

ARCHITECTURAL PRODUCTS

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Ace the Living Building Challenge

Architects from The Miller Hull Partnership share lessons learned during the design and development of several Living Buildings.



Whimsy + Sense of Place

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Function

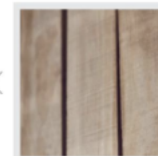


SOLAR AND SHADING

A total of 917 solar panels (330kW) mounted to the canopy generate 440,000 kWh annually.

PROJECT SPECS

Project: The Kendeda Building for Innovative Sustainable Design
Design Architect: The Miller Hull Partnership, LLP
Collaborating Architect & Prime Architect: Lord Aeck Sargent
Builder: Skanska USA
Landscape: Andropogon
Mechanical, Electrical, and Plumbing Engineering: PAE
Mechanical, Electrical, and Plumbing: Newcomb & Boyd
Greywater Systems: Biohabitats
Civil Engineering: Long Engineering
Structural Engineering: Uzun & Case
Commissioning: Epsten Group
Photography: © Gregg Willett Photo



Wood Façade

Accoya is a high-performance, modified wood with a low-carbon footprint. A dimensionally stable and highly durable natural wood product, Accoya siding or façade options come in a range of board widths and finishes. It can be installed vertically, horizontally, or in patterns. Joints stay smooth for a tailored appearance. It is resistant to rot, decay, and insect damage (including termites) and has a 50-year warranty.

Accoya USA
accoya.com



Sustainable Brick

Green Leaf Brick are fired masonry brick, composed of 100% recycled content, including up to 31% post-consumer inputs. They meet all ASTM-C-216 SW specifications and are available in most contemporary brick sizes. Waste stream input materials include overburden clays, mining & manufacturing refuse, incinerated wastewater solids, and recycled glass.

Green Leaf Brick
greenleafbrick.com

The Kendeda Building's canopy shades the building to reduce cooling demand, generates electricity via solar panels, collects rainwater, and is also a defining architectural feature.

Miller Hull Partnership Talks Living Building Challenge

The Miller Hull Partnership has completed a total of six (including its two offices) Living Building Challenge-certified projects. The firm's Living Building design portfolio is documented in the 2023 book *Challenge & Change: Miller Hull's Living Building Practice* by Mary Adam Thomas. Chris Hellstern and Margaret Sprug shared some of the challenges and lessons learned from their regenerative building projects.

The Living Building Challenge—a philosophy and certification program from the International Living Future Institute—is gaining in popularity. The program focuses on designing, building, and operating regenerative buildings that give back more than they take from the environment. "Think about buildings that act like more of a living system, that can collect all of the energy that they need from the sun, all of the water that they need from rain, just like a flower," explains Chris Hellstern, Associate, Living Building Challenge Services Director, The Miller Hull Partnership, Seattle.

ARCHITECTS



Chris Hellstern, AIA, LFA, Associate, LBC Services Director. The Miller Hull Partnership, has completed five certified Living Buildings in his career, with several more currently in design and construction.



Margaret Sprug, AIA, Principal. The Miller Hull Partnership, over her 20+ year career, she has come to believe that regenerative design is synonymous with good and simple design.

Lessons for Acing the Living Building Challenge

Class is in session. The Miller Hull Partnership talks challenges, lessons learned, and offers a little LBC-certified inspiration with the Kendeda Building for Innovative Sustainable Design, Atlanta.

by **Jana Madsen**, contributing writer

With a \$30 million commitment from The Kendeda Fund, the Georgia Institute of Technology, already known for its long history of environmental stewardship, wanted a model for sustainable design on its Atlanta campus and to prove regenerative buildings are possible even in the hot, humid climate of the Southeast. The Miller Hull Partnership and Lord Aeck Sargent Planning and Design, Inc. were selected as architects for the Kendeda Building for Innovative Sustainable Design, which opened its doors in 2020 and received Living Building Challenge certification in 2021.

The building has approximately 47,000 square feet of

programmable space in the form of classrooms, labs, a makerspace, offices, and auditorium. Its 4,300-sq.-ft. vegetated roof is home to a honeybee apiary, blueberry orchard, and pollinator garden.

According to Georgia Tech, the Kendeda Building is 80% more efficient than a comparable new, conventionally built higher education Atlanta building. One of the most notable building features, its 15,860-sq. ft. canopy, creates a two-story front porch that shades the west-facing building, reducing cooling demands significantly. A tight building envelope, with numerous operable windows facilitates both breezes and natural light. More

than 60 ceiling fans also circulate air, adding to the comfort of the building. Instead of a conventional HVAC system, the Kendeda Building uses a dedicated outdoor air system (DOAS). It preconditions and delivers clean outside air, dehumidifying it in the summer and heating it in the winter.

A total of 917 solar panels (330kW) mounted to the canopy generate 440,000 kWh annually. It's a two-part energy strategy. "First, we want to make the project as efficient as we can. Then the second step is to make that power out of something that's renewable; that's where the solar panels come in," notes Hellstern. The

Kendeda Building currently produces 200% more electricity per year than it consumes; the excess is fed back into the campus grid.

The Kendeda Building also limits demand for water with efficient fixtures, landscaping, and irrigation systems. Restroom plumbing is not even connected to the sewer system, but instead uses biodegradable foam flush toilets and waterless urinals. Bioliquids and biosolids are treated in the building's composting toilet system, the largest of its kind in the state of Georgia. Gutters affixed to the building's solar panels collect rainwater that is stored in a 50,000-gallon

basement cistern. This water is used on demand by potable fixtures. The project virtually eliminates stormwater runoff with bioswales, pervious pavers, and permeable concrete. Stormwater and greywater are both treated onsite. "We send that out into the garden to be naturally cleaned and filtered," says Hellstern. Georgia Tech reports that the water collected and infiltrated into the ground is roughly 15 times what the building needs to operate.

In addition to being net positive energy and water, the project boasts reduced embodied carbon construction. This was achieved by recycling 99% of

construction waste, purchasing a one-time carbon offset, utilizing lower carbon building materials including FSC-certified timber, and using salvaged building materials. An example of this is the ceiling, which is made from 25,000 linear feet of salvaged 2 x 4s from film industry sets. Scrap wood from this project was then used for the three-tiered seat stairs in the building's atrium. "Efforts were made to go with products and materials that have lower carbon content," adds Hellstern. The Kendeda Building was the first in the state of Georgia to use mass timber. It was also the first Living Building in the state and 28th in the world.



Miller Hull Partnership Insights Continued

Living Building Challenge certification doesn't simply measure what goes into a building, but how every system works interconnectedly to perform in harmony with the environment. These buildings are net positive energy and water, use materials primarily free from Red List chemicals, and are often constructed with recycled and salvaged materials, generating less waste during the build.

Living Building Challenge certification is organized into seven performance categories, also known as Petals: place, water, energy, health + happiness, materials, equity, and beauty. Each Petal is divided into Imperatives (20 total). Only after a building demonstrates compliance with the Imperatives through actual (not modeled or anticipated) performance is certification possible. "With many other rating systems, you can put forth some documentation and promise your building will be [sustainable]. But Living Building Challenge requires you go through a year-long period of performance of the building being occupied to really prove they work," he expands.

Seattle-based Miller Hull has built a practice on the principles of sustainability. Their design philosophy has grown from building within the local economy and passive solar design to LEED buildings, coinciding with a rising environmental design movement. "We were looking for what's next," says Margaret Sprug, Principal, The Miller Hull Partnership, Seattle. "Our evolution tied together with the Living Building Challenge, and we were totally ready to embrace it."

Performance Over Aesthetics

While it's not to say regenerative buildings aren't beautiful, the aesthetics are a result of following natural principles. "Like a flower, each component of a building has to serve a purpose that contributes to an ecosystem that is in balance," explains Sprug. She urged designers whose architectural education may have encouraged bold forms and iconic style to approach living buildings without a lot of ego. "Our frame of mind has to be very humble when we come into a project. We can't have a lot of hubris about how awesome this thing is going to look because we wanted



Operable windows and 60+ ceiling fans maintain comfortable airflow throughout this Atlanta-based building.



Vegetated Roof

The Keneda Building at Georgia Tech used American Hydrotech's Garden Roof and Ultimate Assembly to help achieve Living Building Challenge 3.1 Certification. By using transparent materials that show where a product comes from, what it is made of, and where it goes at the end of its life, Hydrotech's Assemblies help meet the high standards. The Garden Roof Assembly and Ultimate Assembly consist of waterproofing/roofing membrane, insulation, architectural pavers, green roof components, growing media, and even the vegetation for extensive applications.

American Hydrotech
hydrotechusa.com

A vegetated roof provides the perfect space for a honey bee apiary, as well as blueberry plants and a pollinator garden.



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RETHINK THE STATUS QUO. BOMAconference.org



Miller Hull Partnership Insights Continued

to have a big architectural statement," she explains. The priority must remain on striking a balance between the building and the natural processes it's part of. "That's a very different way of thinking about a project and moving it forward," she adds.

Collaboration and Buy-In Is Critical

Both Hellstern and Sprug stress the importance of making sure that all team members are clear on the goals for building performance; understanding and buy-in is critical to project success. "Our greatest asset is when our clients provide this directive and rigor for meeting Living Building Challenge," says Hellstern. With everyone aligned, communicate openly and collaborate often as a group. "What's best is to have all the team there, including stakeholders, contractors, subcontractors, folks who are going to use the building, and maintain the building. If they're all present at all the meetings, it's much more effective," he adds.

Because of the way systems in a living building tie together and multi-task, changes have a ripple effect. "As we solve one issue in civil engineering, it may affect mechanical engineering, the way the building looks, how it's operated, and what a tenant gets out of it," Hellstern cautions. Forego segregated meetings with individual project members; it's best to get everyone around the table. "Engagement with an expert team is really important," he shares.

Expert Suggestions

In each of the six certified projects Miller Hull embarked on, they encountered the same thing. "Because this design approach is new to many clients, we often hear, 'Hey, what about...?' or 'Have you tried X, Y, or Z?'" If we found a solution that was better and more cost effective, we would have definitely proceeded in that way," says Sprug. Miller Hull welcomes the suggestions and has come to realize that proving out alternatives is just part of the process. "We go through a lot of side explorations that many times don't pencil out, but we learn a lot in the process and give the client the assurance that we are making the right decisions," she adds.



Local and Salvaged Wood

The wood ceilings are made from salvaged 2 x 4s, no longer needed by the Atlanta film industry. Other wood was sourced locally to reduce transportation impacts and supplied by sustainable tree farms.

Ceiling Fans

Essence creates a more comfortable and attractive space. This ceiling fan was designed for power, versatility, and sophistication; its performance transforms stuffy conditions and offers any setting a centerpiece of style. Essence is virtually silent with a gearless direct-drive motor, has eight anodized airfoils with wingless and safety restraints, and a variety of control options. Its lightweight design mounts to bar joists, beams, purlins, and wood frames.

Big Ass Fans
bigassfans.com

Occupancy Sensors

Sensors, such as the LOS-CIR series passive infrared ceiling-mount sensors, communicate with the Quantum control system to ensure that lights automatically turn off in empty spaces. The sensor uses a small semiconductor heat detector that resides behind a multi-zone optical lens to detect hot moving objects.

Lutron Electronics
lutron.com



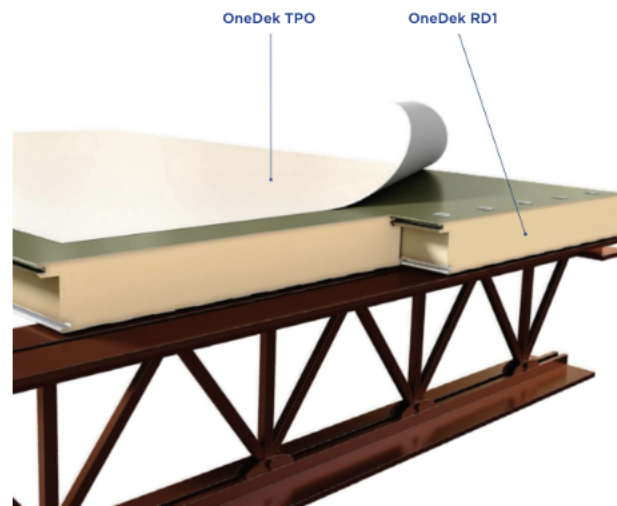
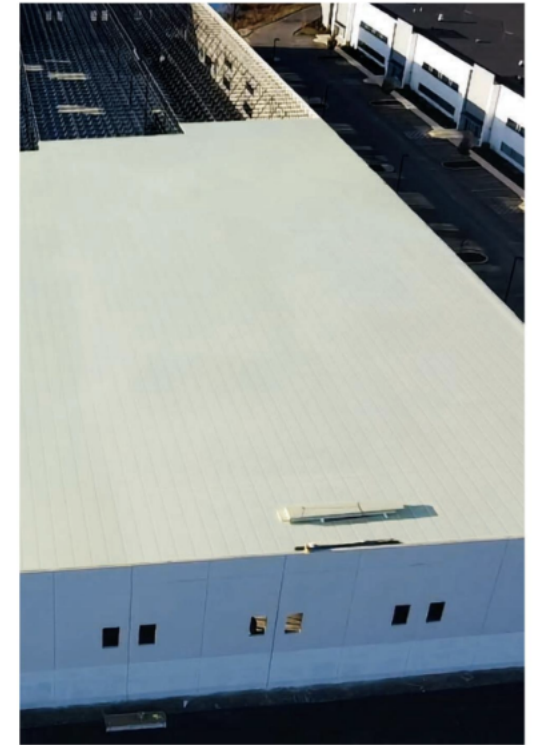
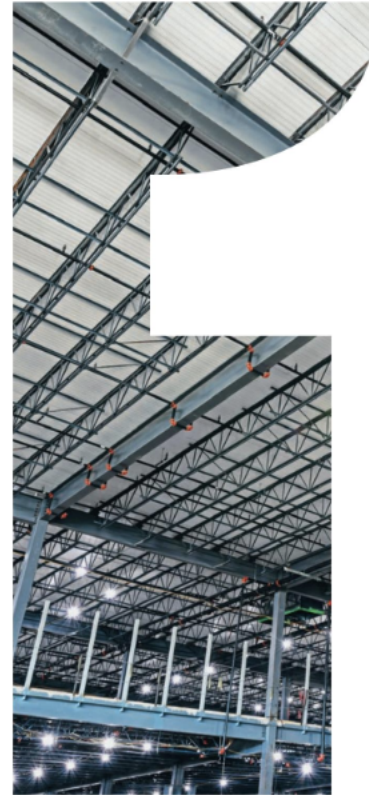
The Kendeda Building was the first in the state of Georgia to use mass timber.



INSIDE/OUTSIDE

Operable windows and large aluminum-framed folding glass doors provide a connection to the outdoors; ample daylight; and when opened, natural ventilation. These strategies increase comfort and reduce energy consumption.

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Miller Hull Partnership Insights Continued

Codes Haven't Caught Up

Depending on the project location, regenerative building design may be more progressive than building codes. "Authorities having jurisdiction and codes aren't quite ready for living buildings yet. This is just something we have to work through in almost every location," says Hellstern. "We have to get together with code officials early on and work through what it means to be a regenerative building." Make time for those conversations and recognize you're laying the foundation for future projects.

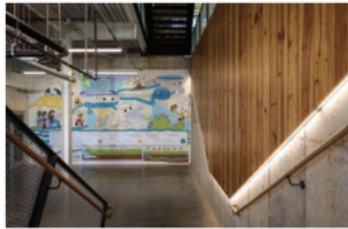
"Some of what Living Building Challenge demands of us is our shift in thinking about the industry, how we build buildings traditionally, what we think of them in terms of performance, and what we expect out of them."

-Chris Hellstern

Driving Change for a Better Future

Miller Hull is proudly championing living buildings to push the industry forward. One small example of this is with product and material selection. "Product reps come into our office every day trying to get us to use their products and we always ask them where they are with the Red List," says Sprug. "Even though the construction industry has been changing rapidly, moving towards full transparency by disclosing the ingredients that make up building products, there are still some product categories that include toxic chemicals that we still use because no better alternative exists, yet. But if you don't ask for the data, the industry won't change."

Bringing these projects into the built environment is not simply adding building stock, it's setting an example. The Keneda Building for Innovative Sustainable Design is used for non-departmental education to enable every undergraduate student to have at least one class there. Energy and water systems are on full display. Keeping them exposed isn't just a design aesthetic, it's the opportunity for students and visitors to see the workings of sustainable building systems up close. Exposure to these buildings for students and the community propagates the idea of what is possible for the future.



Composting System

For more than 50 years in the United States, Clivus Multrum has been developing its technology for a wide range of applications. Using aerobic composting principles, the Clivus system turns both feces and urine into useful fertilizer end-products. A high-nutrient liquid is the primary end-product of the process. A tiny fraction of water and soap (3-6 oz. per flush) creates a foam blanket that carries toilet 'waste' into the compost tank below, where a variety of organisms break down urine and feces.

Clivus Multrum, Inc.
clivusmultrum.com

LEARNING BY ARCHITECTURE

The building is itself a teacher, with exposed and labeled piping so students can see the inner working of building systems to better understand how a regenerative building performs.

The Keneda Building was the first Living Building in the state of Georgia and the 28th in the world.



Energy-Efficient Insulation

EcoBatt batt insulation, a thermal and acoustical barrier for energy-efficient

construction, uses ECOSE Technology. Knauf's patented, bio-based binder and a smarter alternative to the phenol/formaldehyde (PF) binder traditionally used in fiberglass products. It's made from sustainable resources, such as sand with a minimum of 50% recycled glass. Ecobatt insulation products can be used in new and retrofit wood and metal frame applications with High Density (HD) batts available wherever optimal thermal performance is required but space is limited.

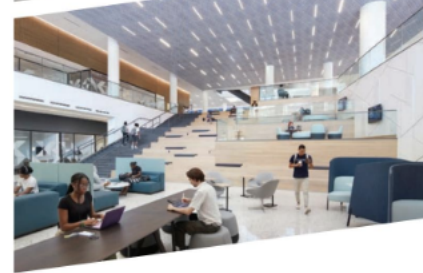
Knauf Insulation
knaufnorthamerica.com



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