remanufactures office furniture into like-new condition, reducing the cost and environmental/carbon impacts of purchasing new furniture. The company also retrofits offices to improve cleanability.

Photo: Davies Office Inc.

Why we chose this product: Davies Office Inc. remanufactures old, dated furniture and turns it into like-new or better condition. This process saves energy and resources, and significantly reduces the carbon footprint of furniture.

If office furniture is replaced often enough as it becomes dated, it can end up being responsible for more embodied carbon than the building structure. This older furniture may not be the latest, but it is still well made. Davies Office takes this furniture, strips it down to its core, and then remanufactures it to meet client needs.

Using Davies Office furniture can save 40%–60% over the cost of new furniture, while saving virgin raw materials. The company claims its process uses 82% less energy than manufacturing furniture from new materials, and that over the course of one year, its office panel remanufacturing saves approximately 8.5 million pounds of raw materials and "avoids the release of more than 6.9 million pounds of carbon dioxide into the environment."

Davies Office offers cubicles, desks, chairs, and other casework, and includes products from Herman Miller, Steelcase, Haworth, Knoll, and more. Some products are even BIFMA level certified.

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Embodied Carbon in Construction Calculator (EC3)

Why we chose this product: The Embodied Carbon in Construction Calculator (EC3) is a free, open-source, cloud-based tool run by the nonprofit Building Transparency; it can be used by building professionals to measure, compare, and reduce their buildings' embodied carbon.

Tracking the embodied carbon in our building products is challenging, and that is a problem since, over time, the embodied carbon in a building can almost equal the carbon from operations. You can't reduce a building's carbon footprint if you don't know the carbon footprint of the products that go into it. Though embodied carbon data is available in environmental product declarations (EPDs), as standalone data, it has not been very useful for building professionals.

The EC3 tool has incorporated the cradle-to-gate embodied carbon data from more than 40,000 third-party-verified EPDs. Though EC3 is not a substitute for whole-building LCA, the EC3 tool can be used during design and procurement to specify low-carbon options.

Design teams can input building material quantities into the tool and, using EPD data, calculate the embodied carbon of concrete, steel, wood, glass, aluminum, insulation, gypsum, carpet, and ceiling tiles. Teams can then select the lowest-carbon options.

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Halton M.A.R.V.E.L. Demand-Controlled Kitchen Ventilation

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Halton's M.A.R.V.E.L. demand-controlled kitchen ventilation manages the ventilation in commercial kitchens to minimize energy consumption and improve worker comfort and safety.

Photo: Halton

Why we chose this product: Halton's M.A.R.V.E.L. demand-controlled kitchen ventilation is a sophisticated system for managing the ventilation in commercial kitchens to minimize energy consumption and improve worker comfort and safety.

Commercial kitchens are one of the most energy-intensive building sectors. The ovens, ranges, and other appliances generate enormous amount heat, smoke, and combustion gases—all of which need to be vented. Some ventilation hoods run non-stop whether there is food being cooked or not. This wastes fan energy as well as venting conditioned air from the building, which then has to be replaced, wasting more energy. And if the ventilation is not working properly, the kitchen gets hot and noisy, creating uncomfortable and potentially unsafe working conditions.

Halton's M.A.R.V.E.L. (Model-based Automated Regulation Ventilation of Exhaust Level) demand-controlled kitchen ventilation uses data from a combination of infrared sensors on cooking surfaces, temperature sensors in ducts and kitchens, and airflow and pressure sensors to control the ventilation from hoods. The sensors can detect whether appliances are on and the status of the cooking, and adjusts the exhaust flow rate accordingly.

These systems combine with the hood's Capture Jet technology to reduce exhaust airflow rates (which reduces the need for make-up air). The system also controls for variable pressures and exhaust flow rates to maximize efficiency and guarantee balanced airflow in the kitchen. All hoods are connected and incorporate individual dampers that adjust automatically to changing ventilation needs.

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Interface Carpet Tiles with CQuestBio and CQuestBioX Backings

Why we chose this product: Interface's carpets with CQuestBio and CQuestBioX backings are the first that are carbon negative, according to their environmental product declarations.

Carpet is ubiquitous in our buildings, adding color, comfort, and sound attenuation, but we pay a price for that comfort. Primarily made from petrochemicals, the embodied carbon of commercial carpet can be as high as 21 kilograms of CO_2e per square meter. Carpet is also frequently replaced and rarely recycled, making its overall environmental impact much worse.

Interface's Embodied Beauty carpet line includes the first carbon-negative carpets using CQuestBio and CQuestBioX backings. These PVC-free carpets incorporate proprietary biobased, recycled, natural, and other carbon-sequestering materials in the backing. The CQuestBioX products contain more of these materials and have a smaller carbon footprint. These backings combine with post-consumer recycled face fibers and low-embodied-energy manufacturing processes to create a carbon-negative product.

For comparison, the company's carpet tile with 20 ounces of yarn on standard recycled backing has embodied carbon of 4.4 kg of CO_2 per square meter, whereas its Embodied Beauty carpet tile with 12 ounces of yarn, and the CQuestBioX backing has –0.3 kg of CO_2 per square meter.

Interface claims its Embodied Beauty carpet will be competitively priced, but note that color options and availability will likely be limited at first. According to the company, these products are the first steps towards making all its carpeting carbon negative.

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Osram Quantum Dot LEDs

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Osram's OSCONIQ S 3030 improves light quality and efficacy by replacing LED phosphors with Quantum Dot technology.

Photo: Osram

Why we chose this product: Osram's OSCONIQ S 3030 LEDs use nano-scale Quantum Dot technology rather than phosphors to create LEDs with excellent color and high efficacy.

While the efficacy of LEDs—measured in lumens per watt (lpw)—has continued to climb over the years, those with excellent color quality have lagged behind. Color quality is measured as color rendering index (CRI), with 100 looking the most like natural light, but LEDs require phosphors to transform the blue light of the LED "pump" into warmer reds and yellows. Because of this, it's easy to get a high CRI with colder daylight blue colors (5000k), but LEDs become less efficacious when the phosphors have to convert that blue to warmer colors. Warm-white high-CRI A19 bulbs (the ones we use for everyday lighting in lamps), for instance, struggle to reach 100 lpw.

OSCONIQ S 3030s can provide a CRI of 90 at 173 lpw with a warm 3000k color. Instead of using phosphors throughout, this Edison Award-winning technology uses Quantum Dot nanoparticles that emit light of a specific wavelength when blue LED pump light is applied to them. The color depends on the size of the Quantum Dots, so a 2 nm LED creates blue light, while a 7 nm creates red.

Osram's OSCONIQ S 3030s are currently being launched in products for area and downlight applications.

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RAB Lighting's Lightcloud Outlet

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The cost-effective Lightcloud "smart" Outlet reduces plug loads by collecting granular energy-consumption data without the need for hardwiring.

Photo: RAB Lighting

Why we chose this product: RAB Lighting's Lightcloud "smart" Outlet combines function, ease of use, and reasonable cost to provide wall outlet control and gather energy-consumption data that can be used to reduce plug loads and to participate in demand-response programs.

Plug and process loads (PPL) can account for >30% of a commercial building's electricity consumption—and even more in high-efficiency buildings. This is because computers, monitors, printers, and other office equipment continue to consume energy even after the building closes. Though there are numerous plug load options on the market, many have limited applications, and those that provide granular control of power use at the plug are often hard wired, expensive to install, and complicated to operate and maintain.

RAB Lighting's Lightcloud Outlet is a 20-amp (120V) outlet that is part of the company's Lightcloud wireless, cloud-based lighting and energy-monitoring control system. The Outlet installs like a standard outlet, and the bottom receptacle is always on and can be used for critical equipment that shouldn't be turned off. But the top receptacle integrates into the company's Lightcloud system. Standard appliances plugged into the top receptacle, such as a computer monitor or lamps, can then be incorporated into lighting schemes or used to control a building's overall energy consumption, including demand-response agreements with utilities.

The Lightcloud system also includes sensors (occupancy, daylighting, etc.), dimmers, controllers, and Lightcloud-enabled fixtures. Each device functions as a "repeater" to ensure connectivity, and for security purposes, the private, encrypted 4G cellular wireless system is separate from the building's other wi-fi networks and connects via a private connection.

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RePurpose Energy Battery PODs

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image=https://www.buildinggreen.com/sites/default/files/articles/repurpose%20energy-1000px.JPG&nid=58524](/sites/all/modules/bg_content/templates/imagemodal.php?image=https://www.buildinggreen.com/sites/default/files/articles/repurpose%20energy-1000px.JPG&nid=58524))

RePurpose Energy uses batteries from electric vehicles as energy storage for renewable power.

Photo: RePurpose Energy

Why we chose this product: RePurpose Energy battery PODs give the batteries from electric vehicles a second life as energy storage for renewable power, helping to reduce the impacts from recycling and disposal of these batteries.

Electric vehicles are becoming ubiquitous, but what happens to their batteries once they wear down? Disposal is a non-starter. Recycling for minerals is currently not cost effective, but these batteries are still viable for energy storage with more than 70% of battery capacity left.

Reusing EV batteries is not easy, though. EV batteries are custom made for each manufacturer, and the lack of battery standardization (size, chemistry, format) complicates their use as energy storage.

RePurpose Energy is taking Nissan Leaf batteries (other batteries are also possible in the future) and turning them into modular battery storage units for commercial and industrial applications. The individual EV battery packs use the company's Battery Management System (BMS) and are called SEEDs (Sustainably Engineered Energy Devices). These SEEDs are then housed in larger modular PODs (Power On Demand). Each POD also includes the inverter, HVAC, fire suppression, racking, and other systems.

Each SEED is approximately 10kWh, each POD is approximately 150kWh, and custom systems are available. For applications larger than 500kWh, the PODs are housed in a larger container.

Battery assessment, modeling, and lifespan determinations are some of the keys to RePurpose Energy's PODs, ensuring the batteries will perform as intended. The company also incorporates a battery management system to maximize performance and compatibility with CANbus or RS485 interfaces. And its energy management system ensures that batteries are integrated and optimized for use with renewable-energy systems and demand-response protocols.

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Trina Solar Vertex PV Panels

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image=https://www.buildinggreen.com/sites/default/files/articles/Trina%20DEG19C.20_Front3-800px.jpg&nid=58524)

The large format wafers in Trina Solar's Vertex PV panels create more power per area while reducing balance-of-system inefficiencies.

Photo: Trina Solar

Why we chose this product: Trina Solar's Vertex PV panels use larger-format wafers to improve the efficiency of the panels, offering the potential to manufacture larger panels with greater energy output.

PV panel power output is limited by wafer size. With smaller wafers and panels, you need more panels to produce more power, and this means more inverters, connections, mounting hardware, and other balance-of-system costs.

There has been a breakthrough in the industry in the past few years, with larger wafers being produced (up from 125 mm wafers in 2005 to 210 mm today). With the larger wafers, more power is produced per area, and there are fewer losses due to connections and inverters, leading to greater overall system efficiencies. The larger format also allows larger panels. Trina Solar's 550W VERTEX 19 Series has an efficiency of approximately 21% and will be available in 2021, with other larger products coming in 2022.

The larger-format wafers are part of the evolution of the PV industry that include cleaner manufacturing and fewer overall emissions. Trina Solar, for instance, had top ratings for sustainability in 2017 and 2018, according to the Silicon Valley Toxics Coalition's Solar Scorecard (it was number two in 2019 (http://www.solarscorecard.com/2018-19/2018-19-SVTC-Solar-Scorecard.pdf)). The company also claims a 46%–47% energy and greenhouse gas reductions, respectively, and 32% less water use since 2015.

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questions about "carbon capture" (/comment/64918#comment-64918)

[(/users/greta-eckhardt)](/users/greta-eckhardt)

Greta Eckhardt

Payette

BuildingGreen Premium Member

🕐 January 4, 2021 - 6:05 pm

I am glad to learn about efforts to remove carbon dioxide produced by the combustion of fossil fuels from the atmosphere, by incorporating it in solid products. However I have questions.

Regarding the Blue Planet Carbon Capture, what is the source of the calcium oxide needed to react with carbon dioxide to form calcium carbonate? As far as I know, CaO does not occur naturally, but is usually obtained by heating limestone, as in lime kilns. That means energy would be expended and CO2 would be given off, to produce the CaO. If they are obtaining the CaO from recycled concrete, it would still be necessary to expend energy to separate it out of the calcium silicates and calcium aluminates. This does not sound like a carbon sink if the entire process is considered.   The Blue Planet web-site does not say anything about this.

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