

Sustainable Supplier Index Game-Changers in Green Building







Introduction

The sustainability world is evolving rapidly. Government and corporate mandates require fast action and new thinking, as well as reliable data.

As a result, many businesses and service providers are developing creative ways to facilitate and fund green building and (most importantly) to report on the impact of decisions.

This report will take you through every stage of the planning, development, building, and measurement process so you can get a glimpse into some of the innovative initiatives that companies are launching.

This report will cover the following product categories:

- Planning and Design
- Energy Efficiency

- Funding
- Water Management
- Sustainable Building Materials
- Waste Management and Emissions
- Electric Vehicles & Infrastructure
- Technology and Tracking

Each section includes a summary of the top trends the Greenbuild team spotted, as well as contributions from many service companies, manufacturers, and organizations.

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Planning and Design

This is, of course, where the green building magic starts to happen. Designers and architects work closely with their clients to understand their goals and budgets and they begin to craft solutions that reduce carbon footprints.

Today, most architectural firms are highly sensitive to the sustainability imperative and are finding ways to build greener, healthier, and more cost-effective structures and environments. These are just a few of the professionals who are innovating and evolving.

Trends & Innovations

- Collaboration is commonplace across functional areas
- Technologies and tracking systems are being developed to accurately measure impact

• General architecture firms are developing sustainability expertise



Kipnis Architecture & Planning

Focusing on collaboration to build better high-end residential homes.

How it Comes Alive in Green Building

Although Kipnis was an early adopter of green design practices, they continue to transform and build their approaches and sustainability team. Comprised of an architectural firm, two interior designers, a landscape architect, general contractor and a technology integrator, Kipnis focuses primarily on sustainable high-end homes.

They believe that building a best-of-class green team and encouraging collaboration is essential to delivering sustainable residences that meet the needs of both homeowners and the environment.

Contributor: Nathan Kipnis, FAIA, Principal, Kipnis Architecture + Planning



CLIMATESCOUT

Revolutionizing the planning and design process by taking climate differences into consideration.

How it Comes Alive in Green Building

Just as technology transformed architectural design, new automated tools are ensuring that buildings are appropriate for the locations in which they are being constructed or renovated.

Using the Köppen-Geiger climate classification and building design strategies from Architecture 2030's Palette, this system classifies climate into five main classes and 30 sub-types. The five main climate groups are A (tropical), B (dry), C (temperate), D (continental), and E (polar). Twenty-seven building scale strategies are paired with the 30 climate subtypes to determine their applicability for the Köppen-Geiger climates. The user can filter, select, and combine appropriate strategies for a selected climate.

As the planner selects these curated strategies, they appear in real-time overlaid in diagrammatic form, providing an immediate visual connection between climate and building response. Most climate analysis tools effectively visualize climate data and quantify the effect of some strategies on thermal comfort. Still, they do not provide a visual image of these strategies integrated into an architectural response. CLIMATESCOUT does this, providing a more integrated and coherent vision of the design strategies working in unison.

This cutting-edge technology was recently featured in *Fast Company* and was the recipient of a "World Changing Ideas" award.

Contributor: Pablo La Roche, Sustainable Design Lead, CallisonRTKL



MindClick

Rating products used in interior design to deliver waste reduction, circularity, and diversity, equity, and inclusion (DEI).

How it Comes Alive in Green Building

This automation tool is designed primarily for hospitality and health care facilities. MindClick connects the impact of interior design specifications and purchasing to the wellness of people and the planet. Through the MSAP (MindClick Sustainability Assessment Program), this tool delivers comprehensive lifecycle ratings of the environmental and social impacts of products.

Powered by MindClick's ratings, Design for Health is a cloud-based digital studio for Climate, Health & Equity, and provides product ratings, interior design project performance analytics, and decision tools to support ESG goals - from net zero carbon emissions and healthy interiors to waste reduction, circularity, and DEI (diversity, equity, and inclusion).

Contributor: JoAnna Abrams, Founder and CEO, MindClick



Verdical Group

Boutique sustainability consulting for ESG, net-zero and sustainability certifications.

How it Comes Alive in Green Building

This is just one example of the integration of all areas of sustainability under one (virtual) roof. As a full-service "one-stop shop" consulting firm, Verdical Group is comprised of industry experts who work with building projects and organizations and consult on events. Among their services are ESG consulting, sustainability reporting, certification management, net-zero, decarbonization and zero-waste consulting and engineering services. Additionally, they are a net-positive company that divests from fossil fuels and does not take on clients who profit from fossil fuels.

Contributor: Chloe Woodruff, Senior Marketing Manager, Verdical Group

Funding

Building and remodeling with an eye toward sustainability is imperative for owners and developers of all sizes.

SMBs (small and mid-sized businesses) and franchisees may not have the capital on hand to invest in sustainability upgrades or construction. From multi-family housing to hotels to senior facilities, green improvements are no longer options. They are imperatives.

C-PACE (or Commercial PACE) funding is an easy and affordable source of funding for these businesses. Many major banks and independent lenders have incorporated C-PACE lending as a borrowing option. Rates tend to be lower than standard commercial loans.

Trends & Innovations

• As consumers become more conscious of sustainable options for housing, retailers, vacations, and active adult communities, the companies that own/manage them look to make upgrades.

• Many financial institutions are creating divisions specifically for "green lending."



Dividend

Offering financial solutions for business owners and developers, making sustainable buildings and finance green retrofits more achievable.

How it Comes Alive in Green Building

C-PACE loans are designed specifically for commercial sustainability projects. Dividend loans are backed by Fifth Third Bank and have been writing these types of loans for more than a decade.

The loans are available in 29 states plus Washington, DC. Unlike many other types of funding sources, they don't involve long-term personal guarantees, are billed as a line item on a tax bill, and can be prepaid at any time.

Contributor: Peter Grabell, Senior Vice President, DIVIDEND

Sustainable Building Materials

The best way to experience a wide range of new products in the buildings space is to attend our <u>annual conference</u> and its dynamic tradeshow floor.

These are just a few of the many innovations contributed by an expert panel. From floor to ceiling (literally), many manufacturers are introducing climate-friendly options that minimize waste.

Trends & Innovations

- The number of options for materials will grow exponentially.
- Manufacturers will need to track and report the specific impact of their products on the environment.

• Buyers will ask more detailed questions about options and will invest time and resources in researching before buying.

• Although price and availability will remain important factors, environmental impact will play a bigger role in decision-making.



Mighty Buildings

Rapidly-building manufactured homes that use 3D printing and other technologies to minimize waste.

How it Comes Alive in Green Building

Mighty Buildings creates prefab home kits that take a structure from the factory floor right to the foundation.

Mighty Buildings makes high-quality, sustainable homes a reality for all, reducing project timelines by 50 to 75 percent. They create 3D printed exterior wall panels combined with high-efficiency traditional steel prefab construction.

The homes are cost-effective zero-net energy swellings, that are concrete-free and have efficient gray water systems. The construction process is close to zero waste.

Contributor: <u>Sam Ruben</u>, Co-Founder/Senior Sustainability Advisor, <u>Mighty</u> <u>Buildings</u>



QuadCore® Technology by <u>Kingspan</u>

Providing insulation that can have a dramatic impact on heating and cooling costs.

How it Comes Alive in Green Building

QuadCore[®] Technology by Kingspan is a thermally-efficient closed cell insulation. These insulated metal panels are used in industrial and commercial buildings.

Panels using QuadCore have upcycled and recycled content that provides points toward LEED certification. Because they are made from upcycled PET plastic water bottles, they involve less waste to landfill and a more circular raw material loop.

Panels with QuadCore are GREENGUARD Gold and Red List-Free, meaning that harmful chemicals are designed out.

Kingspan's Modesto, California manufacturing site uses renewable energy from a PV solar panel roof.

Contributor: Brent Trenga, Director of Sustainability, North America for Kingspan



Interface Inc.

Specializing in carbon-neutral carpet tile and resilient flooring, Interface delivers more sustainable solutions for commercial building interiors.

How it Comes Alive in Green Building

Carbon-negative carpet tile and carbon-neutral flooring portfolio are products focused on the decarbonization of the built environment.

As the only flooring manufacturer to achieve a cradle-to-gate carbon negative carpet tile, the innovation is among only a handful of commercialized carbon tech products that use carbon as a resource by incorporating bio-based raw materials.

Today's commercial carpet tile emissions can exceed 20.5 kg CO2e/m2. In comparison, the Interface carbon negative carpet tile has a carbon footprint of -0.3 kg CO2e/m2.

Contributor: Lisa Conway, VP of Sustainability, Americas, Interface, Inc.



DECRA Metal Roofing

Offering a product that can deflect heat from commercial structures and reduce landfill waste.

How it Comes Alive in Green Building

Metal roofs are known as one of the most energy-efficient roofing options on the market because they reflect heat up away from buildings. Traditional asphalt roofs absorb heat and radiate it down into the home long after the sun goes down. Metal roofs are a sustainable product and are 100% recyclable at the <u>end of their lifespan</u>. Because they are so lightweight, metal roofs often eliminate the need for a tear-off of the existing roof, which diverts waste from landfills.

DECRA metal roofing is unique as the infrared-blocking color pigments in their stone-coated granules effectively block radiation from the sun (the source of accumulating heat). DECRA metal roofs last two to three times longer than traditional roofing materials (with a lifespan of 40-70 years) and don't rely on petroleum-based raw materials like asphalt shingles do.

Contributor: Trevor Underwood, Vice President of Marketing, DECRA Metal Roofing



Green Dot Sign

Using 3D-printing technology, Green Dot Sign focuses on creating eco-friendly ADA and wayfinding signs for LEED and Living Building Challenge projects and commercial buildings.

How it Comes Alive in Green Building

Direct bond to wood fibers is more durable, cost-effective, and flexible than wooden ADA signs using traditional, adhesive-based technologies. Green Dot Sign is developed in-house using 3D printing technology bonds using responsibly-sourced wood and other natural materials.

These signs replace machined or chemically formed custom ADA signs, allowing designers to create with natural materials while reducing plastic demand by 99 percent.

From being transparent about its ingredients and offering end-of-life recycling programs, this is an alternative, more eco-friendly option to the traditional plastic signage used in commercial buildings.

Contributor: Simon Nussbaum, Co-Founder, Green Dot Sign



Sol Vista Roofing

Extending the lifetime of existing roofing by manufacturing an eco-friendly formula as an alternative to replacing old roofing.

How it Comes Alive in Green Building

Roof coatings are unique and an environmentally friendly alternative as they allow property owners to extend their existing roof's life by decades (with warranties) without having to tear off the old roof and dump the debris in landfills. It costs a fraction in comparison to a full roof replacement and is less disruptive to the day-today building users.

Sol Vista's Castagra Ecodur product (an eco-plastic coating) is distinct due to it being VOC-free and non-toxic. Made from abundant natural resources, it is also rated safe for drinking water holding/drainage.

Contributor: Kyle Shirley, Business Owner, Sol Vista Roofing



<u>Nexii</u>

Creating both sustainable building materials and panels which require fewer resources, produce far less waste, and use non-toxic materials.

How it Comes Alive in Green Building

By reducing building time and the number of construction variables and streamlining the process for developers, Nexii allows buildings to be completed quickly and efficiently.

Nexiite [by Nexii], is a sustainable concrete alternative that's used to create nontoxic, disaster-resilient buildings with reduced emissions and near-zero construction waste. The panels are precision-manufactured in green manufacturing plants using 3D software. Nexiite panels are bolted together on-site, accelerating build times by up to 75 percent.

Nexii buildings are more cost-efficient to run than standard builds as they are extremely energy efficient. Their insulating properties and superior air flow, potentially reduces heating and cooling costs.

Contributor: Gregor Robertson, Executive Vice President, Nexii



CarbonBuild

Meeting all concrete standards and regulations without the typical "green premium" with a low carbon concrete product.

How it Comes Alive in Green Building

CarbonBuilt enables the production of very-low carbon concrete without compromising product price, performance, or plant operations. Their process dramatically reduces the embodied carbon of concrete – more than most other low-carbon concrete solutions.

CarbonBuilt's process enables existing precast concrete producers to reduce the carbon footprint of their products by 70-100+ percent. By using locally-optimized concrete formulations with widely available low-cost, low-carbon materials, Carbonbuilt's concrete replaces traditional carbon-intensive Portland cement.

They cure their products with CO2 directly from industrial, biomass, or direct air capture sources, permanently mineralizing it into the products. Each 30-pound concrete block made with CarbonBuilt technology stores more than 1/2 pounds (.27 kg) of CO2, while avoiding another 2.5 to 3 pounds (1.1 - 1.3 kg) of emissions from cement reduction.

Contributor: <u>Rahul Shendure</u>, CEO, <u>CarbonBuilt</u>



NRMCA

The National Ready Mixed Concrete Association (NRMCA) is the leading industry advocate for readymixed concrete.

How it Comes Alive in Green Building

Concrete is one of the most innovative building materials on the planet and is completely recyclable. Concrete increases the resiliency of a building and will play a role in building sustainable cities. As an advocacy and learning center, NRMCA provides builders and project managers with the resources and tools to use concrete on a building project. By leading the way in the concrete industry, NRMCA leads the innovation of finding processes that reduce the carbon emission of making concrete for roads and buildings.

Waste Management and Emissions

Construction waste is responsible for about a <u>quarter of our</u> <u>nation's waste stream.</u>

A whopping <u>2.2 billion tons of waste</u> is expected to be created globally by 2025.

From farming to complex construction sites to commercial packaging, every aspect of the building process involves waste. The companies below have developed simple solutions to what has long been a daunting problem.

Trends & Innovations

• Awareness of how waste disposal has an impact on our environment is increasing dramatically.

- New tools to track and report on the impact of waste management systems are being developed.
- Focus is increasing on all aspects of the design and building process to find opportunities for waste management.



RealPage

Helping with waste management in multifamily housing using AI and camera technology.

How it Comes Alive in Green Building

RealPage created the first cloud-based system capable of tracking each dumpster's location, capacity, and fullness. It can accurately assess when each dumpster should be picked up.

The RealPage Smart Waste Management Solution cuts the cost of waste management by an average of 40%. The AI technology and in-dumpster cameras, in partnership with <u>Compology®</u>, allows clients to track each container's activities, measure KPIs, prevent fines for contaminated recycling, and offer recommendations and practices to improve sustainability in real-time. This technology significantly reduces carbon emissions.

Contributor: Mary Nitschke, VP of Sustainability, RealPage



Locoal

Converting wood waste into clean energy using mobile gasification technology.

How it Comes Alive in Green Building

Locoal created the Rainmaker for commercial wood waste producers who want to minimize leaking toxins and greenhouse gasses.

Locoal uses a containerized and a partially autonomous system to capture gasses emitted when heat and pressure are applied to wood. Eventually, the gasses captured are cleaned and transferred to a natural gas generator where the clean energy is produced. The circular waste streams created have a positive impact on carbon footprint. Locoal provides instantly verified carbon credits and energy offset to those with clean energy produced by the machine.

Due to the near-autonomous technology and wifi and data connectivity, only a single user is required with a handheld device to run this zero-waste system.

Contributor: Ren Lascelles, Marketing Director, Locoal



Freight Farms

Giving farmers the opportunity to have a strong crop yield year-round while minimizing waste using container farming technology.

How it Comes Alive in Green Building

These fully insulated, $40' \times 8' \times 9.5'$ hydroponic containers maximize space and have complete climate control, high-efficiency lighting, and precise hydroponics. These features enable people from any community to grow food 365 days a year.

Farmhand[®] software uses cameras and sensors to read and manage farm conditions like pH, ambient temperatures, humidity, and water nutrient levels anywhere at any time. The system provides environmental recipes and crop scheduling to ensure product and waste management consistency. The conditions and controls are accessible through a smartphone.

Contributor: Rick Vanzura, CEO, Freight Farms





Iconex

Allowing food service companies to increase order speed and accuracy while reducing material waste using the Iconex Sticky Media G2 label design.

How it Comes Alive in Green Building

The Sticky Media G2 label has patented sense marks and adhesive patch technology that can withstand the test of harsh weather conditions. The lightweight material offers POS printers a smooth and easy cut, reducing the number of reprints and the overall wear and tear printers face during long-term use. The unique design reduces waste by eliminating a liner.

Contributor: Christa Houts, Product Manager, Iconex



Gore[®] Remedia[®] Filter Bags by <u>W. L. Gore & Associates</u>

Minimizing the cost of hazardous and medical waste incinerator disposal using filtered bags.

How it Comes Alive in Green Building

The Gore® Remedia® Filter Bags feature state-of-the-art catalytic filter technology, consisting of a Gore Membrane made of expanded polytetrafluoroethylene (ePTFE), laminated to the catalytic filter material.

Contributor: <u>John Knotts</u>, Global Business Development Leader – Particulate and Gas Phase Control Technology Platform, <u>W. L. Gore & Associates</u>





RUBICONConnect[™]

This portal is a one-stop-shop for measuring waste collection across multiple locations. Users can view payment and diversion data across all locations, regardless of their waste provider.

How it Comes Alive in Green Building

Facilities and sustainability managers who are responsible for multiple locations now have an integrated and enhanced way to view and make improvements to how waste streams are managed. The RUBICONConnectTM portal can save time and minimize waste and improve process efficiency throughout a business.

Contributor: <u>Chris Batterson</u>, Key Account Manager Construction & Demolition Projects, <u>Rubicon</u>

Energy Efficiency

Making the right decisions at all stages of the construction and building management process can result in energy savings of 40 to 50 percent.

Therefore, the fact that this section is filled with new innovations is no surprise.

Although energy efficiency begins at the planning phase of building projects, how energy usage is tracked and measured is an ongoing process.

Trends & Innovations

• Technologies (especially Internet of Things or IoT) enable owners, managers, and residents to measure location-specific energy usage.

• New materials used in building and construction will dramatically reduce energy consumption.

• As builders reap the benefits of energy-efficient changes, they will see cost savings and will be willing to invest in new solutions.



Embue

Meeting the increased demand for green multi-family residential properties.

How it Comes Alive in Green Building

As noted in the Planning & Design section, homebuyers and renters are more aware than ever of the impact of efficient energy on their expenses and on how their home's use of energy affects the planet.

Developers and building managers are meeting this need by constructing and remodeling multi-unit properties that operate with less energy.

Embue developed a cloud-based technology that enables those who own and manage multi-family homes to track and manage expenses and review energy usage over time.

Think of it as an automated "air traffic control" system for properties with multiple zones.

Having this data at one's fingertips enables owners and managers to make critical changes and set standards for going-forward projects.

Contributor: Maryellen Edwards, VP, Marketing, Embue



MRI eSight Energy

Helping business owners manage their energy outputs with insight and energy assessment technology.

How it Comes Alive in Green Building

MRI eSight Energy created a multifaceted energy management software that pulls valuable analytics to help business owners better understand their energy outputs. The system has over 200 data access tools and advanced energy data management tools. They centralize the data to create an easily understandable platform.

Through carbon and energy cost reports, building owners can find where improvements need to be made concerning carbon emissions and higher-thanaverage energy consumption.

Contributor: Richard Smith, Snr Director, MRI eSight Energy



Sunflare Solar

Reducing buildings' consumption and implementing more efficient installation of solar panels using these designs.

How it Comes Alive in Green Building

Sunflare Solar produces its CIGS solar panels using low-energy creation and consumption processes.

Their product does not use glass, purified silicon, or metal mounts. In turn, the production of their solar panels doesn't emit toxic chemicals or CO2.

The design is light and thin featuring an adhesive on the back, allowing for a quick and easy installation process. The panels are resistant to micro-cracking and run well in partial shading.

Contributor: Sunflare Solar





<u>Climeon</u>

Meeting the demand for sustainable energy in high emission industries by converting waste heat into clean electricity.

How it Comes Alive in Green Building

Climeon created the HeatPower 300 to convert waste heat into clean and carbonfree electricity. The product uses Organic Rankine Cycle technology to produce waste heat recovery at low temperatures.

The HeatPower 300 increases energy efficiency and reduces fuel consumption while decreasing greenhouse gas emissions. The HeatPower 300 significantly enhances environmental performance in high-pollution industries like factories and power plants.

Contributor: Climeon

Semtech

Measuring and reporting based on environmental indicators of a building using this waste and energy tracking system.

How it Comes Alive in Green Building

Semtech developed LoRa®, an IoT wireless chipset that connects building sensors to a cloud-based system, to measure and report on environmental indicators. This allows building owners to analyze and measure their buildings' environment and detect any toxins.

LoRa is capable of penetrating through dense building materials and can easily detect danger and hazardous materials within the building. It helps protect people from environmental dangers like poor air quality and radiation leaks. The system's communication capabilities enable other smart IoT applications to solve major environmental issues, from energy management to pollution control.

Contributor: Marc Pégulu, Vice President IoT Strategy and Products, Semtech



<u>UrsaLeo</u>

Providing visual reports on energy consumption and carbon emissions.

How it Comes Alive in Green Building

UrsaLeo developed a 3D digital twin IoT platform that allows people to see the exact location where energy consumption is higher than usual. Their application uses a virtual building model, offering facility managers, building administrators, and developers a visual representation of issues and inefficiencies in energy usage and carbon emissions.

The Gemini platform can operate in the cloud with any hardware and be integrated with existing Building Information Modeling (BIM) systems. The software provides energy consumption reports within weeks of installation and has a user-friendly interface.

Contributor: <u>Angie Sticher</u>, Co-Founder + COO/CPO, <u>UrsaLeo</u>



iDig

Improving the efficiency and management of digging jobs with the Automated Excavator guiding system powered by solar energy.

How it Comes Alive in Green Building

IDig created the Automated Excavator Guidance System which offers excavator drivers a platform to easily manage the desired distances, depth, and slopes during their digs.

The technology includes radio technology, simplified installation, and solar charging while excluding cables. The system uses an LED screen placed in the excavator to guide and help users visualize the dig underneath them. Drivers no longer have to perform manual grade checks. One IDig guidance system is enough for multiple excavators, as it is easily transferable and remembers each machine's calibration data.

The IDig system helps simplify digging jobs and offers a more efficient way to work and manage projects. The system is cost-effective as it significantly reduces fuel consumption.

Contributor: Albert Gamal, CEO, iDig (Parent Company: Bridgin)



Signify

Helping building managers manage operational expenses and energy consumption with an energyefficient connected lighting control system.

How it Comes Alive in Green Building

The Interact Pro scalable system connects LED lighting throughout a building using sensors integrated into luminaries.

The system features adaptive dimming and dwells time that automatically adjusts the light levels to match occupancy patterns. Interact Pro provides insights on environmental parameters and space usage. This sensor-driven behavior can reduce energy costs throughout a building by up to 75 percent.

The luminaries and sensors are connected through a gateway for cloud connectivity, offering energy reports and remote management. The intuitive configuration app allows for a quick set-up process with opportunities to expand the network of connected lighting without reconfiguring luminaries or electrical wiring schemes.

Contributor: Rahul Shira, Senior Product Marketing Manager, Signify



McKinstry

Offering a wide variety of sustainable building solutions, McKinstry is an engineering service that can design, build, optimize and maintain high performing facilities and energy assets of buildings.

How it Comes Alive in Green Building

McKinstry's designs and builds products with a focus on sustainability first. With inhouse engineering and implementation teams, they work to develop solutions that focus on reducing consumptions and determine financing structure that maximizes value of their products over the entire lifecycle of the project.

McKinstry is an engineering-first company that takes a holistic approach and seamlessly integrates efficiency, building optimization and controls, technical services, occupant engagement programs, and on-site renewables into a single solution that maximizes the impact and value for building owners.

They start by looking at how to reduce consumption, then layer in solar PV and Battery Energy Storage systems that lower cost than larger stand-alone renewable energy projects. When complete, they then put their performance guarantee on their work so clients know they are getting maximum value for their investments.

Contributor: Heath Mackay, Director of Project Development, McKinstry



Glass Dyenamics

Creating more energy-efficient windows, with adjustable controls.

How it Comes Alive in Green Building

Glass Dyenamics is a form of glass technology that offers the residential market adjustable interior lighting, heat control, and privacy control.

The glass provides control through tints and untints upon the application of an electric signal. The product saves customers up to 20 percent in energy costs, which is similar to rooftop solar, but it is typically less costly.

The glass can be changed from clear to semi-dark to dark, simply by applying an electric charge, which is controlled via a phone app.

Contributor: Christopher Angelo, CEO, Glass Dyenamics



MAGNA3 by Grundfos

Designing energy-efficient canned rotor pumps for large commercial buildings.

How it Comes Alive in Green Building

The MAGNA3 is an energy-efficient pump that is used for commercial air conditioning and heating.

Designed by the largest pump manufacturer in the world, it is a good example of how even small changes in building and upgrades can make a big difference in energy usage.

Contributor: Bent Jensen, Divisional CEO of CBS, Grundfos



OpenBlue by Johnson Controls

Using AI integrated services, OpenBlue is a net-zero advisor that helps building owners monitor and control their building systems.

How it Comes Alive in Green Building

OpenBlue Enterprise Manager (OBEM) is designed to meet sustainability and ESG goals by integrating data from one building or across multiple sites, unifying aging and outdated systems. This repeatable, scalable solution supports smart building capabilities for office, healthcare, transportation, retail and education properties.

OBEM delivers data-driven and measurable results by monitoring energy and carbon footprint against baseline years and goals, providing energy prediction models that estimate consumption and demand, and supports predictive maintenance with fault detection and diagnostics. Through a variety of metrics, OBEM transforms buildings to reduce energy costs, improve the occupant experience, and advance net zero goals.

Contributor: <u>Vineet Sinha</u>, Executive Director Connected Solutions <u>Johnson</u> <u>Controls</u>



Gore Fuel Cell Components by <u>W. L. Gore & Associates</u>

Converting hydrogen fuel and oxygen into electricity.

How it Comes Alive in Green Building

Fuel Cells are electrochemical devices that convert hydrogen fuel and oxygen from the air into electricity with the only byproduct being water. Hydrogen is seen as an attractive energy carrier to decarbonize many industries in the transportation and building sectors.

Fuel cells will play a critical role in our energy future, supporting zero-emission powertrains for cars and buses, backup power for critical systems and remote locations, portable generators and compact charging devices, combined heat and power systems for homes and commercial buildings, and motive power systems for material handling equipment such as forklifts.

At the core of all products manufactured by Gore is polytetrafluoroethylene (PTFE), a polymer with exceptional properties like high tensile strength, low dielectric constant, UV resistance, and more.

Contributor: Simon Cleghorn, Associate, W. L. Gore & Associates

Water Management

Water is the planet's most critical resource. How it's used and cleaned throughout the building process is more important than ever.

Managing water use throughout the construction process is vital, as is installing systems that ensure water is <u>used</u> <u>most efficiently</u> by the people who occupy residential and commercial buildings.

Trends & Innovations

• Systems for cleaning and recycling wastewater are readily available.

• Measurement tools for identifying leaks and over-use of water are essential.



Epic Cleantec

Reusing greywater, blackwater, rainwater, and stormwater with this onsite water recycling system.

How it Comes Alive in Green Building

Epic creates an onsite compact water reuse system that recycles wastewater for reuse while capturing heat energy and organic solids.

Epic's solution helps large buildings reduce their water usage by 95%. The system uses the wastewater for toilets, HVAC systems, and irrigation systems. It uses the captured heat energy to preheat domestic hot water. The recycled organic solids are used in the local landscape as nutrient-rich soil amendments. Building owners can monitor the system remotely through the "EpicWise" monitoring system.

The water reuse system uses 40 percent less energy and 25 percent fewer chemicals than other systems.

Contributor: Eric Hough, Chief Commercial Officer, Epic Cleantec



<u>WINT</u>

Helping facilities and construction sites manage water usage with artificial intelligence and IoT devices.

How it Comes Alive in Green Building

WINT creates IoT devices that utilize AI so commercial facilities and construction sites can detect anomalies in water consumption, waste production, and carbon emissions. The device sends real-time alerts preventing any potential damage caused by leaks in the water supplies.

WINT uses its advanced algorithms to provide accurate leak detections while shutting down water supplies to prevent further damage. It also uses those algorithms to analyze every water system from the first day of construction through the building's operational days to better understand where there is excessive water usage. Analytics run by the system help facility managers reduce water waste and carbon emissions by 20-25 percent.

Contributor: <u>Yaron Dycian</u>, chief strategy officer, <u>WINT</u> (Water Intelligence)

Electric Vehicles & Infrastructure

Sales of electric vehicles (EVs) have doubled in recent years.

Community planners and commercial developers are now invested in ensuring that charging stations are available to the people who need them.

But EVs are not limited to highways and public parking garages. Builders are incorporating electric-powered construction vehicles into their fleets as well.

Trends & Innovations

• A steady increase of EVs by both consumers and commercial drivers is inevitable.

• Charging stations will be ubiquitous and will be incorporated into new design and retrofits.

• Drivers will no longer need to choose between utility and sustainability, as new vehicles will become as good as (if not better than) their gas-powered equivalents.



Volvo Construction Equipment

Saving energy during the building process using electric-powered construction vehicles.

How it Comes Alive in Green Building

Just as electric vehicles are now being used by consumers to run errands, take vacations, and commute, the professionals in the sustainable building industry are investing in electric-powered commercial vehicles.

The ECR25 Electric compact excavator and the L25 Electric compact wheel loader are among Volvo's newest construction vehicles and contribute to greener construction sites and lower costs for builders.

Contributor: <u>Dr. Ray Gallant</u>, Vice President, Product Management & Productivity, Region Americas, <u>Volvo Construction Equipment</u>



Integrated Roadways

Charging electric and autonomous vehicles while on the road using this patented Smart Pavement.

How it Comes Alive in Green Building

Integrated Roadways creates precast concrete sections with digital tech and fiber optic connectivity. This technology offers electric and autonomous vehicles the ability to charge during a drive, extending the range of the car. Other features include 5G wireless access and real-time GPS supporting autonomous vehicles specifically.

Smart Pavement lasts four times longer than traditional asphalt. Due to precast sections, installation and replacement processes, including potholes and road repair, become much quicker. This technology is 95 percent less costly than conventional roadways to install.

Contributor: <u>*Tim Sylvester, Founder and CEO, Integrated Roadways*</u>



Cyber Switching

Leading the charge in electric vehicle charging and continually enhancing its offerings.

How it Comes Alive in Green Building

Cyber Switching is one of the early developers of EV charging systems and has been in the industry for 25+ years. They report a very high uptime rate of 99.98% with a quick installation time.

The AmpUp mobile app allows providers to collect payments and monitor and control their chargers remotely.

Contributor: Cyber Switching



<u>AfterShip</u>

CryomatiKs Inc.

Offering businesses carbon emission reports with this post-purchase e-commerce platform.

How it Comes Alive in Green Building

AfterShip created this Software-as-a-service post-purchase platform to provide reliable data supporting e-commerce merchants' sustainability initiatives. The company uses its expertise in the shipping and tracking space to provide precise and custom reports measuring shipping-related carbon emissions.

The technology is offered to e-commerce merchants running on Shopify, BigCommerce, Magento, or Salesforce Commerce Cloud. The reports measuring CO2 emissions are broken down by distance traveled, parcel weight, and shipment method. These reports show merchants which part of the operation has the most significant impact on the company's carbon footprint.

Contributor: Andrew Chan, Co-Founder at AfterShip

Providing recurring revenue to property owners in high traffic areas with portable Electronic Vehicle charging stations.

How it Comes Alive in Green Building

CryomatiKs Inc creates portable EV "Pop-Up" quick charging stations that do not rely on local electrical grid connections, avoiding peak electricity rates. Each station is capable of running in almost any location and performs with 100 percent zero emissions end-to-end. No rare earth metals are required to manufacture these stations, which can eliminate scarcity concerns.

Contributor: Mark Cann, founder / CEO / co-CTO, CryomatiKs Inc.



Artificial Brain

Meeting the demand for increased EV charging stations as electric cars become more prominent.

How it Comes Alive in Green Building

Artificial Brain creates quantum software capable of finding the results for the best EV charging locations in fewer than 3 seconds.

The quantum computer technology processes large amounts of data in real-time, offering US and European Energy and Utility companies immediate results.

Contributor: Jitesh Lalwani, Founder and Chief Storytelling Officer, Artificial Brain



Smartcar

Allowing companies to track their transport emissions by tracking and assessing company car usage.

How it Comes Alive in Green Building

This application allows for mobility apps and services to have direct access to car details such as mileage, car battery level, tire pressure, etc. With this information, companies can eliminate extra processes from their services. This B2C connection allows for more efficient, streamlined operation systems.

For example, energy and utility companies allow electric car drivers to manage and charge their vehicles right from their phones, or auto insurance companies can instantly verify their customers' mileage.

Contributor: Sahas Katta, CEO, Smartcar



ClearFlame Engine Technologies

Developing proprietary clean engine technologies for the heavy-duty truck, off-highway, and industrial markets.

How it Comes Alive in Green Building

ClearFlame has developed a proprietary engine technology that enables decarbonized fuels to be easily integrated into existing diesel engine platforms, offering a more sustainable and cost-effective solution than diesel fuel. It provides the same performance, fuel efficiency and rugged practicality associated with diesel engines, while eliminating the need for complex after-treatment solutions.

ClearFlame's solutions can also be affordably and widely implemented during this decade with existing infrastructure — achieving a lower-cost, lower-emission, quickly-scalable solution.

Transportation is currently the largest contributor of greenhouse gas emissions, and electrification infrastructure is has a long way to go before replacing the \$360 billion heavy-duty diesel industry, such as long-haul trucks with heavy loads. ClearFlame's technology for long-haul trucks can provide a 42 percent greenhouse gas reduction and are less carbon intensive than even battery electric equivalents based on the national grid average.

Contributor: <u>ClearFlame Engine Technologies</u>

Technologies & Tracking

Automation is playing a significant role in the evolution of green building. From planning and visualizing new structures and remodels, to pinpointing sources of waste, to managing energy usage at individual locations, technology will make identifying opportunities and solutions easier and faster.

Plus, reporting requirements by companies and government agencies give rise to new systems to streamline data analysis and problem-solving.

Trends & Innovations

• Cloud-based systems will enable people to see, measure, and act on a wide range of data 24/7/365 from any device.

• Greenwashing will become more difficult, if not impossible, as real-time tracking and measurement is automatically-generated, without human intervention.

• The immediacy of data will enable decision-makers (including property owners and residents) to make instant changes to behaviors and systems, saving energy and money.



PANGEA Global Technologies

Offering an SaaS platform that automates and advances lighting.

How it Comes Alive in Green Building

This technology controls and monitors LED lighting through automation.

The primary application is horticulture and smart city projects, but the company has also applied its technologies to university parking lots, office complexes, shopping centers, auto dealerships, sporting complexes, and street lighting.

Contributor: Bryan Fried, President & CEO, PANGEA Global Technologies



Agremo

Providing a steady stream of data and decisionmaking processes to better optimize farming practices with this agricultural data software that works in tandem with robotics.

How it Comes Alive in Green Buiding

Agremo can provide tools to observe pollution and identify its sources quickly and more efficiently – especially in issues of air quality. This can help increase yields in certain crops such as wheat and soybeans. It can also help in reducing harmful emissions into the air by helping engender improvements in farm transport, machinery, and logistics.

Contributor: Charlotte L. Robinson, Al Engineer, Agremo



Clean Air Group Inc.

Monitoring air quality can contribute to employee health and energy usage for a wide range of building types.

How it Comes Alive in Green Building

CAG AtmosAir uses bi-polar ionization to clean the air, without using excessive energy.

Contributor: Anthony Abate, CTO, Clean Air Group Inc



Everactive

Transmitting large amounts of data with minimal energy usage with this sensing hardware that operates without batteries.

How it Comes Alive in Green Building

Leveraging more than a decade of circuit technology R&D, batteryless Eversensors require such minuscule amounts of power that they can sense, process, and wirelessly transmit data continuously.

Everactive has used this technology to monitor machine performance, plumbing, and other commercial applications.

Contributor: Rafael Reyes, Director of Product Marketing, *Everactive*



Rheaply

Helping companies recycle and upcycle commercial goods.

How it Comes Alive in Green Building

Companies can minimize supply chain reliance by making companies aware of where they can find the goods and services they need. The applications have included demolition projects, enabling companies to find what they need without investing in new materials.

Contributor: Garry Cooper, CEO, Rheaply



Ecorate

Offering objective and sustainability-based ratings on the sustainability of cafes with an environmental advocacy app that is also an interactive map.

How it Comes Alive in Green Building

Consumers and businesses alike are looking for ways to support those companies that are committed to the environment.

The environmental impact of a business can be the deciding factor for whether or not a person chooses to support a business. In fact, an <u>IBM survey</u> found that 6 in 10 customers are willing to change their shopping habits to improve their environmental footprint and nearly 8 in 10 people surveyed said sustainability is important to them.

EcoRate is a ratings platform that focuses on the sustainability of cafes and gives credit to the cafes that are already doing great work to reduce their waste footprint.

Contributor: Alex Morgan, Founder, EcoRate

Border Security Smart Wall



DarkPulse Inc.

Protecting people and the environment with fiber optic sensors capable of detecting issues and other dangerous hazards to infrastructure with precision accuracy.

How it Comes Alive in Green Building

DarkPulse Inc. creates fiber optic sensors turning any infrastructure, from buildings to roads, into an "intelligent" structure. Unlike most point sensors, this technology has an extended range, enabling the detection of any issue or damage across the entire structure in real-time.

It can pair with Occulus goggles, allowing operators to see the entire gas or oil pipeline with x-ray-like vision. The technology's warning system pinpoints the damage location to within 10 millimeters. Often the operators will be alerted before significant damage occurs, saving money, lives, and the environment.

Contributor: DarkPulse Inc.

In Closing...

Although this is the conclusion of the report, it's hardly the end of innovation and new product development in the green building space.

Decision-makers need to stay on top of new solutions to old problems, looking at all phases of the planning, building, and measurement process to ensure that they are incorporating ideas that will save them time and money and allow for more accurate measurement of their progress to a net-zero environment.

Learn from the manufacturers that are introducing new building materials, the technology companies that are monitoring and reporting on energy usage, and the thought-leaders who are creating new companies, systems, and solutions.

We at Greenbuild bring all of those people together year-round through our educational/inspirational webinars, our cutting-edge white papers, infographics, and reports, and our live sessions at our annual conference.

Let us extend a warm thank you to the companies and professionals who contributed to the compilation of this important new guide!

Have a product or service you'd like to showcase at one of our virtual events, reports, or at the annual Greenbuild International Conference and Expo? Please visit greenbuildexpo.com for more information.



