January/February 2016

# USGBC+

## TRANSFORMING OUR BUILT ENVIRONMENT

**TOP**
As a LEED-driven state, Arizona continues to grow as a sustainable force.

**EMERGING**
Colombia has become the 4th-largest market for LEED-certified projects in Latin America.

**INDUSTRIES**
The industry may be late to the party, but sustainable fashion is quickly coming into style.

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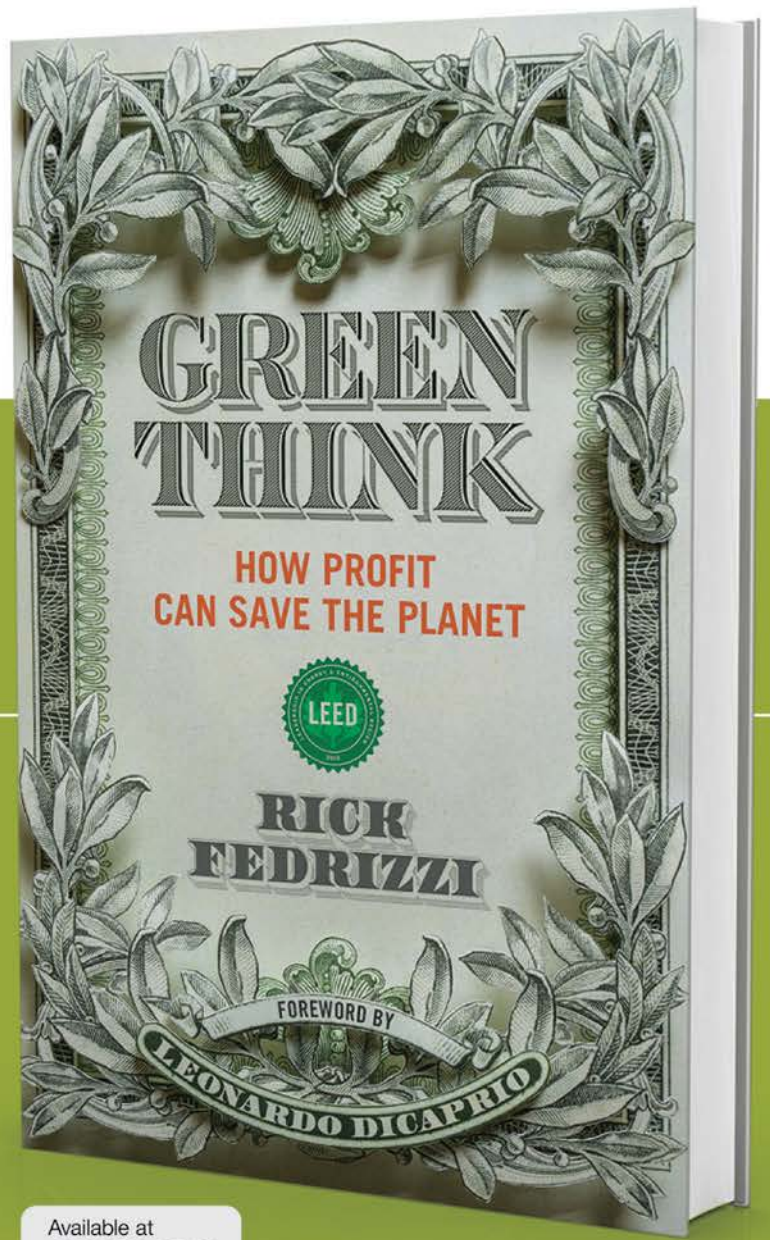


RICK FEDRIZZI
CEO AND FOUNDING CHAIRMAN, USGBC

"USGBC and LEED have created the most significant change in our industry and in my professional career. LEED challenged the status quo thinking of architectural practice and laid the cornerstone for how our profession — and our buildings and communities — evolved these last two decades. Greenthink is quintessential Rick, and captures his optimism and boldness. Fearless and relentless in his passion, and with feet in both the business and environmental camps, his leadership has been key to keeping all the stakeholders in the conversation to collaborate our way to a much better future."

— BOB BERKEBILE, FAIA PRINCIPAL, BNIM

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100% of proceeds from the sale of this book benefit PROJECT HAITI ORPHANAGE & CHILDREN'S CENTER

THE CENTER FOR GREEN SCHOOLS

DISRUPTION BOOKS

**ON THE COVER**

**The wool quilt makers, c.1940**

Artist Dorrit Black shows a Red Cross group making quilts out of scraps of material to send to families in England who have lost their possessions during World War II.

Art Gallery of South Australia, Adelaide, Australia. Gift of Bruce Debelle, Frances Gerard, Belinda Morgan, Justice Kemeri Murray and E & M Resek/Bridgeman Images.

## FEATURES | THE BEST OF

THE WOOL QUILT MAKERS, BY DORRIT BLACK

## LEED On



## LEED Impact Categories



## Departments

Architect: Skidmore, Owings & Merrill
Structural Engineer: WSP Cantor Seinuk
Photograph: Tex Jernigan

# World View

While the world watched, **One World Trade Center** grew in both height and symbolism, its 1,776-foot crystalline form bringing unmatched views back to Lower Manhattan. A redundant structural steel frame, the result of creative collaboration between **Skidmore, Owings & Merrill** and **WSP Cantor Seinuk**, ensures that its safety is as substantial as its stature. Read more about it in **Metals in Construction** online.



USGBC+

TRANSFORMING OUR BUILT ENVIRONMENT



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## CURRENT LEED STATISTICS

AS OF JANUARY 2016

Total commercial LEED projects globally ▶ **75,149**

CERTIFIED: **31,406**
CURRENTLY REGISTERED: **43,743**
LEED FOR NEIGHBORHOOD DEVELOPMENT: **436**

Gross square footage of LEED projects* ▶ **14.38 Billion**
**Includes LEED-certified, LEED-registered**

LEED for Homes Units ▶ **207,827**

*Excludes ND and LEED for Homes

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# Climate Change Demands the Best of Us

**ROGER PLATT**
U.S. Green Building Council

In early December, some of the brightest minds in government, business, and civil society gathered in Paris to discuss perhaps the greatest threat of our time: climate change. At the COP21 talks, USGBC's voice was central in showcasing green buildings as critical solutions to climate change, and I was honored to lead our delegation to the conference.

COP21 was about more than a commitment to change or a concern for the environment, it was about leadership and transformation, two concepts we are very familiar with at USGBC.

In the months preceding the negotiations, we called on our base of member companies, many of which operate in industries or sectors directly impacted by the effects of climate change, to come together as one voice in support of a global agreement in Paris. More than 150 major companies, a third of which are USGBC members, signed on to the American Business Act on Climate Pledge. Additionally, a growing number of companies in our sector joined the Building and Real Estate Climate Declaration, a collaborative effort among USGBC, the Carbon Leadership Forum, and Ceres, spotlighting the role of green building in climate action.

USGBC was proud to partner with the National League of Cities, the World Wildlife Fund, and ICLEI to support a contingent of mayors from cities and towns across the U.S. who proactively address and mitigate climate impacts. The voices of these local leaders were heard on the international stage in France, and their efforts provided examples of the power and purpose of leadership on every level.

COP21 concluded with 195 countries signing on to the Paris Agreement, marking the broadest global consensus on the need for individual and collective action on climate change to date. At USGBC, we continue to advance green building as a viable solution to the monumental challenge of climate change mitigation. Studies show that green buildings measurably reduce greenhouse gas emissions from water consumption, solid waste, and transportation, as compared to conventional buildings. Moreover, green buildings are designed and built with the full life cycle in mind and actively influence inhabitants in ways that support the climate.

Our commitment to climate action focuses on large-scale transformation. Specifically, we have pledged to scale up to support the LEED certification of more than 5 billion square feet of real estate over the next five years. Additionally, we will work to support the adoption of EDGE as a key tool for energy efficiency in developing countries.

We will work to expand non-English educational offerings. We will use the holistic LEED framework to boost net-zero building programs. And we'll support carbon reductions through better integration of demand-side technologies and supply-side modernization, including the application of the Performance Excellence in Electricity Renewal (PEER) system.

There has never been a more critical moment for our industry to lead and to transform the status quo into something greater. Two decades ago, green building was a vision for the future; today it is a reality across the country and around the globe. It is a tool we can leverage for a still greater good. The challenge of climate change mitigation demands our best ideas, our best intentions, and our best efforts, and the green building industry is poised to respond.

LEED ON,

# CONTRIBUTORS

## 29 TOP

**JEFF HARDER**
is a journalist who has written for *Triathlete Magazine*, the *Boston Globe Magazine, Cape Cod Life* magazine, *New Old House* magazine, HowStuffWorks.com, and many other outlets. He lives in Massachusetts.

## 37 EMERGING

**ALISON GREGOR**
has been a journalist at newspapers and magazines for 20 years. After obtaining a master's degree from the Columbia University School of Journalism in 2003, Gregor began her freelance career focusing on real estate and business in New York City. She has written for the *Columbia Journalism Review, Glamour, The Real Deal, New Jersey* and *Company, NYinc, Haute Living*, and other publications.

## 44 INDUSTRIES

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**ALEXANDRA DELUCA**
is a freelance journalist and editor contributing to a number of publications focusing on finance and real estate. After earning her degree at Ohio University's E.W. Scripps School of Journalism, she spent a decade as an editor of the leading international securities services industry magazine. She lives in Brooklyn.

**MARY GRAUERHOLZ**
is a healthcare grant writer and feature writer who focuses on sustainability, architecture, health, and food. She has written for a variety of magazines, newspapers, and websites, including the *Boston Globe, New Old House, Spirituality & Health*, and *Suffolk University Alumni Magazine*. She lives on Cape Cod.

**KILEY JACQUES**
is a feature writer living on the North Shore of Massachusetts where she serves as managing editor of a regional lifestyle magazine. She has been published in *New Old House, Energy of the City, Myopia Polo*, and *Ocean Home* magazines, as well as various trade publications and media outlets.

ILLUSTRATIONS BY MELISSA MCGILL


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# Living WELL

Tampa becomes the first city in the world to introduce a WELL Certified district.

**BY MARY GRAUERHOLZ**

When green building began to sweep the country in the 1970s, it came with a red alert: Construction with toxic components was harmful to the environment. A correlation between the effects of traditional construction and human health increased the urgency. Now, a group of stakeholders is breaking new, higher ground by establishing the world's first WELL Certified city district in Tampa, Florida.

The project will be the first district-wide application of the WELL Building Standard, the world's first building standard focused exclusively on human health and wellness. WELL fulfills a 2012 Clinton Global Initiative (CGI) Commitment to Action to improve the way people live indoors, and this new commitment builds on WELL and tackles the even greater challenge of creating city-scale developments built for health and wellness. "Today more than half the global population is already residing in cities," former President Bill Clinton said as he announced the latest commitment at the 2015 CGI Annual Meeting. "The physical spaces where we live, work, and play influence our level of physical activity, social interaction, and our health."

The philosophy of WELL and its application to the Tampa project is straightforward: Better air and water, greener construction, and more healthful options for food and fitness—presented in the framework of a connected community—intend to help improve the physical and emotional health of the people living there. Research shows that people who live in walkable, connected neighborhoods have lower rates of obesity, diabetes, high blood pressure, and heart disease.

**Paul Scialla helped launch the International WELL Building Institute. He oversees the work to ensure it will meet WELL Certification.**

**The city district of Tampa, Florida, will be the first district-wide application of the WELL Building Standard, the world's first building standard focused exclusively on human health and wellness.**

The 40-acre development, due to break ground in Tampa's downtown waterfront area this year, will be a walkable, sustainable, healthy environment for residents, workers, and visitors. Overseeing the effort is a starry convergence of figures in the worlds of business and not-for-profits: Jeff Vinik, owner of the Tampa Bay Lightning ice hockey team; Cascade Investment, LLC; and Paul Scialla, who launched the International WELL Building Institute (IWBI).

Vinik and Cascade Investment are building the development under the name of Strategic Property Partners in concert with the city of Tampa. Scialla will oversee the necessary work to assure the certification of the district and that the project's individual buildings meet WELL Certification. The intent is that each building also will attain Leadership in Energy and Environmental Design (LEED) certification.

The Tampa project came together last winter. "I was in Tampa last February for a meeting regarding the WELL Certification of another project," Scialla says. "Jeff [Vinik] and I talked, and it completely gelled. As he became more familiar with the WELL Building Standard, he and his team saw this as a wonderful opportunity to become the first pilot community."

The development is anchored around Amalie Arena, home of the Tampa Bay Lightning and the Tampa Bay Storm professional football team. Phase one will include 1,000 residential units; a new 400-500–room luxury hotel; a 650,000-sq-ft office tower; 200,000 square feet of retail, restaurants, and entertainment venues; the University of South Florida Morsani College of Medicine and Heart Institute; and an adjoining office building for health-related businesses. Green space, dog parks, and water features will be woven throughout.

With a $1 billion price tag, phase one is expected to be built out within five years. When all three phases of the project are completed, the development will encompass 6 million square feet of commercial, residential, and retail space, with a total investment of more than $2 billion. The first step, planned for mid-2016, is construction of a reconfigured roadway network and new infrastructure.

The project, informed by the WELL Building Standard, will reflect seven categories that relate to health in the built environment: air, water, nourishment, light, fitness, comfort, and mind. The overall aim, Scialla said, is to create a community that promotes nutrition, fitness, mood, sleep patterns, and performance for residents and visitors.

Scialla is also the founder and CEO of Delos, the company that pioneered Wellness Real Estate™ and WELL. Delos launched IWBI in 2013 after pledging to share WELL globally in the Clinton Global Initiative Commitment to Action. Delos Advisory Board members include Dick Gephardt, Deepak Chopra, and Leonardo DiCaprio.

The district will feature wide sidewalks that allow for more walking, bike lanes for cyclists, abundant public green space to encourage outdoor living, access to healthful foods, green infrastructure, and all the amenities of an urban waterfront.

Tampa Mayor Bob Buckhorn is happy to see sustainability and health polishing the city's profile. "Tampa is proud to be the first city in the world to be home to a WELL Certified District," Buckhorn said. "Our city will demonstrate that city design, not just building design, can be healthy and sustainable, and it will position our community as forward thinking."

As the first of its kind in the world, the Tampa development will set a global example of how a built environment can promote health and wellness, so its measurement system must be impeccable.

The WELL Building Standard is third-party certified by Green Business Certification Inc., which administers the LEED certification program and the LEED professional credentialing program.

Scialla says the rating systems are a seamless fit. "The WELL Building Standard is a perfect complement to LEED and all green rating systems," he says. The project is setting another example, as well. IWBI, the driver of the Tampa district's health and wellness goals, is a public benefit corporation, an emerging type of structure in the U.S. for corporations that are committed to balancing public benefits with profitability. IWBI, Scialla says, has committed to direct 51 percent of net profits generated by WELL Certification project fees, after taxes, for philanthropic purposes and investments focused on health, wellness, and the built environment.

Vinik sees health and wellness as one of the major social movements of our era. "In a competitive marketplace," he says, "employees and employers both desire the quality-of-life investments that will make our district WELL." ●

# MIDDLE Grounds

By closely examining nature for over 40 years, Alrie Middlebrook developed a model ecosystem in which people of all ages learn ecologically sound principles and practices in a playful environment.

**BY KILEY JACQUES**

It's not just anyone who would drive by a bus depot parking lot in downtown San Jose, California, and think: I can build a garden there. But a "For Lease" sign had ecological designer Alrie Middlebrook thinking just that. In 2000, her musings gained momentum and ultimately led to the formation of the California Native Garden Foundation (CNGF), a public-benefit corporation of which Middlebrook is founder and president. In time, CNGF developed the site to support its Environmental Laboratory for Sustainability and Ecological Education (ELSEE) program. Indeed, that lowly parking lot made way for the Middlebrook Center—headquarters for both CNGF and Middlebrook Gardens, its namesake's for-profit garden design/build business responsible for funding the educational programming.

Nestled in the heart of Santa Clara Valley, the center is surrounded by the Santa Cruz Mountains and Diablo Range, and enjoys a subtropical Mediterranean climate. The focus of Middlebrook's work is protecting air quality, improving the health of onsite soils, conserving and cleaning water, restoring local plant communities, and recycling materials. The SITES certification process (administered by Green Business Certification Inc.), she explains, is quite rigorous and includes over 200 benchmarks for sustainable urban land use. "We organized the gardens to meet that criteria and created program development throughout the garden."

All those SITES initiatives have made Middlebrook Gardens, the second green business in Santa Clara Valley, very successful—so successful she was able to bankroll ELSEE, with some additional outside funding. ELSEE, a model for active outdoor learning, teaches environmental education, eco literacy, sustainability and science, technology, engineering, art, and math (STEAM) education to pre-K through eighth-grade students using Next Generation Science Standards. The programs are run primarily by college interns and volunteers, which keeps costs down, and demonstrates how schools can build a sustainable garden education program without the need for hefty financial backing.

PHOTOGRAPHY BY EMILY HAGOPIAN

**Alrie Middlebrook created an ecosystem in which people can learn ecologically sound principles and practices.**

**The Middlebrook Center is headquarters for both CNGF and Middlebrook Gardens, a for-profit garden design/build business responsible for funding the educational programming.**

As a visitor walking through the Middlebrook compound, one first encounters the entry gate above which "the tools of the gardener" (shovels, rakes, pots, etc.) have been arranged in a cheerful aerial configuration. Also at the entry stands "Elsee," a female tule elk and their beloved mascot, who symbolizes, in part, Middlebrook's idea that "if we are going to eat large mammals, we should probably be eating animals native to our local ecosystem."

Native plants, edible crops, and species of other value are grown all over the property in myriad ways.

Take, for instance, "Big Red," a play structure that "recycles itself and grows food." Built with all found objects and recycled materials including old playground equipment, panels of recycled waste, and pallets, it supports multiple crops. Plants grow from the tower top, from "living walls" made with the pallets, and they trail in vines down the structure's sides. It even features a solar-powered fountain made of tires. "It's really mirroring how a plant recycles itself and stays in one place," explains Middlebrook. "We thought, 'Why can't a building do the same thing a plant does?'"

In the Mariposa Meadow, students learn how it replicates the natural grasslands of the valley, as it is full of plant species that have grown in those environs for over 20 million years. It is now habitat for 16 types of butterflies, which are depicted on stepping stones located throughout the garden. As a teaching tool, the meadow exposes children to the concept of preserving local ecology, which is Middlebrook's primary objective. In the middle of the meadow stand two food towers—9-foot tube slides turned on end—hosting 30 plants each (mostly native edibles or perennial food crops, which are harvested regularly). Like Big Red, they are there to demonstrate how food can be grown vertically and without tilling soil, which is ecologically damaging. "Some of the plants have been growing in there for six or seven years and produce food every day without fertilizer, except compost. That's a very efficient way to produce a lot of food with minimal input," says Middlebrook.

Collard greens, one of the top superfoods, and native quail bush are among the crops grown. The latter is a favorite bird habitat as well as an edible species most often used as "a salt substitute," as it draws salts from the soil. CNGF's Community Supported Agriculture (CSA) partner collects quite a lot of this plant's leaves for its produce boxes. "I'm working on some projects that will demonstrate our methods for growing food [using] urban food technology," says Middlebrook. "I think, in coming years, we will be able to grow more food on the site than people can eat."

The chicken coop, aka the "Dino Coop," traces the everyday chicken's ancestry back to the age of the dinosaurs. It was created by a group of elementary-aged

**Middlebrook is an outdoor classroom and has become a significant part of children's learning. Below, the "Big Red," is a play structure that grows food.**


**Left: The chicken coop traces a chicken's ancestry back to the age of the dinosaurs.**

art students, who studied the evolution of the chicken going back 260 million years. They created a timeline starting with the Jurassic Era and the plants that comprised that landscape. "We always say we are eating dinosaur eggs," jokes Middlebrook.

The summer Nature Camp, possibly the most popular program, includes lesson plans to go with the whole garden. Middlebrook drew a diagram of the grounds with a key that indicates 26 different educational elements. Among them is an aquaponics farm featuring a large tank whose finned tenants' waste helps nourish the plant community, which in turn filters the water. Their CSA partner also collects edibles from this unique ecosystem to include in their weekly offerings. Middlebrook views it as a tool for teaching chemistry, physics, water management, conservation, and nutrition. "It provides lots of opportunities for children to learn STEAM education—that's one of our goals. We want the outdoor classroom to be a significant part of children's learning."

Currently, 10 to 20 school groups benefit from the Middlebrook Center's programming each academic year, though its founder intends to increase those numbers. She also dreams of transforming 10,000 California schoolyards into teaching gardens; this in response to how deficient current playgrounds are in terms of learning. For Middlebrook, a schoolyard should be a place where students learn about climate change, reduction in biodiversity, and nature deficit disorder—her major concerns as an ecological designer and educator. "We try to address all three of those things in every decision we make with respect to how urban land is being used."

The ELSEE model is the result of work Middlebrook has been doing for the last 40 years. Her interest in native species led her down a path that started with her design/build business at age 30. Nurturing her love for native species, she spent 15 years hiking all over California to study its native plants kingdom. Today, she refers to herself as an amateur ecologist trained as an artist. "The more you see how nature organizes itself and how the cycles of our planet play out, the more you realize the elegance of [it all]." In her ultimate mission to steward the planet, she now designs to protect nature's cycles. Until the universal model is one that

**Native plants, edible crops, and species of other value are grown all over the property in myriad ways.**

disrupts nature as little as possible or, conversely, mimics it as much as possible, Middlebrook believes we fall short of true stewardship.

The ELSEE project team believes that any healthy land use model should also support profitable sustainable businesses. Unlike conventional businesses, "eco-businesses" value the protection and perpetuation of ecosystems. "I'm thinking this year we are going to get a lot of support from local developers," says Middlebrook. "We really see development following these natural principles of an ecosystem." Noting Santa Clara Valley's rich agricultural past and its leading role in technological advances, Middlebrook talks of marrying the two to develop sustainable building practices that will have business-model appeal. Beyond that, she is also interested in teaching SITES benchmarks to the local service sector. "I'd like to generate income by helping other building and landscape professionals learn these ecological methods for construction and landscaping." Given the gumption with which she tackles all of her project ideas, it will likely be another that comes to fruition before long.

# Chattanooga's NEXT CHAPTER

EPB is not your parents' electric company. Thanks to city leadership, the municipal utility operation is on a mission to eliminate waste and provide savings—and innovative services—for the city and its customers.

**BY ALEXANDRA DELUCA**

The revitalization of Chattanooga, Tennessee, is a story well told. In 1969, the U.S. Environmental Protection Agency identified Chattanooga as the most polluted city in the country, and the subsequent report by Walter Cronkite—declaring it the "dirtiest city in America" on national evening news—became infamous.

It was also something of a wake-up call for this industrial city along the river. Government and community banded together to bring improvements over the next 40 years—from a leading-edge air pollution control bureau to miles of greenways and electric shuttle buses—long before many of these things were mandated or in vogue. Sustainability has become something of a mission for the city, and EPB, the public electricity utility, is helping to write the municipal utility's next chapter.

"[Cronkite's report] kind-of hurt our feelings," says David Wade, COO of EPB. "As a community, we decided to change that, and it's been a multi-year, multi-faceted approach. The recent changes we have made here are just a continuation on some of those building blocks that were established as our community looked forward so many years ago from being a dying community to becoming a sustainable community."

An agency of the City of Chattanooga, EPB was established in 1935 to provide electric power to the greater Chattanooga area. Today, EPB is still one of the largest publicly owned providers of electric power in the country, serving more than 169,000 residents in a 600-sq-mi area that includes greater Chattanooga, as well as parts of surrounding counties and areas of North Georgia.

**David Wade, COO of EPB, is making positive changes at the electric company.**

**Today, EPB is still one of the largest publicly-owned providers of electric power in the country.**

"Chattanooga has done a lot of, in some cases, risky and bold work on itself," says Danna Bailey of EPB. "The work that has been done by those who came before us has been a platform to add to—and an inspiration to us to step up our game and make sure we are working to make the city the best asset it can be with the best infrastructure."

At EPB, that meant building a smarter energy grid, which would reduce power outages and eliminate waste while improving response times and customer experience. "Several years ago, we started looking at what a next-generation electric system should be," says Wade. "We realized that it looked much different than it was. We defined it as three things: intelligent, interactive, and self-healing."

But before an electric grid can achieve that triumvirate, Wade says, it must be able to communicate. So in 2008—thanks in part to a U.S. Department of Energy grant—EPB began construction on a 100 percent fiber optic communications network to support its Smart Grid project. "We looked at building a communications network that would not just have us make a one-time investment that was limited to that improvement, but instead to facilitate improvement over time."

From there, the utility layered sensors and smart devices in the field and, using software, has improved efficiency and drastically changed the reliability of the system through automation, says Wade. Initial projections estimated a 40 percent improvement in reliability, but Wade and his team often see about 50 percent and sometimes nearly 70 percent.

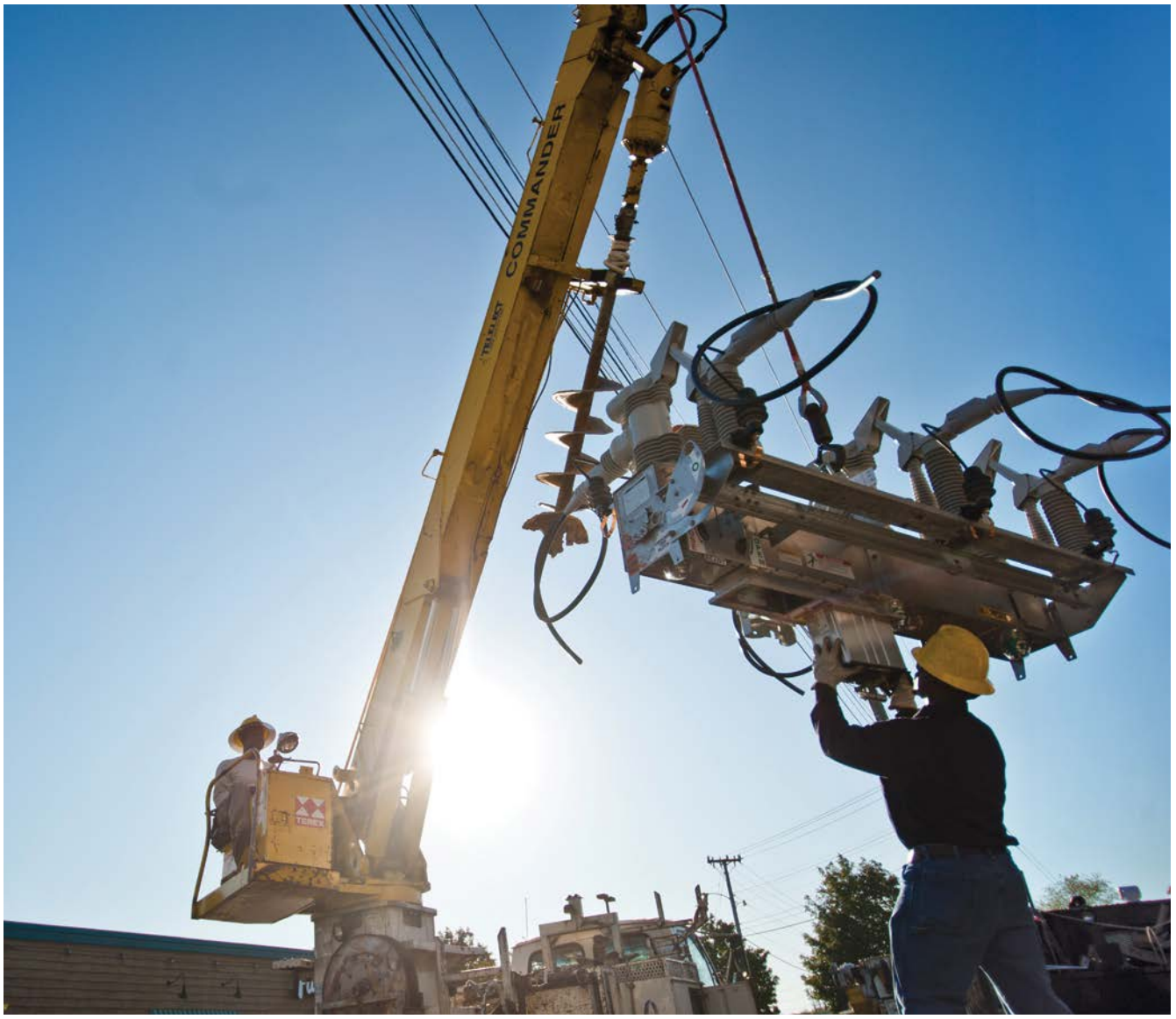
EPB also earned its PEER certification—a rating process that aims to define, assess, and verify the performance of power grids—from third-party administrator Green Business Certification Inc. Modeled after the LEED green building rating system, PEER also serves as the driving force behind the U.S. Green Building Council's (USGBC) vision to transform power systems.

"What I really like about the PEER certification is using validation, looking at hard data, and putting some standards around it," says Wade. "We appreciate that USGBC and PEER have created a model that can validate and measure performance."

A reduction in both number of outages and the duration of outages has even broader impacts. "Of course, we haven't stopped any cars from hitting poles—we still have the same number of accidents," says Wade. "But instead of having trucks drive around to find out where that car hit the pole, radio back where they are, have someone looking at a map and telling them to drive to this location and open switches, then drive to that location and close switches, we have automated it.

"The system routes power around that outage without having to have folks in trucks driving around to do that," he adds. "All of a sudden not only does that improve the service we provide our customers, it saves us hundreds of thousands of miles of driving."


**EPB is building a smarter energy grid, which will reduce power outages and eliminate waste.**




**EPB also earned its PEER certification, which is modeled after the LEED green building rating system. PEER also serves as the driving force behind the U.S. Green Building Council's (USGBC) vision to transform power systems.**

One of the biggest wastes you can have as an electric utility is from an outage—not just at EPB, but at the customer level. "That sounds like an odd thing," says Wade, "but if you think about all of a sudden when there is an outage there are businesses out there that lose sales or must throw products away. An important piece of waste and sustainability is how you use power."

The flow of that power through the entire utilization cycle is something EPB focuses on. "It doesn't stop when we hand off electricity to a business," Wade says. "They are using it for some need. If we interrupt it and it causes them to have waste products and uses more electricity to get back to where they were, then we have a whole layer of waste that we don't talk about much."

The waste is significant in terms of dollars as well. A recent study by the University of California, Berkeley, found that a utility in the Southeast the size of Chattanooga's—which serves a 600-sq-mi urban and rural environment comprising 175,000 homes and businesses—would waste approximately $100 million annually due to power outages. "That is a lot of waste down the system," says Wade. "That is a huge deal."

But before EPB could change its grid, it had to change its culture; work that started long before the first fiber optic cable was strung. "We have put significant emphasis on and energy into really looking at and changing our culture over the last 15 years," says Wade.

"There was a point in time where we were not an easy company to do business with. We acted very much like a monopoly. If you wanted to do business with us, you had to jump through our hoops and we would install service when we felt like it."

It was an internal problem as well. "It becomes very difficult to leverage communications across our electric

system if we can't communicate across the hall with each other," Wade says. The major culture shift has created a more collaborative EPB, where employees are more engaged and committed to a mission to serve and improve their community and their customers. "As a municipal that is a huge privilege and responsibility," he adds.

"We had to make that culture," says Bailey, "and culture work is never done. But it is faster and easier to get where we need to go because we have this in place."

New initiatives include a community solar project and leveraging the power grid while learning to use all of the information the new electric system provides in ways "we didn't see two or even five years ago," Wade says. That includes identifying pieces of equipment in need of service before a major incipient failure that would have previously gone unnoticed.

EPB has also started leveraging its fiber optic system by selling video, voice, and data products. Because of this, Chattanooga currently has the fastest Internet in the country, known as the "Gig" for its 1-gigabyte per second speed (about 50 times faster than the U.S. average), which has become an economic selling point for the city.

"Giving the ability to add communications and collapse time and space gives our community the opportunity to think differently and act differently," says Wade. "We are one part of that as our electric system."

EPB, along with several partners, recently started a relationship through which a microbiology class at a STEM (Science, Technology, Engineering, and Mathematics) school in Chattanooga is taught from the University of Southern California. "Streaming live microscopic images from 1,800 miles away is drastically changing the learning experience of these students in Chattanooga," Wade says. "We don't have that type of microscope or instructor. It's an extremely different learning environment."

All of this appears to be catching the attention of other utility companies. EPB gets multiple requests and visits a week from those who want see firsthand what Chattanooga is doing.

"One of the coolest things about that, if they come to visit Chattanooga, by interacting we have the opportunity to learn from them," Wade says. "That must be the best thing about it. We aren't done learning and there is a lot of value in those conversations."

# LEED Certification

EPB's downtown headquarters was the first building in Chattanooga to receive LEED certification for Existing Buildings, Operations and Maintenance. This certification focuses on the long term, cultural and operational processes that occur within commercial building. EPB must follow rigorous environmental guidelines in all areas of business, from energy use and recycling to cleaning methods and pest control to help protect our environment. It's just one of many ways that EPB works to increase the quality of life for the people we serve.

- The LEED Project has an ROI of less than one year.[1]
- To date, the Project Building's occupants saved 5.7 Million kWh. This kWh translated to $420,640 and 4,054 metric tons of CO2. This CO2 reduction is equivalent to the carbon sequestered annually by 3,323 acres of U.S. forest.[2]
- So far in 2013, the Project Building's occupants saved 336,374 gallons of water. This translates to $6,701 and is equivalent to saving the amount of water to fill roughly 15 standard-sized U.S. swimming pools.[3]
- During the LEED Process, the building's occupants recycled 712 cubic yards, the equivalent of keeping 59 standard dump trucks' waste out of landfills.[4]
- During the LEED Process, Corporate CSA Program participants bought 3,500 pounds of sustainably grown local produce.[5]
- During the LEED Process, Clean Commute participants avoided an estimated 248,420 miles of conventional travel, an amount equivalent to traveling to San Francisco from Chattanooga 102 times.[6]
- During the official LEED Process, 69 people representing 26 organizations worked over 4,000 hours to make this project happen.[7]

1. Approximately $125,000 spent / $131,650 in annual recurring energy savings = ROI less than one year. This calculation doesn't include other benefits, such as water savings.

2. 5,746,450 kWh x .0732 (losses rate) = $420,640. CO2 and equivalencies calculated using the US EPA's Greenhouse Gas Equivalencies Calculator.

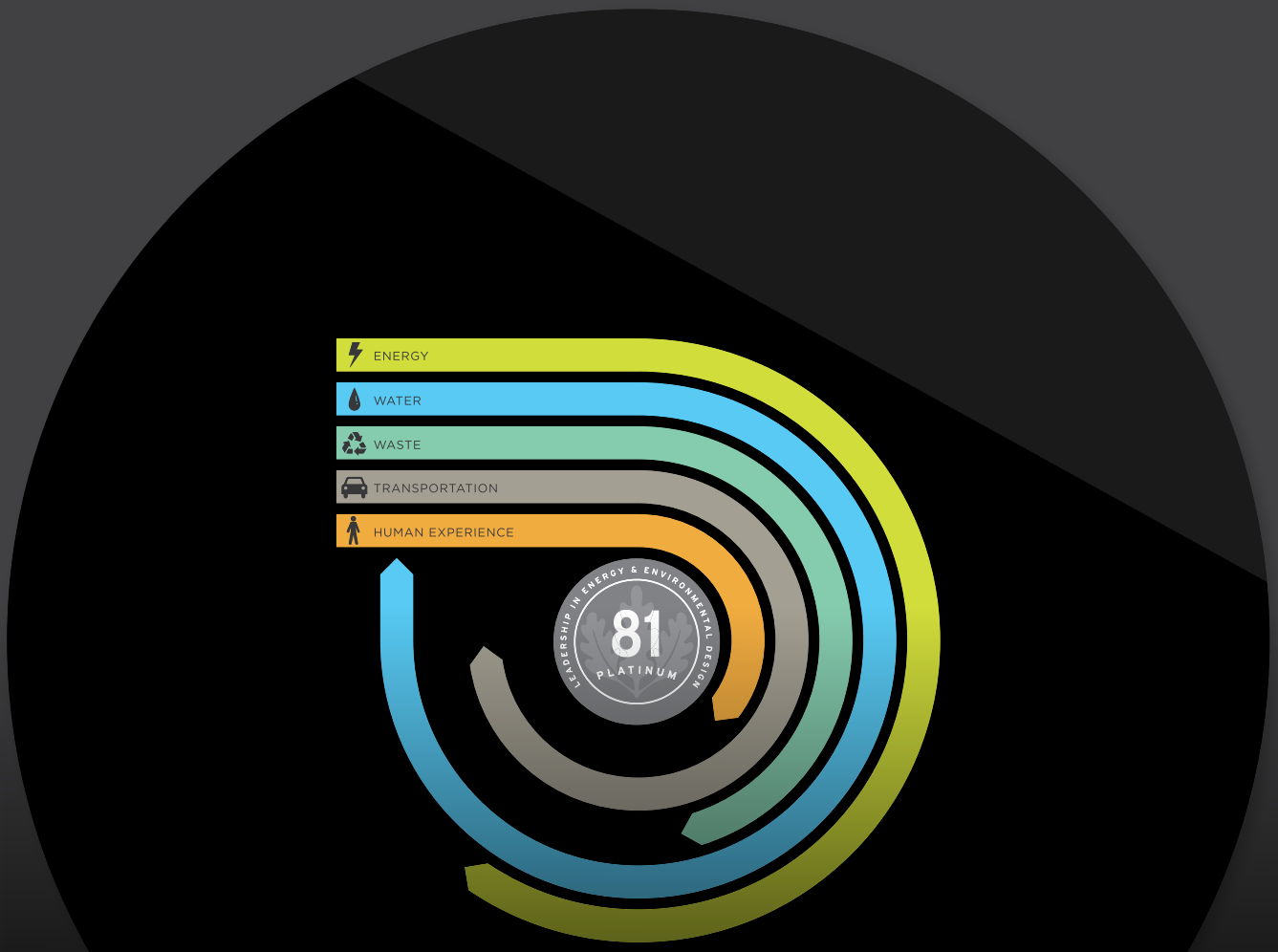
3. Data is from EPB's TN American Water bills. Standard Pool calculation referenced by Ask.com & WikiAnswers: 336,374 gallons/ 22,000 gallons = 15.3 US standard pools.

4. Data is from Internal Recycling Records independently gathered by Reliable Building Solutions. 712 cubic yards/12 cubic yards = 59.3 standard dump trucks.

5. Data from Crabtree Farms delivery records.

6. Data from Internal records; data utilizes employee zip codes for estimated miles and considers travel method. Chattanooga to San Francisco miles calculated using GoogleMaps.

7. Data from internal and external records. Hours include administrative and operational activities, but do not account for time spent outside the LEED Performance Period.

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USGBC and Honeywell are currently piloting this dynamic tool at USGBC's corporate headquarters, DPR Construction's San Francisco office and Menkes Union Tower in Toronto, Ontario.

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# Sunny Outlook


## As a LEED-driven state, Arizona's future looks bright.

WRITTEN BY **JEFF HARDER**

**Previous spread: Peoria Mayor Cathy Carlat; Peoria's Municipal Courthouse was LEED Gold certified in 2011**

**Opposite: Gonzo Gonzalez, chair of the USGBC Arizona Chapter.**

**Photos: Fawn DeViney**

Green buildings are thriving in Arizona. The evidence—more than 479 Leadership in Energy and Environmental Design (LEED)-certified projects—can be found around the state, from college campuses to corporations' headquarters to spring training clubhouses of Major League Baseball (MLB) teams. And after years of hard work, the Grand Canyon State is building a more sustainable future.

Arizona continues to emerge as a sustainable force with 47 projects achieving LEED certification and more than 6 million square feet of LEED-certified space around the state in 2015; Arizona has 0.95 square feet of LEED-certified space per capita, a sign of a changing approach to the built environment in the American southwest.

"Historically, Arizona wasn't a place that embraced [LEED] for many, many years," says Gonzo Gonzalez, chair of the USGBC Arizona Chapter. "Now, it's great to see that there are so many organizations and institutions at all levels that have made it their basis of design."

The ascent of Arizona, the sixth-largest state in the country, to becoming a LEED-savvy destination was nearly a decade in the making. In February 2005, when then-governor Janet Napolitano issued an executive order mandating new guidelines for energy efficiency and renewable energy in new state buildings in Arizona, a cornerstone of the order required those buildings to meet LEED Silver standards or above. Arizona wasn't the first state to enact such an order, but it was a galvanizing moment: In time, cities from Scottsdale to Phoenix to Flagstaff ran with Napolitano's decree and set their own LEED-based efficiency standards for municipal buildings. "Energy, water, and waste are huge issues for us in Arizona," says Dorie Morales, editor-in-chief and publisher of *Green Living* magazine, noting the city of Phoenix's ambitions of achieving a citywide waste-diversion rate of 40 percent by 2020.

From one city to the next, the successes of LEED had a viral effect. "Everyone started to see that not only is having spaces that are energy efficient and green the right thing to do, but it helps our bottom line," Gonzalez says. "The universities, the cities, the state all realized that it's going to save us money at the end of the day, and because now there's so much more efficiency in the design, we're not going to pay the costs for energy and water we were 5 or 10 years ago, plus we can help the environment."

LEED's success in the public sector trickled down to a private sphere that had begun thinking about buildings in terms of their entire lifespans, instead of solely their upfront costs. Gonzalez, a veteran of the world of real estate development, says he noticed LEED-certified buildings selling and leasing better than their ordinary counterparts, a trend that fostered broader acceptance of the third-party certification system. "The conversations we had always started with 'Yes, there's going to be a higher capital expenditure, and yes, it's going to be more difficult to initially build this, but you've got to consider the big picture: We can make up what we paid up front with lower operating costs,'" he says. Some of the biggest national brands that have set up shop in Arizona heard that message loud and clear: Intel's headquarters in Chandler and US Airways'


FIRE EXTINGUISHER

**Opposite: ASU owns the most LEED buildings in the state—45 all together as of July 2015—and holds the honor of constructing the first LEED Platinum building in Arizona.**

**Right: Mick Dalrymple is the director of University Sustainability Practices at ASU.**

headquarters in Tempe both achieved LEED Gold, for example, while Kohl's owns and operates three LEED-certified stores in the state. In the process, Arizona has developed a common array of sustainable features to its buildings: underground parking garages that help occupants bypass sweltering ambient temperatures, overhangs, shade trees, and alternatives to traditional four-sided architecture.

At Arizona State University (ASU), the school practices the same message of sustainability that it preaches. Along with being the home of the first degree-granting School of Sustainability in the country, ASU owns the most LEED buildings in the state —45 all together as of July 2015—and holds the honor of constructing the first LEED Platinum building in Arizona. "Universities generate and disseminate knowledge to their students and communities," says Mick Dalrymple, director of University Sustainability Practices at ASU. "By practicing green building and LEED, ASU is helping build awareness and skills that are vital to building resilience and sustainability in the local design and construction industries, as well as the broader community."

While ASU (as well as its sister institution, the University of Arizona, which has its own impressive assemblage of LEED buildings) fell under the 2005 executive order, its campuses quickly began exceeding those expectations. Over the next several years, ASU enacted its own comprehensive sustainability plan aimed at carbon neutrality and zero waste, drawing on initiatives ranging from composting programs to community gardens to innovative solar shade structures. LEED projects remained integral to the approach; in 2007, ASU's Biodesign Institute B in Tempe became the first LEED Platinum facility registered in the state. At last count, ASU possesses 4,103,943 square feet of LEED buildings, or 16.5 percent of the university's total square footage.

Most recently, ASU achieved LEED Gold certification for College Avenue Commons, a five-story, 148,829-sq-ft mixed-use building that's home to the Sun Devil Marketplace and ASU's School of Sustainable Engineering and the Built Environment. The building was designed to encourage the use of stairs rather than elevators, says Dalrymple, and serves as a living lab for engineering and construction education. College Avenue Commons uses a double-skin that shades the building from intense sun while also shading the public sidewalk below (promoting walkability), and includes thermocouple sensors throughout the various layers of the building envelope so that students and researchers can track how the building envelope responds to varying climate conditions.

Just as Arizona State University has been a boon to elevating the profile of LEED in the state, the LEED rating system itself has helped validate the university's

environmental aims. "LEED provides a comprehensive third-party tool for and verification of ASU's efforts to design and construct buildings that are better for our environment; healthier for our students, faculty, and staff; cost less to operate; minimize our carbon footprint; and maximize our productivity," says Dalrymple. "We are educating tomorrow's leaders and we want to show them how to do it in a more sustainable manner."

Peoria, a sun-drenched city of 154,000 that straddles two counties, illustrates how good intentions and years of persistence have helped transform LEED in Arizona from an anomaly into a fact of life. Peoria was hardly a pioneer in weaving USGBC's signature certification program into its municipal building standards. In fact, for a fast-growing city with comparatively inexpensive land, going green was an afterthought, if considered at all. But that changed in 2006 with the arrival of deputy city manager Carl Swenson, who had proven himself an ardent advocate for sustainability at previous posts in Washington and Illinois. "Carl asked the question of whether we were doing LEED at about the time when we were just hearing about its use by larger entities like the State of Arizona and the City of Phoenix. We still didn't fully understand what LEED was," says Ed Striffler, architectural services manager for the city of Peoria.

But Swenson (who USGBC's Arizona chapter later recognized as a Green Champion) convinced city leadership that the principles of sustainability create more livable communities. And after he was named city manager in 2008 and the Great Recession took hold, LEED's attention to fiscal responsibility became attractive to city officials and a populace seeking to streamline operating costs. It was also a mode of inspiration. "We were trying to use LEED building innovations to become a leader, so that others out there in the community might see it as practical, convenient, and creative, and use the city as a model for improving their energy efficiency and construction practices," says Susan Daluddung, Peoria's deputy city manager.

In 2009, Peoria acquired $1.3 million through the American Recovery and Reinvestment Act. Along with a slate of other green measures, including converting municipal office buildings and parks to LED lighting systems, the funds paid for LEED Green Associate and LEED AP training for 16 city staffers. Credentialed as a LEED AP in 2008, Striffler recruited other development- and operations-focused city employees to understand LEED as a language, an ethos, and a new, disciplined way of thinking about building design, construction, and operations. "In our extreme desert climate, there are only so many strategies that the electrical and mechanical engineers can implement within the limits of current technology," Striffler says. "Under LEED, when passive building envelope strategies are implemented in combination with the technology, buildings begin to meet the mark in the LEED rating system. These strategies yield results, month after month."

**Far left: Carl Swenson is the city manager of Peoria. Photo: Fawn DeViney**

**Left: The San Diego Padres head to Arizona for spring training each year. The sports complex they practice in is LEED Gold certified. Photo: StudioAsap.com**

In short order, Peoria had become one of only three communities in Arizona, along with Flagstaff and Tucson, to implement a sustainability action plan, one key aspect of which mandated all of the city's new construction projects and major renovations to meet LEED Silver standards, at minimum. The city began putting LEED principles into action by embarking on a two-year, $11 million upgrade of the 20-year-old Peoria Municipal Court, a renovation that involved adding 19,000 square feet of courtroom and administrative space. When the courthouse was LEED certified in 2011, it surpassed all expectations. "We achieved LEED Gold on our first try," Striffler says. "And we looked at it and we said, 'Wow—there's a lot of design decisions we made that aren't very different from what we've been doing.' So we did it again, and again, and again, and now we have four LEED Gold buildings."

Those other projects include a complete renovation and expansion of a multigenerational community center and a pair of clubhouses at Peoria's Sports Complex (both LEED Gold) for two MLB teams that head to Arizona for spring training: the San Diego Padres and the Seattle Mariners, the latter of whom chose to outfit their facility with a 345-kw solar array that stretches across the building and parking lot. "There was a competitiveness that developed between the Mariners and the Padres," Striffler says. "We built both buildings identically from a systems standpoint, but the Padres facility remained just shy of the threshold of achieving a Gold rating. We found the Padres asking questions like, 'Will it help if we get ENERGY STAR laundry equipment? Will it help if we adopt a green cleaning practice?' That competition between two MLB teams in the arena of sustainable buildings was fascinating to watch." Now, in designing a stadium for the Sports Complex from the ground up, Striffler is aiming for LEED Gold from the outset. "It's a little bit contagious: When you achieve high [standards] the expectations remain high, so you continue to have to move the bar and perform," Striffler says.

Peoria Mayor Cathy Carlat echoes that sentiment. "A priority of the city of Peoria is to advance our already outstanding quality of life for citizens, now and in the future. We have a responsibility now to our residents to use their hard-earned tax dollars in the most efficient way we can, but we also have a responsibility to our future residents to set the example and establish a culture of forward-thinking stewardship of our resources."

Today, Arizona's embrace of LEED shows no signs of abating. In fact, as part of a larger sustainability movement, it's essential for life. "Sustainability needs to be at the forefront of everyone's minds," says Gonzalez, the chair of USGBC Arizona. "We have finite resources, and we need to make sure that future generations can benefit from living in the state." But in a place that sees 300 days of sunshine a year, if becoming a LEED-driven state is an indication of what's to come, Arizona's future looks brighter than ever.


HIGH
MARKS

# Colombia has become the 4th-largest market for LEED-certified projects in Latin America.

WRITTEN BY **ALISON GREGOR**

When César Ruiz, CEO of Colombia-based Setri Sustentabilidad, answered the call for sustainability consultants for a hotel–office project back in 2012, he was a bit surprised when the owners also hired an engineering firm based in Portland, Oregon. The mixed-use development, called Tierra Firme, is located in the capital city of Bogotá and was designed to meet the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) standards.

"The owners of this project were nervous about the LEED certification for this building," says Ruiz. "So they were just willing to spend the extra money, and they hired Interface Engineering from the States and Setri from Colombia, and said, 'Now, my friends, you have to talk to one another.'"

Together, both firms were tasked with guiding developers through the certification process—and emerged successful. Tierra Firme, a 600,000-sq-ft building completed in 2015 and awarded LEED Gold Core and Shell certification, is now the W Hotel Bogotá, operated by Starwood Hotels & Resorts.

As Ruiz explains it, the two companies worked well together and have become good friends, but it was an unusual situation that exemplified the attitude toward LEED-certified construction in Colombia several years ago. Nervousness, apprehension, and oftentimes need for education were the hallmark of developers and the building industry in Colombia at the time. But things have changed.

Colombia is now the fourth-largest market for LEED building in Latin America, behind Brazil, Mexico, and Chile. As of November 2015, there are 59 certified projects in the country—nearly 11 million square feet of space—and 140 projects in the pipeline, which is more than 44 million square feet, according the Consejo Colombiano de Construcción Sostenible (CCCS), Colombia's green building council. Four buildings have been certified to the Platinum level, 26 to Gold, 20 to Silver, and 9 are Certified.

And Ruiz's company, Setri, is now working with the same owner of Tierra Firme on a new project (this time as the only environmental consultant) involving development of two towers, one 27 stories and the other 13, and a 5-floor commercial center—all of which are pursuing LEED certification.

Colombia's private sector has taken the first steps toward sustainable construction, and the government is following its lead. Inés Delgado, a project manager and founding shareholder of Construcciones por Colombia, was building the 141,000-sq-ft mixed-use ALPASO Plaza a couple of years ago in an environmentally friendly fashion, but she hadn't planned for LEED certification. "We thought it would be a costly and cumbersome initiative," Delgado says. "Then we ran into SUMAC, a [consultancy] that convinced us to go through the process, though we were very advanced in construction when we decided to go for the certification."

Located in Suba, a large lower- to middle-class neighborhood, ALPASO Plaza has been a boon to the


CUSEZAR
Scotiabank

**Previous page: The plaza at Tiera Firma, a mixed use development, was designed to LEED standards in Bogotá.**

area in northern Bogotá, where the city is most likely to start growing. "The project is interesting, because it's not located in a really popular business corporate center, where you can find a lot of big company headquarters," says Catalina Lozano, marketing director for SUMAC, a company that provides sustainability consulting throughout the Americas.

Attractive shades on ALPASO Plaza's façade keep it cool, and although the structure is air-conditioned, it has sensors to operate air-conditioning at minimal levels. The building also has fully programmable LED lighting and low-water-usage fixtures in bathrooms. It's located at the intersection of two major roadways, as well as in front of a stop on the TransMilenio, a relatively new rapid bus transit system serving Bogotá.

Delgado was interested in making her building green to distinguish it from other office and retail offerings in Bogotá, says Ron Dean, SUMAC's vice president. She was so excited about SUMAC's suggestions for LEED certification that she initially aimed for Platinum, though in the end it achieved LEED Gold for Core and Shell in 2015.

One of the most unique features of ALPASO Plaza is its green rooftop, which captures rainwater for consumption through a 17,000-sq-ft pond; water is then filtered through a treatment plant. The roof is also open to workers for enjoyment and the pond is fitted with a skylight, making plants and fish visible to those below.

Delgado says she foresees LEED certification for all future buildings of Construcciones por Colombia, including an office building in the vicinity of Parque de la 93 in the Chico area. And more and more building developers are following suit, especially within the past five years, as more LEED educational resources have been translated into Spanish, and the LEED AP and Green Associate exams are now offered in Spanish.

"And they just told us at Greenbuild recently that you can now submit your projects in Spanish," Ruiz says. "That's impressive."

The LEED International Roundtable now has results from a pilot program (in which Setri participated) involving three projects, and is poised to approve an alternative compliance path for naturally ventilated projects in the tropics, Ruiz says, which should increase Colombian interest even more.

SUMAC has done its part to spread the creed of LEED by helping to compile a Catálogo Green, which lists current materials and services for the sustainable construction industry in five Latin American countries (www.catalogogreen.com).

"Finding materials in each country that will meet the LEED requirements can be hard," Dean says. "It's not that they're not there, it's just that people aren't aware of them."

As large international companies return to Bogotá, they're demanding high-performance office spaces, which include eco-friendly features, Ruiz says. Office buildings are a growing sector for LEED certification, with shopping malls and hotels not far behind, according to the CCCS's data. Because Bogotá has relatively little parkland for residents, shopping malls are one of the biggest forms of entertainment. And residents, along with international retailers, are demanding the best space possible.

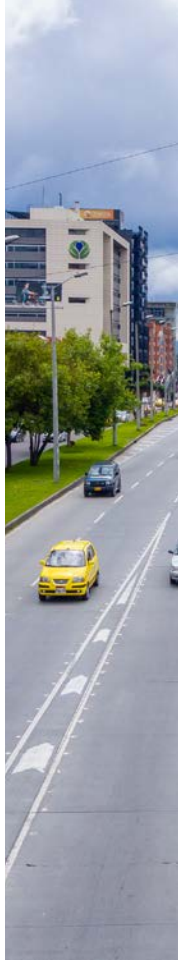
"Something that's amazing is that every new mall or commercial center here has to be LEED," Ruiz says. "The people who are going to buy or lease the big areas in these commercial centers or malls ask for LEED."

Hotels are following suit, especially those being operated by American brands. "[They are] following their sustainable corporate standard, so you can see some of the Holiday Inns, Sheraton…and some others, are being certified," Lozano says.

The push for green buildings in Bogotá, with roughly 8 million residents, has been made as the city attempts to refashion itself as a tech powerhouse, or the Silicon Valley of Latin America. It was big news when Mark Zuckerberg, the chairman, CEO, and co-founder of Facebook, chose Bogotá to host his company's first town hall meeting last January, announcing plans to bring free Internet to Colombia.

Google, Facebook, and Microsoft have opened offices in Bogotá in recent years. And the city is full of educated Colombians who finally have the safety and freedom—not to mention the potential international investment—to attempt to accomplish their dreams of opening businesses.

**An outdoor dining terrace at ALPASO Plaza. Shades on ALPASO Plaza's façade keep it cool, and although the structure is air-conditioned, it has sensors to operate air-conditioning at minimal levels.**

Still, the trend is just in the beginning stages, says René Rojas, a founder of HubBog, an academy for startup tech businesses that offers a co-working campus, a mentor network, and "angel investors."

While 97 companies have been founded in the past eight years at HubBog (84 percent of which are still in business), even the most successful of these businesses don't have green office space as a priority—at least not yet, he says.

"When they grow too large for our campus, they go to an old-style house, because it's cheaper, " Rojas says. "They prefer to invest in people, in tools, like software and PCs and assets. Location is secondary."

However, that doesn't mean there aren't larger, more established international tech companies arriving in Bogotá seeking LEED-certified space and educated employees, he says. But on the part of locally grown businesses, "to observe that kind of behavior, I think we have to wait maybe two or three years," Rojas says.

Delgado agrees: "Bogotá is still far from being able to call itself a Silicon Valley. I think the [CCCS] and green building certified professionals are pushing these practices on local developers."

Still, with the return in 2016 of former Bogotá Mayor Enrique Peñalosa, who created the TransMilenio idea along with an extensive bike path system, residents are getting excited about the possibilities of sustainable lifestyles again, Lozano says.

While Bogotá leads the country with 24 LEED-certified projects and 47 registered, Medellín, with almost 2.5 million people, is the second-largest market with 10 projects certified and 19 registered. Medellín is a slightly different story, where the government has gotten more involved in creating opportunities for entrepreneurs, including mass transportation, Delgado says.

Medellín "is the city where innovation is considered key for region development, and city officials take it so seriously that they have issued public policies and created organizations to foster investments in entrepreneurships," she says, pointing out that while Bogotá created some bike paths, Medellín has invested heavily in a safer system of elevated bike paths that are currently under construction.

Lozano also points out that Manizales, a city of almost half a million people located 60 miles east of Medellín, was found in a recent survey conducted by the Red Colombiana de Ciudades Cómo Vamos, as the Colombian city with the happiest residents. She anticipates that the city will soon see its own share of LEED-certified buildings. Cartagena, the country's fifth-largest city with almost 900,000 people, has been slower to jump on the LEED bandwagon. There is one certified LEED building there, with nine registered. However, Ruiz says he believes that LEED will become ascendant next in Colombia's coastal cities, such as Cartagena, Baranquilla, Bucaramanga, and Santa Marta.

**Google, Facebook, and Microsoft have opened offices in Bogotá in recent years. Colombians finally have the safety and freedom to attempt to open their own businesses.**

"Let's say a big company wants to run a conference—they'd like to set that conference in a LEED-certified resort, for example," he says. "It's the perfect opportunity for our Caribbean coast. We're located perfectly geographically, where we don't get hit by hurricanes."

Lozano says that Cali on the Pacific Coast, which has a free-trade zone, is another candidate for more LEED-certified construction. Currently, SUMAC is consulting on a Hewlett-Packard building in nearby Palmira that will aim for a LEED-certified Core and Shell, she says.

While Colombia's government as a whole has been slow to take up the cause of green building, it has created laws around other sustainability issues, such as reforestation, and has recently passed some initiatives that will regulate use of resources such as water and energy, according to Cristina Gamboa, the executive director of the CCCS.

"This legislation is a very good sign for the market, as more players in the industry will be interested to innovate and invest in green businesses," she says.

Action by the government makes sense, especially as it faces a weather phenomenon known as El Niño. About 70 percent of Colombia's electricity is generated by hydroelectric plants due to the abundance of water resources in the country, says Catalina Morales, SUMAC's engineer in charge of all LEED projects. But because of El Niño, the country has been facing drought conditions, forcing the government to confront possible water and energy shortages.

This year, the country created a decree and resolution requiring minimum percentages of savings in water and energy in new buildings (certain types of housing, offices, shopping malls, hospitals, and schools), which will take effect in June 2016.

"These minimum percentages are broken down by type of project and climatic zoning, and go together with the requirements given by LEED," Morales says. "Thus, if a project decides to opt for LEED certification, [by] default [it] would be complying with national regulations."

Ruiz says it's important that the Colombian government is finally participating in the green building movement, though he says that private developers don't require incentives once they've tried one LEED project.

"After that first project, they fall in love with LEED," he says. "Not the plaque, nor the fact that you can rent your space better or faster or at a little higher price. They like the integrated process that LEED forces them to do. They believe the discipline of building a green building the right way forces the project to be very efficient—the result of making good decisions right from the very beginning."

# GREEN IS THE NEW BLACK

# The industry may be uncharacteristically late to the party, but sustainable fashion is quickly coming into style.

WRITTEN BY **CALVIN HENNICK**

Take a poll of sustainable fashion gurus, and you're likely to hear the same thing in multiple ways: They're currently a small group, but they're poised to set a trend. Lewis Perkins, interim president of the Cradle to Cradle Products Innovation Institute, a nonprofit that certifies sustainable materials in several industries including fashion, says there was "not much movement at all" around sustainable fashion as recently as a couple of years ago. To the extent that fashion designers did focus on environmental and human rights issues, they largely did so on an individual basis, he says. Now, finally, Perkins is starting to see collaborative efforts across the industry. "It's never going to move fast enough for those of us that are advocates in the space," he says, "but the reality is, it's moving faster than it ever has."

"Consumers certainly haven't taken up [sustainable fashion] in the way they've taken up organic food," says Kate Black, author of *Magnifeco: Your Head-to-Toe Guide to Ethical Fashion* and *Non-toxic Beauty*. But, she says, a number of companies are making positive changes anyway, both for business reasons and because they anticipate that shoppers will soon begin paying as much attention to how their clothes are made as to how their food is grown. "Everybody is scrambling to change their ways before consumers realize what they're paying for."

"I would say [the fashion industry] is a lagger, if I'm completely honest," says Shannon Whitehead, founder of Factory 45, an online business accelerator for sustainable fashion designers. She bemoans the "fast fashion" culture that promotes cheap and trendy items that might just as likely find their way into a landfill as into a closet after their first wear. But she's also excited about independent designers like the ones she works with, who take a storytelling approach to their companies, with an emphasis on products that will last. "It's going to take a very small group of early adopters to really create a movement," she says. "We have that small group, but we just haven't gotten to the mainstream yet."

There are a number of possible explanations for why "sustainable" and "fashion" are only recently being put together in the same sentence. For one, it's not immediately intuitive to many consumers how large an environmental impact the clothing they wear can have. While the production of clothes requires resource-intensive processes—such as agriculture, manufacturing and shipping—the average person doesn't think much about how the shirt on his back got there. While it's readily apparent to most people how gas-guzzling SUVs and inefficient buildings can cause environmental harm, they rarely apply the same level of eco-scrutiny to their socks and underwear. And in some ways, the very notion of fashion—with its focus on trends, newness, variety and constant reinvention—may seem inherently incompatible with the ideals of sustainability.

But Perkins says that high-end fashion items are already made to last, and that, even with the change of


**Shannon Whitehead is the founder of Factory 45, an online business accelerator for sustainable fashion designers.**

seasons, there is little danger of them being discarded. "When I think of high fashion, I think of people who stay current," he says. "But those kinds of consumers tend to purchase and hold on to legacy items, and there's a tremendous market for them in consignment boutiques, where a $1,500 dress is going to retain its value and become a vintage piece. It's almost like precious metals like gold and silver. You don't have to worry about them being thrown into the trash."

In fact, Perkins says, high-end designers are uniquely poised to adopt sustainable practices because their customers aren't as price-sensitive as those in the larger fashion marketplace. "The luxury industry has the price points to be able to innovate," he says. "They have the price points to say, we can make this a better, higher-quality, safer dye, and if it goes up one dollar per unit, we can absorb that, because it's already a high price point."

Some luxury shoppers are already coming around to the idea, Perkins says, that beauty should encompass more than just the garment itself and also incorporate the way the apparel affects people and the planet. "I think that's the conversation that's changing in the luxury market, where the discussion is about how, to be to be truly beautiful, there aren't any ugly stories that you're going to uncover."

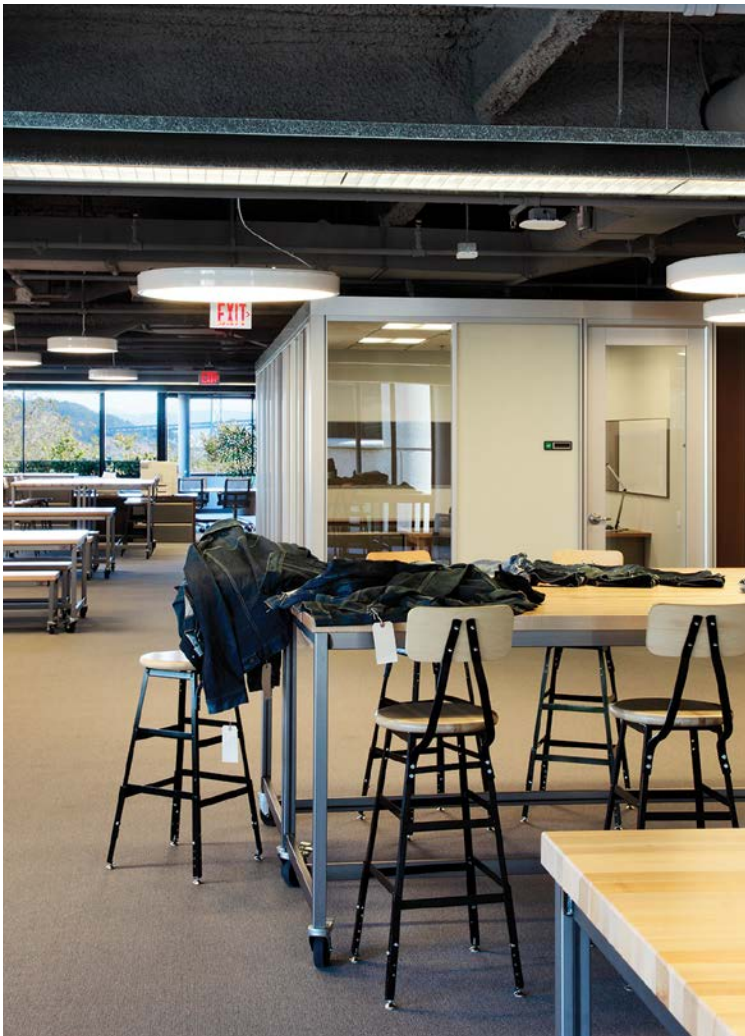
Black argues that there's nothing inherently unsustainable about fashion, and says that the emphasis on constant turnover is a recent phenomenon. "When you look at something like a kimono, it's a lifetime garment," she says. "I think fashion really was sustainable up until the last 30 or 40 years when we got into this idea of everything being new, and [utilizing] mass production overseas. I think we're just going back to how things used to be—well-made garments that we have a connection to."

As in any industry, a number of factors will have to come together in order for sustainability to become the new normal in fashion. Not too long ago, "green" was a relatively novel concept in the built environment, as evidenced by the dramatic growth in the numbers of U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED)-certified buildings over just the past few years. Early adopters

**Previous page: Lewis Perkins is the interim president of the Cradle to Cradle Products Innovation Institute. Photo: Emily Hagopian**

**Right: Kate Black is author of *Magnifeco: Your Head-to-Toe Guide to Ethical Fashion* and *Non-Toxic Beauty*.**

**Below: Levis' Water<Less™ techniques substantially reduce the amount of water needed in the finishing process when making jeans.**




long ago embraced concepts like solar panels and efficient heating and cooling systems, but it took industry-wide standards like LEED to create a larger marketplace for sustainable building materials. As more suppliers competed to create products that met the standards, prices came down, and in many cases have reached a "tipping point" where they are attractive to mainstream developers (rather than just to developers specializing in sustainable projects). As green buildings became more prevalent, more businesses and landlords began to see how energy and water efficiency could save them money. At the same time, governments and other institutions began requiring that new buildings be built to green standards, and today the basics of green building have entered the public consciousness.

While sustainable fashion advocates acknowledge that the industry hasn't kept that same pace, they can point to activity that mirrors each step along the pathway. Certainly, the designers working with Whitehead at Factory 45 bring the same enthusiasm and creativity to their work that early green building advocates did, and also have the benefit of several more years of green products and practices to draw from. Black points to the steps around corporate responsibility and sustainability that a number of large apparel companies are already taking, which she says is evidence that they see a business case for green practices. And Perkins sees emerging fashion sustainability standards, including Cradle to Cradle's own standards as well as the Sustainable Apparel Coalition's Higg Index, as analogous to LEED in that they provide a new level of transparency and accountability around materials used in the industry.

Whitehead says that the designers she works with—her "group of early adopters"—are approaching sustainability from a place of passion and appealing to a younger demographic of shoppers who are more eco-conscious than previous generations "I think the millennial generation is putting pressure on the brands, because they care about where their clothes are coming from," she says. "They're much more particular about where they're spending their money. Now that they have more purchasing power, the bigger retailers are feeling [that] pressure to create transparency within


**The 300,000-square-foot San Francisco headquarters of Levi Strauss & Co. was certified LEED Gold after a recent renovation. BAR architects were the executive architecture firm on the project.**

the supply chain. And the smaller brands are putting pressure on the bigger brands, as well."

Even in cases where consumers still aren't fully aware of sustainability issues, Black says, a number of companies are "greening through the backdoor"—quietly making changes in their supply chains that benefit both the environment and their bottom line. These companies, she says, may not want to draw too much attention to their green practices at a time when some of their other processes may continue to be less-than-ideal. But, she says, the result is the same, regardless of the motive or how much attention the changes get: When a company takes steps to reduce water use or packaging materials or shipping distances, people and the planet benefit.

"I don't know whether [companies] are empathetic to the planet or empathetic to their businesses," Black says. "It's not clear what the motives are, but the motives are leading to change."

While eco-friendly changes in corporate practices and consumer concerns are welcome, Perkins suggests that a true sea change will come about when standards and regulations simply make it unacceptable for companies to continue environmentally destructive practices.

"This is where third-party verification comes in," Perkins says. "As we change the conversation around what is acceptable—what chemistry is being used to produce all the things we make, what labor practices are employed to make the things we make—as we change the conversation, consumer awareness about the impact of products will shift. We'll get to a point where so many products will be third-party verified and meet a certain production guideline, that you just wouldn't dip below that anymore."


"It's like with buildings," Perkins adds. "At some point we're going to get to a place where all buildings must be energy efficient. That's the future state. It's where we're headed. I think it's going to be the same for apparel."

## Forward-Thinking Fashion

For some apparel giants the future is now. A few iconic brands have been focused on ways to make the garment industry greener for close to a decade. For instance, in 2007, Levi Strauss & Co., maker of the iconic 501 jeans, conducted what it says is the apparel industry's first-ever lifecycle assessment study—focusing primarily on the company's U.S. operations to determine the environmental impact of certain products.

The findings were many, but one stands out: From the day the cotton is planted to the day they're tossed into the trash, a pair of jeans uses up a lot of water. To be exact, the average 501s go through 3,781 liters of water throughout their entire lifecycle. That's enough

## LEED Highlights

**Levis**
The 300,000-sq-ft San Francisco headquarters of Levi Strauss & Co. was certified LEED Gold after a recent renovation. The building repurposes more than 25,500 pairs of blue jeans as insulation.

"They really wanted it to be an environmentally efficient–as well as inviting–space that would help serve as a creative expression of who they were," says Linda Crouse, director of marketing for BAR Architects, which served as the executive architect for the project.

The building also includes features like efficient HVAC systems and bike storage.

This January, Levi Strauss & Co.'s Henderson, Nevada, distribution center achieved LEED Platinum certification, with the help of features such as a reflective white roof (especially helpful in the desert sun), LED lighting and motion-sensor lights, and a green cleaning program.

In addition to being more environmentally friendly, the center will be good for the company's bottom line. Through water savings, energy efficiency upgrades, and tax abatements from the state, the center will save approximately $60,000 in each of the next 10 years, the company estimates.

**H&M**
Set to open in the spring of 2016, H&M at Westfield World Trade Center–the company's first store in lower Manhattan–will also be the retailer's first U.S. location to apply for LEED certification. The 25,000-sq-ft space will incorporate recycled materials throughout the store and use LED lighting and ENERGY STAR–certified equipment.

**Kering**
In 2014, Kering announced that Luxury Goods International (LGI), the Swiss-based Kering Group subsidiary that manages distribution and logistics for most of Kering's luxury brands, achieved LEED Platinum for its distribution center. The center was the first distribution hub in the luxury sector to attain the designation, and uses 43 percent less energy and 70 percent less water than a comparably sized conventional building.


**The interior of H&M's newest location will operate on renewable power sources and will use less electricity than conventional retail spaces.**

**The interiors of the Levi Strauss & Co. overlook San Francisco Bay.**

to meet the needs of the average U.S. household for three days.

If it's startling that creating and caring for a pair of jeans takes up enough water to fill a small swimming pool, then one of the company's water-reducing solutions is perhaps also a touch surprising. Customers can help fix the problem, Levi's suggests, by washing their jeans less often.

Your mom may not approve, but fashionistas have long touted the style benefits of leaving your blue jeans unwashed. If you buy them a bit tight and break them in, the thinking goes, they will have a lived-in, fitted look that can be destroyed by washing. Jean-washing skeptics also say that unwashed jeans last longer, as washing can break down fibers and fade dyes. Now, they can add environmental reasons to their list of arguments.

"It's time to rethink autopilot behaviors like washing your jeans after every wear because in many cases it's simply not necessary," says Chip Bergh, the president and chief executive of Levi Strauss & Co. "By engaging and educating consumers, we can fundamentally change the environmental impact of apparel and, ideally, how consumers think about the clothes they wear every day."

More than two-thirds (68 percent) of the water used in the lifecycle of a pair of jeans is consumed during the cotton-production process, but consumer care (i.e., washing) has the second-largest impact, accounting for 23 percent of the total water used.

Consumers in the U.S. wear their jeans an average of 2.3 times before washing them, according to the lifecycle study. If that was increased to an average of 10 times, the company says, water use could be reduced by 77 percent.

It's easy, of course, for a company to call on consumers to change their behavior, but Levi's is also taking dramatic steps of its own. In a series of techniques the company calls Water<Less™, the company is substantially reducing the amount of water needed during the finishing process; for example, by removing water from some stone washes and combining multiple wet-cycle processes.

Last March, Levi Strauss & Co. announced that the program had saved 1 billion liters of water since 2011. That number could soon be dwarfed. While the company currently makes around 25 percent of its products using Water<Less™ processes, it plans to push that number up to 80 percent by 2020.

Another Goliath in the apparel arena is also pushing the envelope in terms of sustainable ready-to-wear. In March 2015, fashion companies Kering and H&M announced a partnership with a United Kingdom company called Worn Again to test that company's processes for reclaiming raw materials from used clothes.

Worn Again says that its textile recycling technology is the first of its kind, able to separate polyester and cotton from end-of-use clothing. The partnership with Kering and H&M is aimed at bringing these processes to market.

"Our technology is at the heart of a global vision that will engage all brands, textile recyclers, suppliers, and consumers in a unified ambition to keep clothing already in circulation out of landfill, and as part of a global pool

**Gigi Hadid walks the runway wearing Balmain x H&M collection during their launch event in New York City.**

of resources to be used time and time again," says Cyndi Rhoades, chief executive of Worn Again. The company, founded in East London in 2004, began as a business-to-consumer "upcycling" company, but since 2007 it has focused on business-to-business consulting and has worked on zero textile waste projects with companies like Virgin Atlantic and McDonald's.

H&M and Kering (through its brand PUMA) will monitor testing of Worn Again's fiber extraction and recycling technology, during which time the reclaimed raw materials will be converted into yarn and fabric. The companies hope that the tests will demonstrate that the technology is commercially viable.

"Innovation is what we need to solve our global environmental challenges," says Marie-Claire Daveu, chief sustainability officer and head of international institutional affairs at Kering. In addition to PUMA, the French company also owns brands such as Gucci and Stella McCartney. Daveu calls the collaboration with H&M and Worn Again "a great example" of this necessary innovation and says the company hopes to use sustainable raw material sourced from the recycling technology in its sport and lifestyle brands.

According to Worn Again, approximately 65 million metric tons of polyester filament were produced globally in 2014. By 2020, the company says, the global demand for the fibers is projected to increase to 90 million metric tons.

Anna Gedda, head of sustainability at H&M, says her company is also excited about the collaboration. "It brings us closer to our goal of creating fashion in a circular model," she says. In the long run, this can change the way fashion is made and massively reduce the need for extracting virgin resources from our planet."

According to Worn Again, approximately 65 million metric tons of polyester filament were produced globally in 2014. By 2020, the company says, the global demand for the fibers is projected to increase to 90 million metric tons.

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As of August 2015

# Eco by Example

## Habitat for Humanity has just completed construction on its largest net-zero and LEED Platinum for Homes affordable housing development to date.

By Kiley Jacques

Making this feel like a special community was a key goal," says Susan Roeder about Habitat for Humanity's Eco-Village in River Falls, Wisconsin. As director of public affairs at Andersen Corporation (one of the project's many partners), Roeder, like all involved, played a very hands-on role from the start.

The idea for a residential neighborhood based on the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) for Homes benchmarks originated with a small consortium of people from the city of River Falls, the University of Wisconsin (and its Sustainability Institute, which focuses on large-scale applications of sustainable building practices), Frisbie Architects, and St. Croix Institute for Sustainable Community Development, among others. The design phase got underway in 2011; they broke ground in 2012; and the last home was completed this past December. Eco-Village encompasses 18 homes on 7 city-donated acres and represents a growing number of progressive community building projects put forth by Habitat for Humanity.

"Andersen has had a long relationship with Habitat for Humanity," explains Roeder, who together with her colleagues, came on board during the design phase. "Habitat had the land but didn't know what they were going to do with it in terms of housing." In fact, the plot could have served any number of purposes. Once a city composting site, it proved a viable (and valuable) resource, as it borders a large green space with walking trails and is close to an elementary school. "It was a beautiful chunk of land," recalls Roeder. "Habitat was pretty thoughtful, knowing they could have a big impact on the city."

**Dave Engstrom of Habitat for Humanity.**

Architects, business owners, and area residents joined a series of community meetings to sketch out a plan. "That's a really special way to develop a plot of land," says Roeder, noting the unique role the St. Croix Institute for Sustainable Community Development played. "They had college professors and students all dreaming about what components could really be part of a community development of this sort."

As Roeder describes it, the residents in this village have helped build not only their own homes but also those of their neighbors. They have worked side by side literally building their community—both physically and socially. "It's very empowering to

PHOTOGRAPHY BY ANGELA JIMENEZ


**Resident Robert Smith says sustainability is harmony…to live in harmony with one another, within a community, and with the environment.**

hammer in nails on your own home," says Roeder. "And to be part of a new effort with Habitat for Humanity takes it to the next level. The homeowners are cognizant of that and really proud. They understand that it is a model that is much bigger than just them."

Resident Robert Smith says, "The big word is sustainability but you need a dictionary to go along with that word. It's about harmony…to live in harmony with one another, with a community, with the environment—to me, that's natural, and that's the idea of Eco-Village."

This group of homes can claim a 50 percent reduction in potable water use through rain- and storm-water barrels and cisterns; a carbon-negative, net-zero energy footprint; and zero emissions for community transportation. Furthermore, 90 percent of the construction waste was diverted from landfills; 25 percent of the building materials were locally sourced; and the homes are built to be storm and tornado resistant. Other sustainable initiatives include shared gardens, solar panels for electricity and heating water, water-based in-floor heating systems, mini-splits for electrical HVAC systems, permeable pavers that allow water to seep into the ground (versus running into nearby St. Croix River), green spaces, and even a proposed fleet of electric cars for the neighborhood. All told, Eco-Village is the largest LEED Platinum and net-zero affordable community by Habitat for Humanity in the U.S.

But its greater value, according to Smith, lies elsewhere: "It's not just about energy in terms of what comes through the wires, it's about energy of the soul…creating a space in which people can thrive in very positive ways—that's everything."

The partners looked at all the options for making the homes both energy efficient and economical. "They had to be affordable," stresses Roeder. "Habitat was really smart; they used off-the-shelf technology, which was just coming of age and becoming more commonplace." By way of example, she describes the structural insulated panels used for walls. "It's like putting together puzzle pieces rather than traditional two-by-fours and 16-penny nails," she explains. "They made it very volunteer friendly." Which, of course, helped keep costs down.

Further savings measures included sourcing in-kind donations of building materials. With so many projects to their credit, Habitat for Humanity is highly skilled at finding the best product for the best price when they do need to purchase supplies. For this project, Roeder says, they chose "products at the right price point that provided the right level of energy efficiency and performance." She notes,

**The Eco-Village is the largest LEED Platinum and net-zero affordable community by Habitat for Humanity in the U.S.**

too, the misconception that being green requires sizable discretionary incomes. "You can always go to the 'Nth' degree, the top-of-the-market, highest-performing products, but they didn't need over-the-top to get these homes to be net-zero," she explains. "That's really one of the most compelling pieces about this project. Habitat has demonstrated that, with the right approach, it's not necessary."

Those cost-savings efforts and informed choices directly affect residents like Mark Tamminga, who is grateful to be able to live in a home where he can afford to turn the heat on. "I think most people take that for granted, but for me, it is heavenly—it's about having dignity."

In the three-year time span in which the homes were completed, it's interesting to note that while house No.1 was the model when they began, it's house No.18 that will be the usable template. "We learned so much along the way," says Roeder, noting how things constantly evolved as the project unfolded. For instance, the roof pitches in combination with the solar panels on the first few homes were not volunteer friendly. By the time they got to the last group of homes, however, solar power panel technology had improved such that they could change the roof pitch, which made it safe for volunteer builders, which saved money since they no longer needed subcontractors to perform the work.

A zero-interest, 30-year mortgage is Habitat for Humanity's model. They serve the working poor—people who make too much money to qualify for government aid but not enough to qualify for a traditional mortgage. Primarily first-time home buyers, Eco-Village residents learn some basic skills, like how to manage their homes once they are in them, how to track their budgets, how to maintain the grounds, etc. "Habitat serves those families and education is absolutely key," says Roeder. Beyond that, part of the agreement is that residents let their homes be monitored by Habitat for the first five years.

There is also a behavioral piece to the program. "Behavior is such a big component of how you make your home perform at its best," notes Roeder. Locking windows and closing doors when running out to the mailbox are examples of activities that will be monitored to watch for spikes in usage. "The homeowners are all in on this effort, which is pretty special," says Roeder, adding that the residents' shared focus has (happily) shifted from having a home to live in to achieving lower energy bills. Some of them don't owe anything on their electric bills; others are putting energy back into the grid. "What's unique about Eco-Village," explains Roeder, "is the technology behind these homes and how empowering it is for these families to be taught that up front, and then engage in it over time and really see the benefit to the bottom line."

Habitat International staff have visited this site to better understand and potentially replicate it elsewhere. "Net-zero building is a keen interest for Habitat," says Roeder. And, with Eco-Village, they have a highly informative, user-friendly model to share. From beginning to end, the entire project was very well documented. And, as it's not proprietary, it's adoptable, which bodes well for future buyers, builders, communities, and the environment. As Roeder puts it: "The more folks we can get into homes like this, at an affordable price, the better." ●

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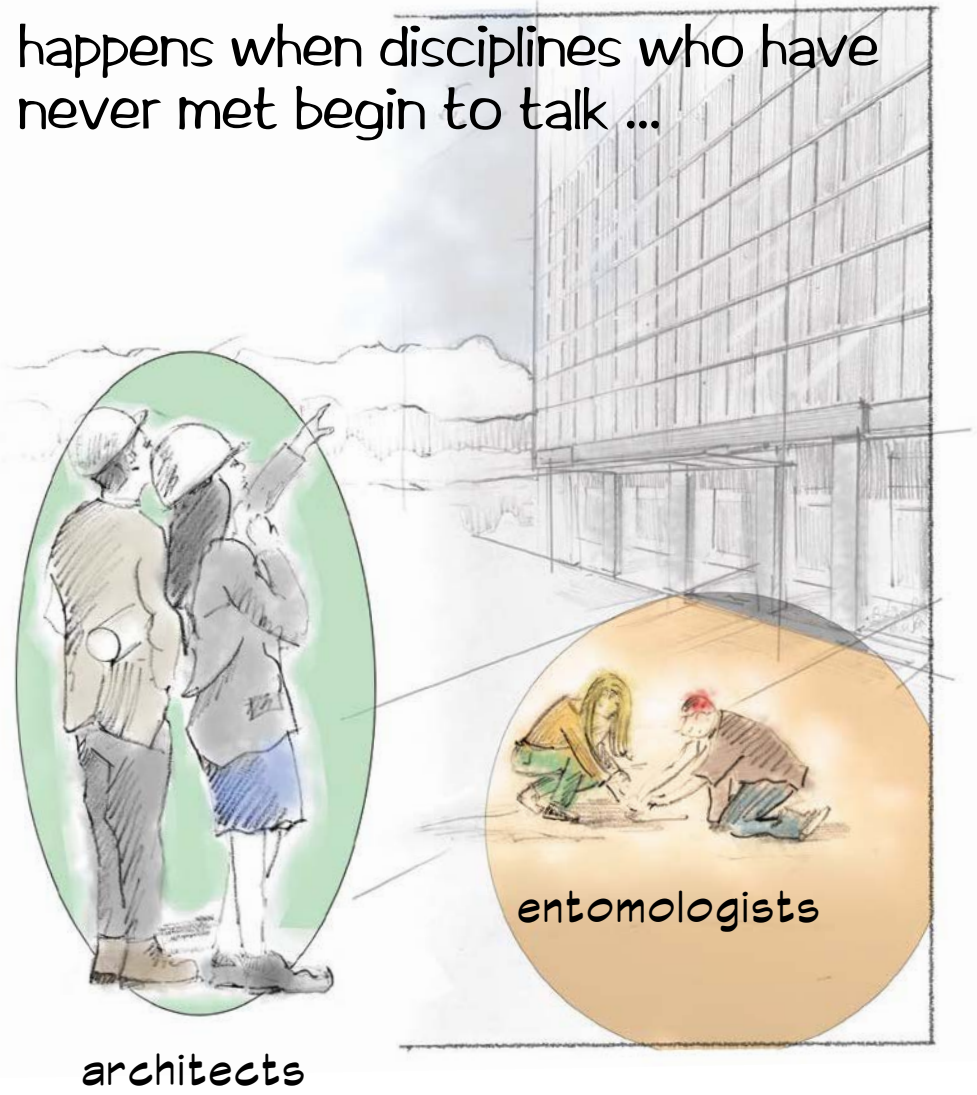


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# ADVERTISER INDEX

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# Q&A

## Honorable Katherine Hammack, Assistant Secretary of the Army (Installations, Energy and Environment)

The Honorable Katherine Hammack was appointed the Assistant Secretary of the Army for Installations, Energy and Environment (ASA IE&E) by President Obama on June 28, 2010. She is the primary advisor to the Secretary of the Army and Chief of Staff of the Army on all Army matters related to installation policy, oversight, and coordination of energy security and management.

### Q. What are some of your responsibilities in your role with the U.S. Army?

As the Assistant Secretary of the Army for Installations, Energy and Environment, I am responsible for policy and oversight of sustainability and environmental initiatives; resource management, including design, military construction, operations, and maintenance; base realignment and closure (BRAC); privatization of Army family housing, lodging, real estate, and utilities; and the Army's installations safety and occupational health programs.

### Q. What has been your greatest achievement in your 5 years in this position?

I am proud to lead a team to establish the Army's Net Zero program, publish a comprehensive Energy Security and Sustainability Strategy and create the Office of Energy Initiatives (OEI).

The Net Zero Strategy is the cornerstone of the Army strategy for sustainability and energy security. This strategy is based on the principles of integrated design, which will ensure the Army of tomorrow has the same access to energy, water, land, and natural resources as the Army of today. The Net Zero approach consists of five interrelated steps: reduction, re-purpose, recycling and composting, energy recovery, and disposal. The approach has been adapted to each of the three Net Zero focus areas of energy, water, and waste. Net Zero Energy Installations reduce overall energy use, maximize efficiency, implement energy recovery and cogeneration opportunities, and then offset the remaining demand with the production of renewable energy from onsite sources.

Building on what the Army has learned from Net Zero, in May 2015 we published a comprehensive Energy Security and Sustainability (ES2) Strategy that provides strategic direction for efficient and effective use of our critical resources. The ES2 Vision is a clear guide to our future— "A ready and resilient Army strengthened by secure access to the energy, water, and land resources in order to preserve future choice in a rapidly changing world."

### Q. What are some of your greatest obstacles?

One of the biggest obstacles we face is the fact that funding levels are not keeping pace with the reality of the strategic environment and increasing world threats. The 2016 budget approved by Congress is much less than our budget in 2013. As a result, the Army has had to accept significant risk by reducing manpower and minimizing, delaying, or deferring modernization programs and infrastructure sustainment. The 2017 funding levels may be reduced again, which would result in a dramatic decrease in our infrastructure modernization and construction, as well as a deferral of key modernization programs.

**For more Q&A, visit plus.usgbc.org.**

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