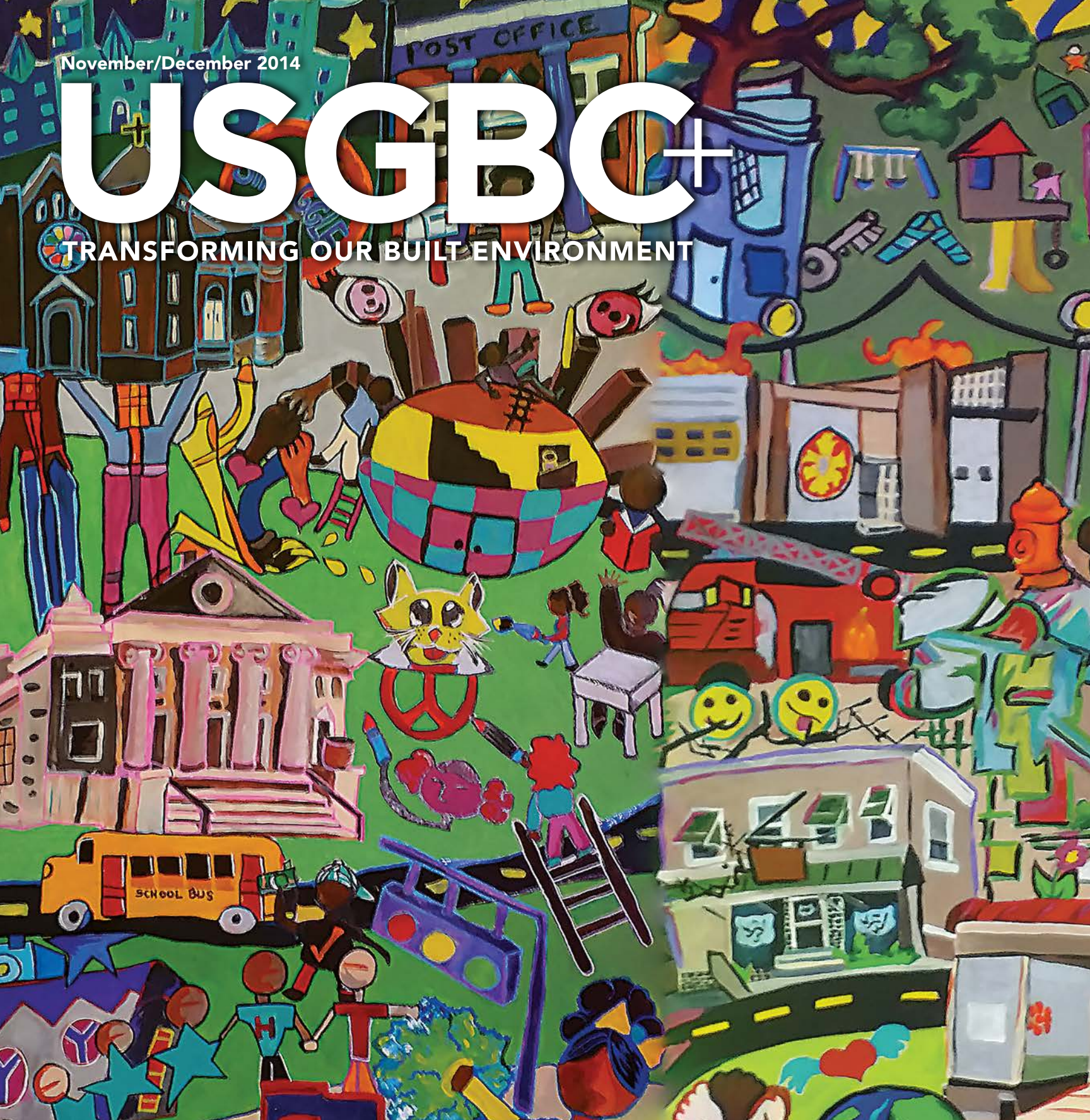


November/December 2014

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## BUILDING

Virginia Beach City Public Schools integrates sustainability into its buildings as well as classroom teachings.

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**ON THE COVER**

Students re-envision their neighborhood through illustration.

During Artist Danyett Tucker's mural residency program at Hamilton Elementary/Middle School, students celebrated their community by remodeling Main Street and adding their own businesses. The students created all of the drawings and then Tucker collaged their individual efforts together to create the scene that now proudly covers their lunchroom wall.

*Courtesy of Hamilton Elementary/Middle School in Baltimore, MD.*



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Mural of Main Street, 2014; Courtesy Hamilton Elementary/Middle School

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## CURRENT LEED STATISTICS

AS OF NOVEMBER 20, 2014

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CERTIFIED: **26,015**

REGISTERED: **42,145**

LEED FOR NEIGHBORHOOD DEVELOPMENT: **404**

Gross square footage of LEED projects ▶ **12.2 billion**  
Includes LEED-certified, LEED-registered

LEED for Homes Units ▶ **179,267**

CERTIFIED UNITS: **66,299**



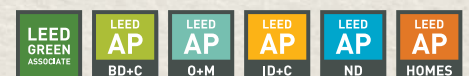
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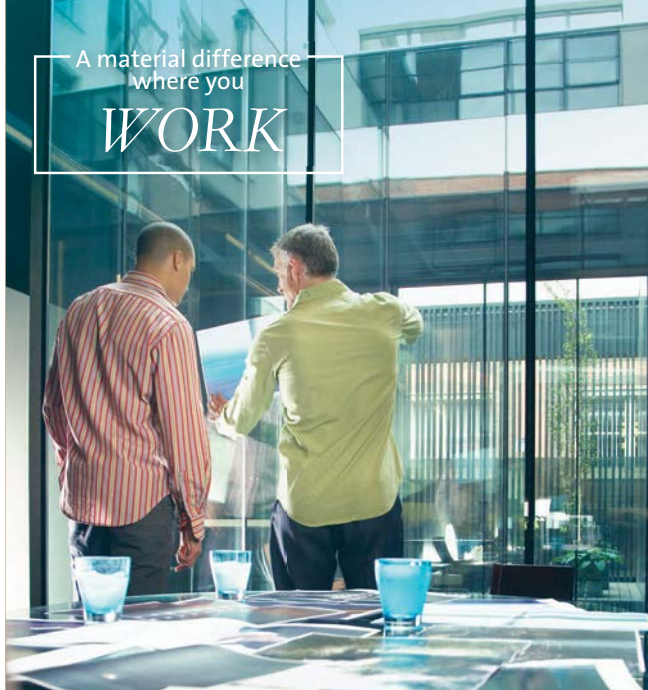
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# Playing the Scale: Redefining **Community** for a **Resilient Future**



**Harriet Tregoning**

Director of HUD's Office of Economic Resilience

**T**raditionally, the word “community” conjures the notion of a small geographic area: a city block or small neighborhood, where you might enjoy a potluck at the local recreation center or get together with your neighbors to do an alley cleanup.

More and more, however, changes in the way we interact with one another—as well as our recognition of common interests—are redefining the term community into something that morphs those geographic boundaries. These days, we are just as likely to think of our online communities the same as we are about our next door neighbors when we consider those who share common characteristics and have mutual interests. Likewise, when addressing the community-scale challenges of the 21st century, we are not bound by the solutions discovered in our own zip code.

To build resilient communities—to prepare for climate change, to make critical infrastructure decisions, and to establish new physical and business models—we must plan, develop, and invest at different scales and, often, outside our neighborhood or jurisdictional boundaries.

Not only do we have the ability to use the strengths and tools developed in communities to effect change at different scales, but we also have the obligation to do so. Many of the fundamental building blocks for a healthy and resilient community—reliable transportation, a clean and dependable energy supply, healthy schools, healthy and affordable housing, robust opportunities for employment and economic development—can't be tackled by one zip code or census block at a time and operate at a regional scale.

At the Department of Housing and Urban Development's Office of Economic Resilience, we are working with communities and regions around the country to find new ways to apply the criteria of sustainability, health, and resilience in public investments and apply those decisions across city, county, and even state lines. By replicating successes at scale, we will not only be able to leverage strategies to conserve resources, but also will better prepare ourselves for future challenges. HUD will also be a step closer to succeeding in its mission of creating strong, sustainable, inclusive communities and quality affordable homes for all.

The U.S. Green Building Council (USGBC) continues to be a critical voice and resource for how green and healthy physical development is core to the concept of resilient communities. Their Center for Green Schools is transforming the places where we learn; and empowering children, scholars, and teachers to act as community and environmental stewards. Their Leadership in Energy and Environmental Design (LEED) rating system provides a toolkit and a blueprint for building and maintaining sustainable buildings, and LEED for Neighborhood Development program looks beyond individual buildings to green neighborhoods, measuring everything from walkability to green infrastructure.

USGBC's solutions for healthy and resilient communities work at different scales—from a single shop at the town center to an entire neighborhood, which provides many entry points, tools, and resources for communities wherever they are along their journey to sustainability and resiliency.

It is harder to cross property, neighborhood, and jurisdictional boundaries to address the critical issues that confront us, but we find we must match our approach to the scale of the problem. Together, our collective efforts can transform our communities—whatever their scale—into more vibrant, diverse, economically competitive, and resilient places.

LEED ON,

**Harriet Tregoning**



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**Calvin Hennick** has written feature stories for a number of national magazines and newspapers including the *Boston Globe*, *The Philadelphia Inquirer*, *New York Press*, *Men's Health*, *Running Magazine*, and *Eating Well* among others. He is a creative writing instructor at the University of Massachusetts.



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**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.



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**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.

A hand is shown holding a black-framed square graphic. The graphic has a green background with a faint, stylized city skyline. Overlaid on this is the text "BUILD YOUR POTENTIAL" in large, white, bold, sans-serif capital letters. The background of the entire advertisement is a white sketch of a city skyline with various buildings and trees.

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# Taking the Challenge

By Jeff Harder

Pittsburgh 2030 aims to reduce its energy consumption and transform the city as a leader in sustainability.



When the Pittsburgh 2030 District branched out this past August, its reputation preceded its expansion. After just two years, the initiative had already guided a disparate assortment of property and business owners down a path toward creating high-performance, energy-saving buildings in the city's Downtown. But when Pittsburgh 2030 added a second district in the adjacent Oakland neighborhood, the early response to the voluntary program exceeded the sunniest expectations: 244 buildings comprising 24.5 million square feet of real estate came under the program's umbrella right away.

"We launched with 81 percent of the total square footage committed to the program," says Sean Luther, senior director of the Pittsburgh 2030 Districts at Green Building Alliance. "That was just a jaw-dropping stat once we added it all up."

It's not the only impressive number: Since launching in 2012, the Pittsburgh 2030 Districts have committed close to 60 million square feet of real estate to meet targets outlined in The 2030 Challenge, an aggressive approach to mitigating buildings' energy usage. By 2013, the buildings in Downtown Pittsburgh surpassed the Challenge's first-year energy reduction target. Through improving existing structures to reduce consumption of fossil fuels and water and improve indoor air quality, the Pittsburgh 2030 Districts aim to create properties that benefit the environment as well as the bottom line. And in taking a grassroots approach, the Pittsburgh 2030 Districts have mobilized the business community to make a profound impact.

**Since 2012, the city of Pittsburgh has committed 60 million square feet of real estate to meet the 2030 Challenge.**





**“We launched with 81 percent of the total square footage committed to the program... a jaw-dropping stat once we added it all up.”**

— SEAN LUTHER, SENIOR DIRECTOR OF THE PITTSBURGH 2030 DISTRICTS AT GREEN BUILDING ALLIANCE

In 2007, the nonprofit group Architecture 2030 issued The 2030 Challenge, a set of ambitious objectives for folks in the building sector to curb their energy use and emissions: New buildings, for example, aim to be carbon-neutral by 2030, while existing buildings seek to reduce energy consumption by half over the same span. The Challenge manifested in the 2030 Districts, a series of voluntary public-private partnerships in cities across North America that connect businesses, property owners, local governments, community groups, and other organizations to benchmark their performance and encourage solutions that meet the aims of The 2030 Challenge. Seattle 2030—the first 2030 Districts—launched in 2011, four others have come to fruition since, and at least 10 more are in development.

Once an industrial mecca, Pittsburgh and western Pennsylvania have been reinventing themselves for the 21st century, Luther says. “It’s a region that understands that our next economic surge isn’t going to come from heavy industry, but from identifying the hardware and software that are going to help us achieve those 2030 goals.”

The Pittsburgh 2030 Districts began when Green Building Alliance (GBA), a Pittsburgh-based U.S. Green Building Council (USGBC) chapter that’s been promoting green building practices in western Pennsylvania since 1993, instituted a strategic plan calling to effect change on structures already present in the city. “The reality is that most of the real estate in Pittsburgh—especially Downtown—is already here,” says Luther. “We were looking for a program that would move the needle on the existing real estate market.” After seeing the progress made in the Seattle 2030 District, GBA began gauging the interest of business and property owners in Downtown Pittsburgh. Large, forward-thinking organizations like PNC Financial Services, BNY Mellon, and the City of Pittsburgh signed on right away, and the district launched with more than 30 percent of Downtown’s square footage committed to the

program. By the end of the year, Luther says, that number moved to 50 percent.

Today, there are more than 80 property, community, and resource partners spread between Downtown and Oakland, and the results have been emphatic and swift. By 2013, Downtown saw an 11.6 percent decrease in energy consumption. “That’s equivalent to taking almost 8,000 homes off the grid in western Pennsylvania,” Luther says.

The Pittsburgh 2030 Districts’ first step toward those reductions was simple: Help partners understand how much energy they were expending in the first place. “Big, big owners that signed on to the program weren’t tracking their energy usage. They viewed it simply as the cost of doing business,” Luther says. Using Energy Star’s Portfolio Manager software, the Pittsburgh 2030 Districts team provides data to its constituents on how their properties perform against national averages—as well as their peers in Pittsburgh—and formulate specific plans to reach 50 percent energy reductions, which could include HVAC overhauls, improvements to the building envelope, lighting retrofits, and so forth.

Six times a year, these partners meet in closed-door, confidential sessions to talk about improvements they’ve made and share stories of energy-saving initiatives that inspire their peers to make similar changes. One property owner, for example, made a presentation about a newly installed on-demand elevator system and escalator retrofit in front of an audience due for their own upgrades. Several others have spoken about having their cleaning crews work during the day instead of at night, which allows for earlier shutdown of lighting and HVAC systems, improves social equity for housekeeping staff, and requires no extra funds to put into action.

“This is a completely non-prescriptive program,” Luther says. “We don’t mandate that everyone needs to go into the parking garage and change their metal halide lighting to LED. Each property owner makes decisions on what and when

**The Tower at PNC Plaza in downtown Pittsburgh is dedicated to the challenge.**

Photo: PNC Realty Services

to invest in their building on an individual basis. At its heart, we're really cataloging and celebrating success in improving building performance in western Pennsylvania."

Credit the widespread adoption to how the Pittsburgh 2030 Districts deliver the message. Western Pennsylvania is subject to the same effects of climate change afflicting the rest of the Northeast—hotter summers, warmer winters, more intense and frequent rainstorms—and the Keystone State produces 4 percent of the nation's greenhouse gas emissions. But, Luther says, some of Pittsburgh 2030 partners do not list climate change as their top priority: Instead, they signed on because learning how to reduce operating expenses would make their buildings attractive to prospective tenants. "The end result [of the program] is moving the needle on climate change, but it's important that that not be the only conversation piece," he says.

Despite the success so far, Luther says plenty of work lies ahead, including developing benchmarks for water consumption and indoor air quality. Over time, the Pittsburgh 2030 Districts intend to merge Downtown and Oakland into a single program. GBA is also exploring how to adapt the 2030 Districts model to western Pennsylvania's suburbs, office parks, and other settings beyond the confines of cities—and the organization is excited to see the results of the 2014 progress report, which will include metrics of Oakland's performance for the first time.

In a broader sense, the concrete numbers behind the Pittsburgh 2030 Districts make the best case for Pittsburgh as a city undergoing a true transformation. "All cities—especially their downtowns—market themselves as green," Luther says. "The 2030 Districts allow us to show what our energy performance looks like, that this is a long-term goal that our private and public sectors have committed to. We'll be able to say, 'We're a high-performing city, we're a healthy place to live, and here's the number that indicates that. What's yours?'" ●



# Community Health

Kaiser Permanente takes a holistic approach to healing its patients and the environment.

By Mary Grauerholz

**Opposite page: Kathy Gerwig, Kaiser Permanente's environmental stewardship officer.**

Photo: © Eric Millette

For places of healing, hospitals have emitted notoriously toxic substances—to say nothing of the noxious waste the structures discharge. Until the turn of this century, not much thought was given to the contradiction this posed.

Kaiser Permanente, the prominent healthcare provider based in Oakland, California, has been turning this notion on its head. Kaiser Permanente executives maintain that hospitals should be healing environments and that healing is done best in clean, “green” environments. The same environmental stewardship, the organization maintains, can transform communities for better health for residents overall. In 2013, Kaiser Permanente invested \$1.9 billion in the environment, people, knowledge, and communities through sponsorships and partnerships with community health clinics and other nonprofits with similar social missions.

Also in 2013, the organization made a commitment to seek a minimum of Leadership in Energy and Environmental Design (LEED) Gold certification for new construction of its hospitals, large medical offices, and other major projects. The effort is expected to affect as many as 100 buildings and millions of square feet over the next 10 years.

Kaiser Permanente has spent much of the last 50 years cultivating enlightened environmentalism far beyond LEED construction, as part of its mission to create healthy communities. This includes early involvement in the healthcare industry's efforts to address the issue of medical waste; hospitals generate some 7,000 tons of waste per day, or more than 2.3 million tons a year. In 1963, before environmentalism was a household word, Kaiser Permanente invited Rachel Carson, author of the groundbreaking environmental treatise, *Silent Spring*, to speak to its staff physicians and scientists. It was Carson's last public appearance before her death.

The same principles gathered new steam in 2001, when a Kaiser Permanente executive visited a neonatal intensive care unit in San Francisco and questioned the use of medical equipment that contained DEHP, a phthalate used to soften some plastics. Kathy Gerwig, Kaiser Permanente's environmental stewardship officer, details that experience in her new book, *Greening Health Care, How Hospitals Can Heal the Planet*, along with the ensuing efforts she and others in the





healthcare industry have made to embrace environmental stewardship as part of their commitment to improve the health of communities.

Kaiser Permanente thinks of its mission in terms of “total health,” and advocates for a healthcare system that treats the minds, bodies, and spirits of patients. “We invest significant resources in programs that improve the health of our communities because we know ensuring good health extends beyond our doors,” Gerwig says. “It begins with healthy environments, fresh fruits and vegetables in neighborhood stores, successful schools, clean air, accessible parks, and safe playgrounds. These are the vital signs of healthy communities, and Kaiser Permanente is committed to working with our many community partners to create them.”

The organization recently funded \$90,000 to the Oakland-based Alliance for Climate Education (ACE) to support its ongoing initiatives to build climate-change solutions with youth in schools. ACE works with high school students, equipping them to be the next generation to lead lasting climate solutions for a healthy planet and thriving communities. So far, ACE has educated 1.77 million high school students nationwide and mentored youth to lead energy and waste reduction projects, spread awareness about climate solutions, and explore green majors in college. ACE prioritizes reaching youth in urban public schools, providing underserved populations with quality climate science and hands-on experiential learning opportunities. Approximately 73 percent of the high schools with which ACE works are public schools; and 48 percent of those are designated as Title I or at-risk schools in low-income districts.

Healthful food is another part of Kaiser Permanente’s mission. The organization hosts more than 50 farmers, markets and farm stands at its hospitals, medical offices, and other buildings across the country, including a weekly market outside its corporate headquarters in Oakland, California. Kaiser Permanente also promotes sustainable food and agriculture by increasing sourcing of local and sustainably produced food in its hospitals, cafeterias, and vending machines. About 190 tons of the fruits and vegetables (nearly 50 percent of all fresh produce that Kaiser Permanente purchases each year) served on patient menus across the organization are sustainably produced. To meet this definition, the produce must be either grown within 250 miles of the Kaiser Permanente facility or certified as sustainably produced by a third-party eco-label.

Today, with the growing effects of climate change, Kaiser Permanente’s commitment to cleaner, greener medical settings is stronger than ever. The organization pledged in 2012 to reduce its greenhouse gas emissions by 30 percent by 2020, from a 2008 baseline.

Donald Orndoff, Kaiser Permanente senior vice president of National Facilities Services, announced the details of its Leadership in Energy and Environmental Design (LEED) building goals. “By adopting the LEED standard for all new major construction, we are demonstrating our commitment to green building strategies and to the total health of our communities,” Orndoff says. “The LEED certification program provides an internationally recognized approach to building and operating well-designed buildings.”

“A LEED plaque is an internationally recognized symbol of good design,” Orndoff says. “We are always proud to

**As part of their community outreach Kaiser Permanente holds farmer's markets at many of its facilities.**

Photos: Kaiser Permanente

put a LEED plaque on our buildings as a demonstration of our commitment to the environment, as an extension of our mission for total health. We hope that as more of our medical centers carry the plaque, we will build momentum for healthier buildings of all kinds, and encourage others to measure the value of a building not only by economics, but by its effect on people and the environment.”

While the first Kaiser Permanente hospital to earn LEED Gold status is in Hillsboro, Oregon, the organization has since opened the LEED-certified San Ramon Medical Offices near its home base in Oakland, California.

The 67,000-square-foot project, located in San Ramon, earned LEED Gold certification for sustainable, environmentally sound construction. Some of the project's aspects exceeded the stringent LEED Gold standards; for example, 93 percent of the onsite-generated construction waste was diverted from landfill. LEED certification requires only 50 percent be diverted. Kaiser Permanente converted

a foreclosed big box store in Portland, Oregon into a LEED Gold medical office building; and its Antelope Valley Medical Offices, which opened in October in Southern California, was designed to meet LEED Platinum (certification still pending).

Kaiser Permanente, which operates 38 hospitals and more than 600 outpatient medical offices across the country, was one of the first healthcare institutions to eliminate polyvinyl chloride (PVC) from carpets and flooring. In 2004, in fact, the organization worked with manufacturers to bring PVC-free building products to the market when none existed. Last June, Kaiser Permanente leaders announced they wouldn't purchase furniture with flame-retardant chemicals.

“For Kaiser Permanente, sustainability is about health,” Gerwig says. “By addressing air pollution and climate change, reducing the use of harmful chemicals, and promoting sustainable food choices, Kaiser Permanente is taking concrete steps toward reducing pollution and conditions that can harm health.” ●



# Leading by Example

StopWaste adds to its list of firsts with LEED v4 Platinum certification.

By Barbra Murray

StopWaste—a public agency responsible for reducing waste in Alameda County, California—is green by nature, and its staff is always conscious of the need to “walk the talk.” The agency, which works on behalf of the 14 cities in Alameda County, the county itself, and two sanitary districts, tries to lead by example, and one of its latest accomplishments may well draw the attention of building owners and building professionals around the globe. The organization’s 14,000-square-foot headquarters in downtown Oakland recently became the first building to earn Platinum certification under Leadership in Energy and Environmental Design (LEED) v4 Building Operations and Maintenance.

“There’s been a lot of angst around v4, so getting the project out there and showcasing it—especially it being a public sector project—will help everyone realize that v4 is not scary,” says Wes Sullens, manager of Green Building Policy and Advocacy at StopWaste. Sullens also worked with U.S. Green Building Council (USGBC) on the development of v4.

If it can be achieved in the public sector, where the purse strings are short and pulled tight, and with a structure that was originally erected in 1926, then private-sector building owners of both new and existing structures can certainly embrace LEED v4.

StopWaste was already ahead of the game when it decided to seek LEED O+M v4 certification. In 2007, its headquarters building earned the title of the nation’s first







All photos: © Emily Hagopian. [www.emilyhagopian.com](http://www.emilyhagopian.com)

renovation project to earn LEED-New Construction v. 2.2 Platinum certification. The project cost, including the acquisition of the building and all renovations was approximately \$6 million.

“At the time we had been promoting LEED to our cities and county as a low-cost green thing you could do,” Sullens recalls. “There was a lot of talk back then from citizens saying ‘That is so expensive, 10 to 15 percent more expensive,’ but we’d been proving, with public buildings, that you could do it for a lot less than that. LEED Silver for no additional cost—that was our mantra. We wanted to prove that we could do it on time and on budget—no additional costs.”

And StopWaste was doing it on time and on budget early in 2006 when it became clear that LEED Platinum certification was within reach, so they went for it with the assistance of Komorous-Towey Architects (KTA). In came the photovoltaic solar panels, a shower, and a unique rain catchment system. Faced with a roof that sloped in an inconvenient direction, the team conceived a plan to attach the rain barrel to the side of the building to collect rainwater from the solar panels. “It was a really nice synergy that happened at the last minute,” Thomas J. Towey, CEO of KTA, notes. “It was low-cost way to feed that system. We had some really fun things like that happen.”

Salvaging played a large role in ratcheting up to the Platinum level, and dovetailed with the organization’s waste reduction mission. Among the great finds were metal panels that now adorn the façade of the building. Those panels were

leftovers from a sign company, so with letters and words cut out of the metal here and there, KTA had to choose its words carefully. “‘LOVE’ appears many times,” Towey says, laughing at the thought.

And the price tag on going Platinum: less than \$100,000.

While its original LEED certification gave StopWaste a head start in its LEED O+M v4 pursuit—“We were set up for success,” Sullens says—the agency was well aware that the new LEED edition took requirements up a notch—or five. BuildingWise, a San Francisco-based green building consulting firm, was on hand to shepherd StopWaste through the guideline alterations, additions and the like. In some cases, what seemed like a small issue on the surface, turned out to be a challenge.

“For a small building, it had lots of cool little green bells and whistles,” says Levi Jimenez, project manager at BuildingWise. “They had a shower on site, they had indoor bike racks, they monitored their own waste which was really helpful. All of the service providers were very happy to oblige the specific criteria-per-credit, so getting service vendors on board was quite easy.” But not everything was easy. Even with StopWaste being, as Jimenez notes, “very conscious of how they purchase things,” ongoing consumables were out of reach at this time. And some measures that had been achieved relatively easily in the past version of LEED, such as outdoor maintenance and landscaping measures, were more difficult on tight urban sites like StopWaste. “Because they are small—only 14,000 square feet with about 2,000



**Previous spread: Nathan Greene and Wes Sullens of StopWaste. Left: Architectural firm Komorous-Towey Architects stepped in to help StopWaste achieve LEEDv4 Platinum certification. Daylighting is one way StopWaste wins points. Right: Cisterns affixed to the building collect rainwater.**

square feet of landscaping—it was difficult to maximize some points,” says Jimenez.

Despite the occasional hurdles, BuildingWise found advantages to v4. Some of the credits have been consolidated, creating a more efficient program in general in Jimenez’s opinion. But perhaps the big takeaway from v4 is serving as a positive example. Jimenez and his BuildingWise colleagues hope that others will follow StopWaste’s lead. “I think there’s enough friendly competition in the marketplace that people do want to stay on top of the game and stay ahead of their neighbors,” Jimenez says. “It’s easy for anybody to say ‘I have a green building’ or ‘I have a high-efficiency building’ but without some sort of proof or label saying somebody else verified this, then all you have is a building. To have that verification is critical and it seems like the market is moving toward stronger competition with LEED certified buildings.”

“Things like not earning the consumables credit leaves us with room for improvement,” says Nathan Greene, facilities manager at StopWaste. “We view earning LEED O+M v4 Platinum as a validation and snapshot on how we have been doing, but that doesn’t mean we are finished. We still have to operate our building every day and make the right choices consistently—finding innovative ways to walk our talk.”

StopWaste plans to continue innovating. As part of their Platinum certification, and with the help of Virtually Green, the team earned an Innovation credit for monitoring and gamifying plug-load energy use in cubicle

workstations. Furthermore, StopWaste plans to set up a LEED Dynamic Plaque, a continuous evaluation of the building’s performance. “The Dynamic Plaque is not without controversy,” says Sullens, “but my hope is that, as an industry, existing building owners can add more and better metrics to the Dynamic Plaque platform so that it gets enhanced significantly over time.”

StopWaste is developing an ongoing waste tracking app for the Dynamic Plaque that utilizes wifi-enabled scales to track waste in real time. Scales will be placed under the recycling, composting, and garbage bins in the building and will link to a central dashboard that plugs into the Dynamic Plaque. “We are excited to test pilot this new waste tracking system,” says Greene, “and to make it an open application programming interface for others that want to track waste in real time as well.”

At the end of October, USGBC announced that it would extend the closing date for LEED 2009 registration from June 15, 2015 to October 2016, thereby giving the building industry some breathing room for easing into LEED v4, which USGBC acknowledges is more rigorous.

“The bar has been raised,” Sullens says of LEED O+M v4. “Yet it is still achievable and has real value. With v4, the USGBC has redefined what it means to build and operate green buildings and that definition continues to be an internationally recognized sign of leadership.” By becoming the first v4 Platinum project in the world, StopWaste has become an international symbol of leadership as well. ●



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# **BUILDING CURRICULUM**



Previous spread: Tim Cole and architect Clay Dills at College Park Elementary School, Virginia's first LEED Platinum school.

Right: Floyd E. Kellam High School is the 8th LEED certified school in the district.

Photos: Ara Howrani. [www.howranistudios.com](http://www.howranistudios.com)

## Virginia Beach City Public Schools goes to the head of the class, integrating sustainability into their buildings as well as classroom teachings.

WRITTEN BY **Calvin Hennick** | PHOTOGRAPHED BY **Ara Howrani**

**L**ast January, at a wooded site 10 miles from the ocean, the Virginia Beach City Public Schools unveiled their latest high-tech teaching tool. Officials hope that it will promote collaborative and interactive learning, particularly around sustainability issues, and they've invested considerable resources in the device. It took two years to assemble, takes up more space than an aircraft carrier, and came with a price tag of \$102 million.

It's called a school building.

Floyd E. Kellam High School is the district's eighth Leadership in Energy and Environmental Design (LEED) certified building, with a ninth under construction. The buildings are a mix of basic LEED certification, Silver, Gold, and Platinum (Kellam is still being certified, and is likely to come in at either Silver or Gold), but school officials are focused on more than just getting plaques that they can hang at the buildings' entrances. They want to infuse the district's teaching and learning with lessons about sustainability—and that means using the buildings themselves to educate students and community members about the impact of the built environment.

"I think our approach to sustainability is more holistic than most folks' approach," says Tim Cole, sustainability officer for the Virginia Beach schools. "A lot of people might build LEED buildings and stop there. But we're trying to develop the infrastructure, then integrate sustainability throughout the school district and educate the public at the same time. These buildings become tangible objects around the city, so when we talk about this stuff, people can see things happening, and realize it's not rocket science."

Visitors to Kellam, for example, might learn about the school's geothermal well field, vegetated roof, and bamboo wood gymnasium floor. And students learn and work in the school's expansive courtyard, which was designed (with the help of previous students) to capture and reuse rainwater. Architects have visited several other schools to explain to young children exactly how their heating and lighting systems save energy, and Cole himself recently Skyped into a classroom from a construction site, explaining the new school's sustainable features to its pint-sized future occupants. Officials are hoping to do more, including adding a new two-year course of study centered on renewable technologies for interested students.

FLOYD E. KELLAM  
HIGH SCHOOL





**Left: Tim Cole shares his vision for building sustainable generations.**

**Right: Chris Freeman teaches advanced placement environmental science at Kellam in one of the open-air classrooms.**

But why bother connecting construction with curriculum? Sure, Virginia Beach's LEED buildings help the environment and save the school district money on its water and energy bills, but the state's standardized tests don't ask questions about solar panels and low-flow toilets. Why not skip the stuff about green building and squeeze in five extra minutes of math or literacy test prep, instead?

For one, the emphasis on sustainability provides educators with an opportunity to make connections across different content areas, helping students dig deep with real-world examples and project-based assignments. An English teacher might assign reading materials on climate change, for instance, while math and science teachers cover the more technical aspects of the topic, and a social studies teacher leads discussions about the societal causes and consequences of a warming planet. (Kellam was designed specifically with this sort of teaching in mind, with built-in collaboration space for teachers and movable dividing walls that allow teachers to consolidate their classes.)

Sustainability isn't merely a means to teach other subjects, though. Virginia Beach officials consider the topic essential on its own—something students need to learn about to prepare them for the future. "We're raising good stewards of the planet," says James Pohl, executive director of secondary teaching and learning for the district. "Instead of, let's build better drills that go deeper in the ocean, it's let's see how we can avoid doing that."

"If we can develop students who have that mindset," he adds, "who knows what they'll create in the future?"



For a large organization like the Virginia Beach schools to fully embrace sustainable development, it needs at least one person to agitate, to advocate, to keep bringing up stormwater retention and operable windows and low-VOC paints until everyone else finally buys in, too. In Virginia Beach, that person is Tim Cole.

The former Navy SEAL came to the district as a project manager in 2001 after a stint in the private sector. (When he left the SEALs, he considered becoming either an architect or a stuntman. His wife insisted on the relative safety of the drafting table, although with his shaved head he might still be able to stand in for Bruce Willis in a pinch.)

Hermitage Elementary School was one of Cole's first projects in Virginia Beach, and the building was already budgeted before he came to the district. "We talked to the architects and engineers and said, 'We'd like to see if we can make this a LEED building, here's our budget,'" Cole says. "It wasn't budgeted for LEED, but let's see what we can do."

As a SEAL, Cole says he had to be constantly aware of his environment (which, he says, was usually "cold, wet, and miserable"), and so his current focus on the built environment makes a certain sort of sense to him. "Most SEALs are good at solving problems," he says. "You have a small group of dedicated guys who are able to overcome much larger odds. To me, it's very much in line with sustainability. It's a daunting problem, so it was an interesting challenge."

Cole wasn't around when Hermitage opened as Virginia's first LEED-certified elementary school in

2005. After the terror attacks of September 11, 2001, he'd re-enlisted in the military, signing up for the Navy Reserve, and now he'd been called up for a tour in Iraq. When he returned home, Virginia Beach had three more school construction projects underway, and Cole asked whether the projects were on track for LEED certification. They weren't.

"An interesting discussion came out of that," Cole says. School officials had talked about the possibility of incorporating green elements into buildings without perusing formal certification, but Cole came to realize that those sustainable features tended to fall by the wayside unless there was a mechanism in place to ensure accountability. "People say, we'll design for LEED, but if no one is tracking it, they're really loose about it. You're not getting the same building. To say you're not going to pay \$5,000 at the end to get the plaque, in a \$50 million or \$100 million project, is asinine."

Tony Arnold, director of facilities planning and construction for the Virginia Beach schools (and Cole's boss), gives Cole credit for making the district a leader in sustainable development. "It's a good example of what a difference one guy can make," Arnold says. He paints a mental picture of Cole, the SEAL, "dropping out of a helicopter into an educational bureaucracy" and tackling his mission. "It takes a unique personality. You've got to be willing to take a little bit of a risk. Sustainable buildings are mainstream today, but when we started doing it, people weren't talking about sustainability."

Today, the school system's LEED buildings total more than 1.6 million square feet, representing over



10 percent of the district's building space. The schools have also commissioned a firm to audit its greenhouse gas emissions and develop a plan to reduce the schools' carbon footprint. Since 2006, the number of environmental clubs in the 86-school district has increased from six to 72, and the number of outdoor teaching gardens has gone up from five to 64.

During that same time period, other school districts near Virginia Beach have followed the district's lead, perusing green building certification for their own school construction projects.

"I think there's a little bit of that 'keeping up with the Joneses' going on," says Bryna Dunn, director of sustainability planning and design for area firm Moseley Architects, which compiled the district's emissions report. "They were definitely pioneers, and they really do influence all of their peers."

That's exactly what Cole—whose motto is "Think big, start small, act now"—was hoping for. "You want to be that pebble in the pond," he says. "You want that ripple effect to go out to a broader and broader audience. We've been able to highlight what we've done and change other folks' behavior. They start to see the numbers—we're saving all this money, it has all these benefits. You become an example, where people

look and say, 'If these guys are doing it, why aren't we doing it?'"

Cole has fielded calls from school officials in Kentucky, Georgia, and even Australia seeking his advice on green building—which is a tad ironic, given that he initially wanted the district to "fly under the radar" with its sustainability efforts. He'd seen too many good ideas scuttled by the drama that sometimes comes with public debate, and he didn't want Virginia Beach's school building projects to be influenced by the political fights surrounding climate change and environmentalism. And so, just as he had done in the SEALS, he quietly went about his mission, focused on results rather than publicity.

"All along, the theory has been, we're going to do our own thing, we're going to try to lead by example, and eventually people will notice what we're doing," Cole says. He's only received about a half dozen notes from people who disagree with the district's approach, including an email from one man who called him a communist. "Now, it doesn't really matter if people get up in arms about it, because it's hard to argue with success."

When rain falls on the roof of Kellam High, it follows a path set out by the school's former graduates. While the building was being planned, environmental science and drafting students participated in a charrette



with architects to help design the courtyard that now separates classroom space from a central commons area in the school's hub-and-spoke layout.

"They came up with some pretty ingenious ways to get the water to move from one end to another," says Michael Ross, the lead architect on the project.

At the west end of the courtyard, rainwater is used to irrigate squash, greens, and herbs in the school's edible garden. The vegetables grow in raised beds, arranged in the form of a maze, which sit just outside the school's culinary classrooms. Excess water flows through runnels in the central gathering garden, which features amphitheater seating where teachers sometimes hold classes. Eventually, the water reaches the infiltration garden, where it soaks indigenous wetland grasses until it seeps back down into the water table.

Even a proposed apiary, which didn't make it into the courtyard due to obvious safety concerns, was located elsewhere on the school grounds, and students in a beekeeping club learn how to maintain the hive.

Christopher Freeman, who teaches Advanced Placement environmental science at Kellam, says students were "shocked" at the amount of responsibility they were given, and that the real-world stakes of the design project motivated them to put in extra effort.

**Left: Amphitheater seating was incorporated in the courtyard so teachers could hold open-air classrooms.**

**Above: Irrigation channels are introduced to the courtyard.**

Photos: HBA

## Learning and Health Impacts of Green School Buildings

- Task speed increases significantly when students are exposed to outdoor air.
- Exposure to daylight is associated with higher levels of student learning.
- Kids attending naturally-ventilated child care centers have lower asthma and allergy levels than those in air-conditioned buildings.
- A study in one school district showed that student test scores went up following school construction projects.

SOURCE: The Impact of School Buildings on Student Health and Performance, McGraw-Hill Research Foundation, in partnership with the Center for Green Schools.





**Left:** Chris Freeman, architect Mike Ross, and Tim Cole walk with the beekeeping club to the apiary.

**Below:** Cole engages students at Kemps Landing/Old Donation School on sustainable design principles.

“They worked harder than I’ve ever seen,” he says. “They were all going to graduate before the building was fully developed. I think they saw themselves as handing down a legacy, and having input on how their younger brothers and sisters would utilize the space and learn.”

Matt Antonelli, a Kellam alumnus who participated in the courtyard charrette and is now a senior at Virginia Tech, says projects like this one put him “ahead of the curve” when he arrived at college. “It was a cool project, because it was more in-depth and got me thinking, got me to do my own research. I learned about a lot of things that weren’t necessarily taught to me in class, like pervious concrete and retention gardens, because I was looking those things up.”

While only one set of students was able to design the courtyard, officials plan to use the space to help educate generations to come. Cooking classes and gardening clubs work in the edible garden, science students study biodiversity in the retention garden, and teachers hold “Socratic seminars” in the amphitheater space, just to enjoy nice days. Eventually, signage explaining the stormwater capture process will be put up, so that anyone passing through can learn about the purpose of the gardens.

When teachers and students first moved into the building, earth science teacher Christopher Henry was teaching a unit on water, and he took his class out into the courtyard for a peek at real-world examples of what they were reading about in their textbooks.

“I just let them loose and said, ‘Pretend that it’s raining right now,’ and they had to figure out where all the water would go,” he says. “I really left it up to my

## VA Beach Public School LEED Timeline

**2005** – Hermitage Elementary School, the first LEED certified elementary school in Virginia, opens in Virginia Beach.

**2010** – The LEED Silver Windsor Oaks Elementary is dedicated.

**2010** – Renaissance Academy, a LEED Gold school, opens. It is the first building in the district to use reclaimed rainwater to flush toilets.

**2011** – The district unveils the LEED Platinum Pupil Transportation Services Maintenance Facility, the first building in the city to incorporate wind energy turbines.

**2011** – The LEED Silver Virginia Beach Middle School opens.

**2012** – College Park Elementary opens. It is the first LEED Platinum school in Virginia.

**2012** – The LEED Gold Great Neck Middle School, featuring solar water heaters, renewable building supplies, and a reflective roof, is dedicated.

**2014** – The 325,000-square-foot Kellam High School opens and becomes the eighth LEED certified school in Virginia Beach.

Right, middle, and below: Parent Gina Foresta; volunteers in the Linkhorn Park garden.

Far Right: Students in front of a school mural at College Park Elementary School.



students to tell me why it was built this way. We had some really neat conversations.”

Cristina Biddlecome, a senior at the school, says the emphasis on sustainability is unmistakable, from the motion-activated hand driers in the bathrooms to the green roof. “It’s very evident everywhere you go that it’s a green building.”

Jennifer Seydel, executive director of the Green Schools National Network, has visited Virginia Beach several times. “I’m in awe every time I walk through a building,” says Seydel, a former teacher. At Kellam, she sees practically limitless lessons to be taught about earth science, ecology, and other subjects. “If I were going to jump back into the classroom, I would jump into a building like this,” she says. “Maybe when I retire, I’ll go back to teaching, and I’ll move to Virginia Beach.”

While high schoolers are able to study the issue more deeply, younger children tend to instantly “get” why sustainability matters, says Clay Dills, an architect who designed two LEED buildings for the district.

“With a 10-year-old kid, if you say that [an LED] light bulb lasts longer and uses 75 percent less energy, and you tell them electricity comes from a coal-fired power plant, you don’t have to say anything else to them,” Dills says. “They just say, ‘Well, that’s what we should be doing.’”

Dills designed College Park Elementary, the state’s first LEED Platinum school, and after it opened in 2012, he came in to talk with kids about the school’s sustainable features. He followed an exploratory lesson plan, asking students provocative questions and allowing them to figure things out, like how the school’s low-velocity HVAC system works. “I would say, ‘Does anyone know where the hot or cold air comes from in the



classroom?’ They would all point at a giant bench in the back of the room with the grill. I say, ‘Can you hear it?, And they say, ‘No,’ and I say, ‘That’s because there’s not a huge fan, so you save energy.’” Next, Dills would ask how cool air moved through the room without the help of a fan, and the kids would figure out that the air was pulled up to their warm bodies and then eventually to the ceiling. “They essentially understand thermodynamics. They just don’t know that’s what we’re talking about.”

A multimillion dollar school building would be an incredibly expensive tool for teaching students about hot and cold air, if that’s all it did. But of course, students have to go to school somewhere, and Dills points out that the efficient HVAC system costs about the same as a traditional system while saving between \$15,000 and \$25,000 a year in energy costs. “You tell that to a kid,” Dills says, “and he’s going to kick you in the head for not doing it.”

True to the district’s holistic vision of sustainability, kids are learning about the issue even at school buildings that aren’t LEED certified, often through learning gardens. Gina Foresta, a parent volunteer, runs an after-school gardening club for about 30 students at Linkhorn Park Elementary. “It’s not just about digging in the dirt and growing food,” she says, “but what it means to eat seasonally, what it means to eat locally, and what does that mean for the planet.” Some students have pushed their parents to start vegetable gardens at home, and a school janitor who grew up on a farm in Georgia was inspired to start growing some of his own food again, Foresta says.

“Especially at the elementary age, it’s really important how we teach these children about sustainability, especially climate change,” she says. “It can come across almost as a scary future. So we need to frame it as, ‘What

can you do?’ They’re not old enough to vote yet. They’re not old enough to make big financial decisions. But in their own day-to-day lives, they can make small changes that have a huge impact.”

At Kemps Landing/Old Donation School, an elementary school for gifted children, fourth-grade teacher Melissa Follin teaches a unit on oyster restoration. A nonprofit group gives the school a thousand oysters to raise, and at the end of the year, students release them at a sanctuary reef in Chesapeake Bay.

“Kids naturally have that inclination to care about nature. They’re not as worried about shortcuts, or getting things fast,” Follin says. “They’ll be able to go one day and look at that reef and say, ‘I helped grow that.’ I think there’s more power when they can see what they’re doing, and they have ownership over it.”

Cole says he didn’t start thinking seriously about sustainability issues until he began working for the schools. “For everybody, the light comes on for a different reason,” he says. “They read a book, or they see a movie. About the time I came to work for the school division, I started thinking about what’s going to happen with my kids, and my grandkids, and the light came on.” Now, Cole is working to help “the light come on” early for the kids in Virginia Beach. He hopes that the lessons they learn from oysters and squash gardens and green construction practices will stay with them until they’re the ones in charge, deciding what sort of world they’ll leave for the generations that come after them.

“We’re really trying to teach that next generation of kids,” Cole says. “They need to build a smarter environment for themselves, so we’re trying to get them thinking in the right frame of mind. They’re the next generation of sustainable citizens.” 🌱



# Nets at Work



**Previous Spread: In the Philippines discarded fishing nets are collected and reused as carpet fibers.**

**Right: Net-Works is proactive in cleaning up waters polluted with discarded fishing nets. Its first pilot project took place in the Philippines.**

All photos: Interface

## Saving marine and coastal ecosystems through economic value, environmental stewardship, and social leadership.

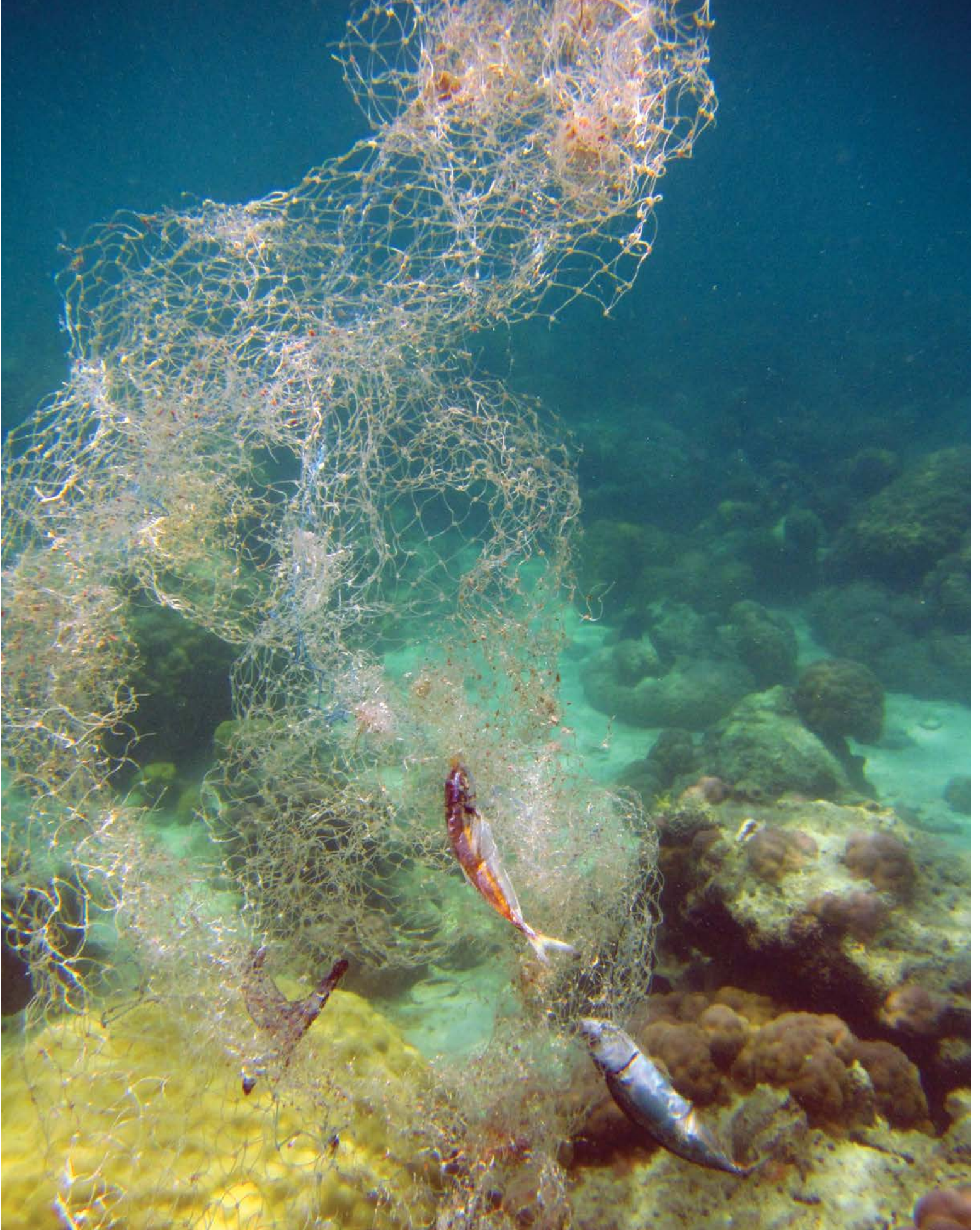
WRITTEN BY **Kiley Jacques**

**S**ince 1996, Interface—a global manufacturer of commercial carpet tiles—has employed innovation-based green strategies for the making of its products. Today, it is a business leader in environmental sustainability. Developing and manufacturing products with a small carbon footprint and high level of recycled content is part and parcel of Interface’s mission. In addition to its efforts to reduce waste, it also works to connect with and benefit people on all levels of the supply chain.

“We wanted our products to have a social voice as well as an environmental one,” says vice president and chief innovation officer, Nigel Stansfield. In 2007, as a first step toward that goal, they developed a social business model in India and worked with local nongovernmental organizations (NGOs) and villages to tap into traditional weaving skills. FairWorks was launched, but ultimately was so far removed from the company’s core product line that it failed commercially. “Rather than scrap our efforts,” notes Stansfield, “we chose to see [it] as an opportunity—a successful failure we could learn from.”

Meanwhile, Aquafil, one of Interface’s yarn suppliers, was looking at ways to recycle waste polyamide 6 (“nylon”) and turn it into usable material for the carpet and textile industry. One of the waste streams of nylon they identified was fishing nets; specifically, used commercial fishing nets from industrial fishing regions. “We asked ourselves if we could create an inclusive business model, in the vein of FairWorks, and incentivize net collection in developing communities [to] connect some of the poorest people in the world to a global supply chain,” says Stansfield.

Enter Net-Works. Born of the desire to be more proactive in social sustainability as an organization, the project mobilizes fishing communities in the central Philippines to collect discarded fishing nets from the coastlines and waters. The Philippines were chosen for the pilot program, in part, because “the opportunity and extent of waste nets was known to be enormous,” according to Stansfield. With no sustainable waste channels, innumerable unusable nets were being discarded directly into the seas and along the shore, destroying the marine and coastal ecosystems. These waste nets take hundreds of years to break down and, in the meantime, negatively impact both the local communities and the environment.







“Many community members are motivated to participate in net collection to improve their immediate environment and health, as much [as they are by] the income from the nets.”

– NIGEL STANSFIELD

In time, Interface partnered with Zoological Society of London (ZSL) whose marine conservation work and expertise they valued—they also already had ties in the Philippines. “We discovered we could build something together, which would be far stronger and more robust than anything we could do alone.

“We challenged our partners and contacts to help maximize this new opportunity, and discovered how many discarded nets are actually out there in the world,” says Stansfield. The program requires each of the village communities to collect nets either directly from fishermen or through beach and ocean cleanup sessions that they themselves organize. Ultimately, supplementary income is distributed to the participants. Net-Works does not employ villagers directly; monetary compensation is generated and managed through community banking models—either existing micro financing or Village Savings and Loans Associations (VSLAs) that Interface has set up. “The nets are sold to the community bank, which then sells them to ZSL-Philippines, who, in turn, sells [them] into our supply chain,” explains Stansfield.

Education and outreach are key components of the Net-Works initiative. Communities learn that these nets last up to 600 years in the environment, pollute their beaches, and kill valuable marine life. “Many community members are motivated to participate in net collection to improve their immediate environment and health, as much [as they are by] the income from the nets.” The nets’ monetary value also provides an incentive for community members to feed their old nets into the collection program rather than discarding them irresponsibly.

On-the-ground logistics depend heavily on a full-time ZSL employee—funded through the program and integral to the business model—based in the Philippines who ensures nets from the villages are aggregated into one of two collection hubs (soon to be three). At the hubs, the nets are packed for shipping and sent to Aquafil, where they are regenerated into nylon yarn, and ultimately used to make Interface’s carpet tiles. “This is a truly collaborative partnership,” notes Stansfield. “This project represents the best of all of us.”

Environmental monitoring is also part of the model. “ZSL actively trains communities, local government agencies, and other NGOs in environmental monitoring to help build local capacity, engage relevant stakeholders, and achieve sustainability,” explains Stansfield. ZSL’s marine conservation activities in the area are linked to Net-Works. They routinely conduct underwater surveys of marine protected areas, mangrove forests, and seagrass beds to evaluate their intervention and restoration tactics and measure their effectiveness.

So successful has Net-Works been that plans for expansion are already underway. “We plan to start collecting in Cameroon in 2015,” says Stansfield, “and we will

**Left: Workers are employed through community banking models.**



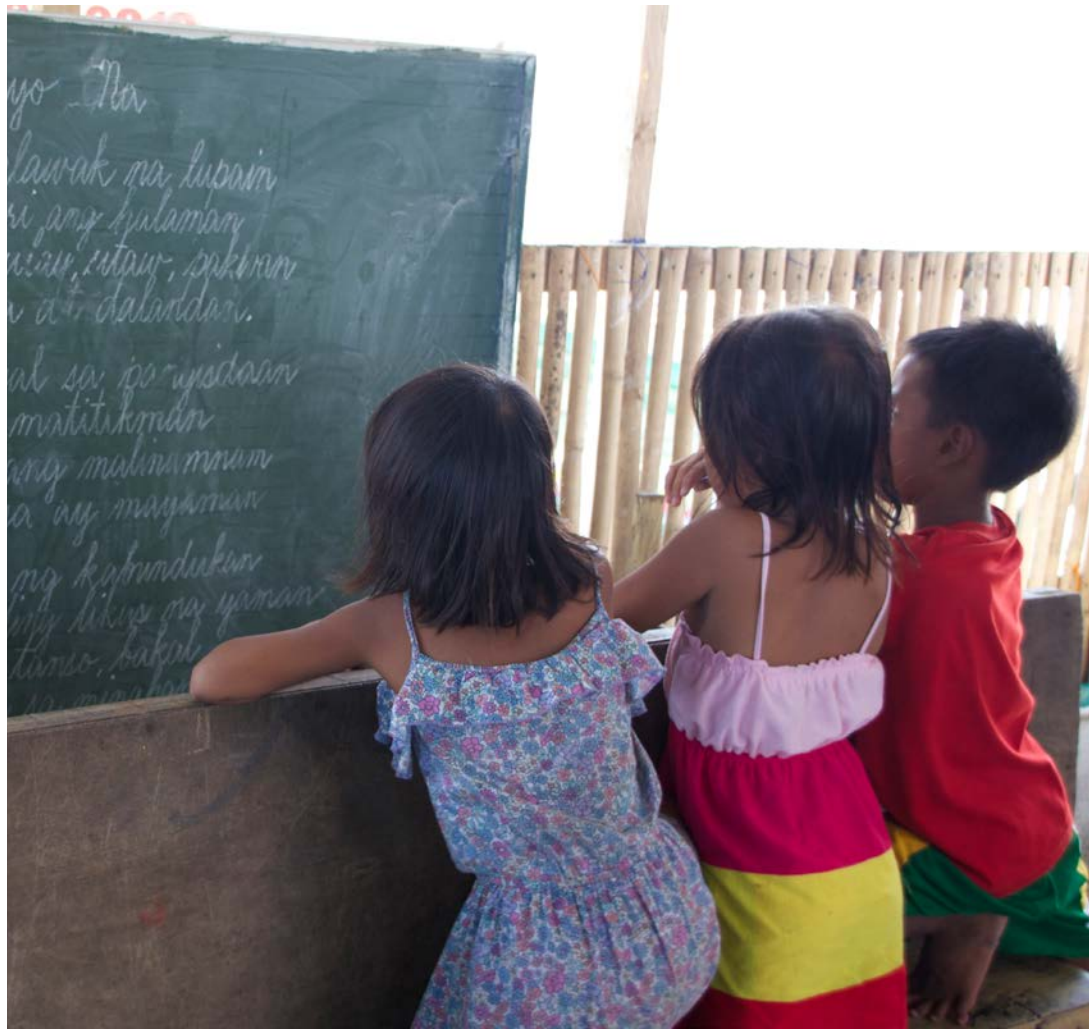
**Top: Local villagers gain economic independence, sustainability awareness, and educational resources.**

develop a further site in another country yet to be determined.” The goal for 2016 is to come up with a shortlist of possible locations, and to have three new sites running by 2017. By 2020, they hope to include 10,000 people in the supply chain. The idea, according to Stansfield, is to “connect the right people with the right ideas to make sure that the game changers are resourced, evaluated, and implemented.”

Steps are also being taken to turn Net-Works into a free-standing, financially viable program independent of Interface and ZSL. Toward that end, they assembled a “tool kit” to help other organizations set up similar programs based on the Net-Works model; it includes information about net collecting, material testing, community banking, and packing and shipping. “When we set the first program up we wanted to make it financially independent of corporate philanthropy or charitable donations,” says Stansfield. “We believe that this is an extremely important part of developing successful inclusive business models.”

As Heather Dietz, co-innovation communications manager at Interface, explains: “Net-Works was designed to be financially sustainable. The goal has always been to operate a business model that would cover the program costs while retaining as much of the value from the sale of the nets as possible within the local communities.”

Logistically speaking, revenue for the village is generated from the sale of the waste fishing nets collected by community members and sold to Aquafil. Because the nylon



material provided by Net-Works is of such high quality, they are able to sell it at a very strong commercial rate. In turn, this revenue covers Net-Works' operating costs, including the salaries of local community coordinators, general labor, the purchase and maintenance of equipment used for bailing the nets, and the transportation of materials from the collection sites to the international port for shipping.

Interface is itself responsible for investing in the core Net-Works team—a small, but effective group whose job it is to manage on-the-ground logistics in collaboration with local community member partners. Additionally, the company sources funds to cover the costs of further expansion to other sites, such as the most recent efforts made possible by investments from the UK Darwin Initiative—a United Kingdom government grant that helps to protect biodiversity and the natural environment through locally based projects worldwide—and USAID—the lead United States government agency that works to end extreme global poverty and enable resilient, democratic societies to realize their potential.

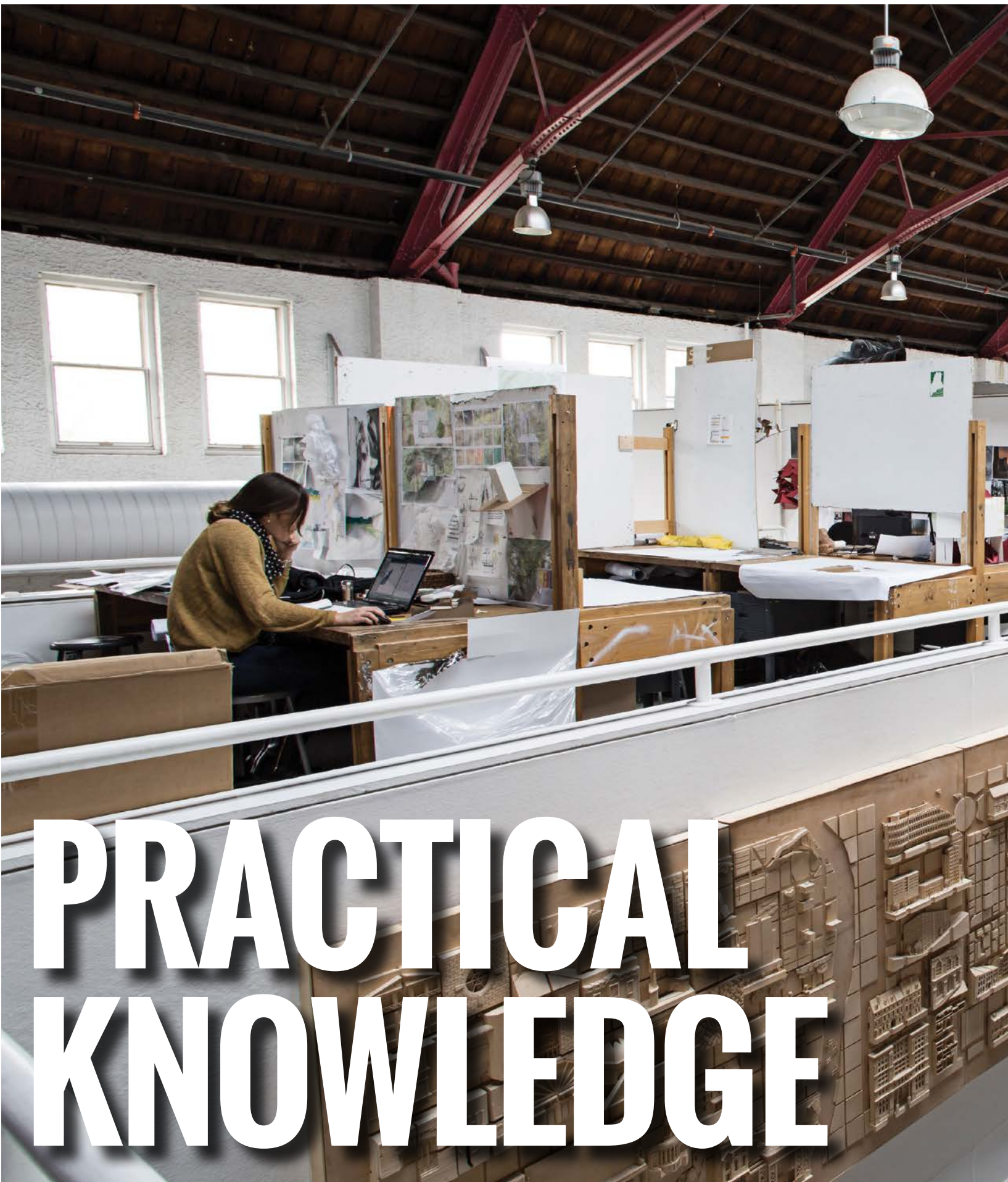
Stansfield also believes collaboration between corporations and NGOs will define the 21st century. "Net-Works is an example of what can be achieved when the right organizations and individuals partner together and create truly inclusive businesses," he says. "The holy trinity of sustainability can coexist—economic value, environmental stewardship, and social leadership." 🌱

## Empowering Communities with Impressive Results

**10 KG** of rice can be bought from the cash earned by selling 25 kilograms of waste net.

**84,000 MEALS** could be provided for families every year if they meet their 2015 target.

**18,870 MILES** of discarded fishing nets were collected in the first 18 months. That's three times longer than the Great Wall of China.



# PRACTICAL KNOWLEDGE



## University students receive hands-on training through the LEED Lab program.

WRITTEN BY **Alison Gregor**

**W**hen students marched into a Purdue University building in late 2012 and began dumping bins of trash onto the floor in the plush atrium, it wasn't a demonstration of student activism reminiscent of the tumultuous 1960s. Instead, the students were conducting a waste stream audit, and the event was a highly public example of a U.S. Green Building Council Center for Green Schools program that's been quietly gaining popularity among higher education institutions, called LEED® Lab™.

The LEED Lab program is a hands-on course, initially launched at the Catholic University of America in collaboration with the Center for Green Schools, in which students join forces with the campus facilities department or consultants to improve campus sustainability by working toward obtaining certification of existing campus buildings under Leadership in Energy and Environmental Design (LEED).

While Purdue's course was initially developed independently by a staff member at the university, it's very similar to LEED Lab and aims to achieve the same outcomes. A waste stream audit, which was dubbed "Mount Trashmore" at Purdue, was one of the credits offered under LEED for Existing Buildings: Operations and Maintenance.

"In terms of student engagement and working on a university campus, it seems pretty universal that students get really excited about waste audits," says Michael J. Gulich, the director of university sustainability at Purdue. "I'm not sure what it is—it's visceral. Not just with LEED projects, but across the board we've had great participation on waste audits."

Purdue students in the LEED Lab course, primarily graduate students from a variety of disciplines with a few undergraduates, were working toward LEED certification of the Jerry S. Rawls Hall, a four-story building in the

business school. Gulich, who runs the course with assistant director of university sustainability Michael Ursem, structured the course so that ideally a building could achieve certification in two semesters, and students are encouraged, though not required, to take the course for two semesters, he says.

While Gulich developed the course at Purdue independently, the USGBC's Center for Green Schools assisted Catholic University of America in developing the course and conducted a pilot program there from spring of 2011 through 2013, says Jaime Van Mourik, the director of higher education at the U.S. Green Building Council (USGBC).

At Catholic University, five or six semesters are necessary to achieve certification of a building, which is examined with other buildings for feasibility in one semester, while implementation of the LEED requirements and credits, along with documentation of the data, may well take two semesters each, says Patricia Andrasik, the assistant professor and the head of sustainability outreach who designed the course syllabus.

While about seven colleges and universities are now offering LEED Lab courses (with some international institutions as well as K-12 schools also interested), Catholic University is the first institution where the LEED Lab course has resulted in certification of a building under LEED for Building Operations and Maintenance. As a result of student coursework since 2011, the Crough Center for Architectural Studies, a former gymnasium built in the early 1900s, was certified in September, Andrasik says.

Perhaps even more important to students, however, is the impact the course can have on their futures. Of the 48 students who've taken the course at Catholic University, 12 have achieved LEED Accredited Professionals status and 16 have landed jobs in related fields after graduating, she says.



**Previous spread: Catholic University's Crough Center, a former gymnasium, was certified under LEED for Building Operations and Maintenance.**

**Above: Patricia Andrasik, assistant professor and the head of sustainability outreach designed the LEED Lab course syllabus at Catholic University.**

Photos: Ryan Smith. [www.ryansmithphoto.com](http://www.ryansmithphoto.com)



Van Mourik says that LEED Lab was created back in 2011 to address multiple issues. One was that employers were finding that students taught about environmental policies and practices, as well as LEED, on a theoretical level showed a “real gap in knowledge” in the workplace, she says. Students themselves felt unprepared for the real-world challenges of the workplace and were clamoring for more hands-on experience.

“Students were very eager and hungry for experiential learning opportunities,” Van Mourik says. “They really wanted to get their hands dirty and be part of a team working through the LEED process, but it was difficult for them to find those types of experiences within their academic coursework.”

At the time, USGBC began hearing about a few academic institutions that were engaging students in LEED projects on a volunteer or internship basis, she says. “Those volunteer experiences were great, but when

you’re in college, your primary objective for being there is to focus on your academic coursework.”

Developing a for-credit academic course that was highly experiential to educate and equip students with a professional skill set gleaned through actual building certification seemed like a solution to that dilemma, she says. Another issue for USGBC was that the council was not seeing many institutions of higher education certifying existing buildings under LEED Operations and Maintenance.

“One of our goals was to help universities and colleges build capacity in-house to begin to better integrate sustainability into their daily operations and maintenance practices,” Van Mourik says, “because colleges and universities are struggling with deferred maintenance, lack of resources, continued budget cuts, and a lot of these institutions don’t have that capacity, and it’s very difficult to fund-raise for operational improvements.”

Gulich says he had similar motivations for developing the course at Purdue University, which has 375 buildings, among them 175 buildings that are more than 10,000 square feet.

"We're bringing on new LEED buildings at the pace of about one per year, and they're great—they're great donor opportunities, they're great for PR, they're sort of sexy additions to the campus," he says, "But in terms of the problem we're all trying to solve, we're not going to do it bringing on one building out of 175 a year."

With the LEED Lab course, Gulich is shifting the focus from new construction to the operations and maintenance of existing buildings. For some students, that was part of the course's appeal as well. "It was interesting to do an existing building as opposed to new construction," says Tony Gillund, a former graduate student who took the LEED Lab course for two semesters and worked on Purdue's second candidate for certification, the Dick and Sandy Dauch Alumni Center.

"So much is done on new construction," he says, "but existing buildings, which make up the majority of the infrastructure at any complex, university or otherwise, are some of the ones that we need to make more energy efficient and have better use of resources."

The LEED Lab courses are all structured differently at each academic institution. Some institutions gear their course toward graduates, while others focus on undergraduates. With anywhere from eight to 18 students, most courses

**Left: Director of higher education at USGBC, Jaime Van Mourik, and Andrasik work with students at Catholic University.**

Photo: Ryan Smith. [www.ryansmithphoto.com](http://www.ryansmithphoto.com)

**Below: Purdue University students (left to right) Ariadna Caixach; Maribel Hernandez; Tony Gillund; Zhiyao Yang; Sanjana Hemanth; Xiangfei Meng; Eduardo Olmeda.**

Photo: Purdue University





break the students into groups that then pursue one or more credits toward certification of the chosen building, but how the groups choose to do this is often left largely up to them, though typically a graduate student will serve as a project manager.

At Colorado State University-Pueblo, where the course was first offered last spring, Sarah Spencer-Workman, a sustainability education specialist, and visiting assistant professor of Construction Management Daniel Trujillo created a syllabus structured around “learning modules” adapted from chapters of the LEED Reference Guide for Green Building Operations and Maintenance. This syllabus was used as the course text, supplemented by other reading and online video tutorials.

Students, who attend a two-hour seminar and one-hour lab each week, were quizzed on the learning modules, and were then broken up into groups to focus on two credits toward certification of the Library Academic Resources Center, a building on Colorado State’s campus that also served as their classroom.

“They go through the process as though they were a real LEED consultant,” Spencer-Workman says. “And their midterm was a presentation of their credits and where they were to date. They should have been about 75 percent completed, and that was largely the case. “For the final, we downloaded the real LEED credits, and they had to complete the templates as if they were going to submit them, whereas in fact, Daniel and I would just finalize the information and submit it ourselves,” she says.

Bahar Armaghani, faculty at the College of Design Construction and Planning and director of the U.S.

LEED program at the University of Florida, created the institution’s first LEED Lab course being offered this fall, which aims to certify the 16-acre Donald R. Disney Stadium/Florida Lacrosse Facility. As in other LEED Labs, she divided her students into groups led by graduate students serving as project manager that are each assigned a LEED category. However, the tools she employs are guest speakers and class trips.

“I never thought the class was going to be this exciting for them,” Armaghani says. “It’s more hands-on, and it’s not like a structured class where you have to do this first and then that. It’s a totally different method of teaching, which I think is really appealing to the students.”

While at the University of Florida, students spend some time at the beginning of the semester examining the feasibility of certain buildings as certification candidates, at Catholic University, they spend an entire semester doing so. Also at Catholic University, the Green Building Certification Institute (GBCI) meets once with students each semester to provide feedback and guidance on their work toward certification.

“To have GBCI reviewers actually sit in front of the students and tell them face-to-face what they did wrong on their submissions, and what they should improve on, that just hadn’t been done ever,” Andrasik says.

Some institutions use professional consultants, while others do not. Purdue hired a consultant, Heapy Engineering, to be an advisor and project manager, and effectively serve as the “instructor” for the LEED Lab course, Gulich says. Over the course of its three-year



**Far left: A Colorado State-Pueblo class is structured around learning modules adapted from the LEED Reference Guide.**

Photo: Colorado State University-Pueblo

**Middle left: University of Florida students gain hands-on knowledge through the program.**

Photo: University of Florida

**Left: Andrasik lectures students at Catholic University.**

Photo: Ryan Smith. [www.ryansmithphoto.com](http://www.ryansmithphoto.com)

contract, Heapy's participation in the course will be rolled back as the university enlists additional staff and faculty to teach the course, he says.

The consultant has driven up the cost of the course for Purdue, something Gulich hopes to reduce as Heapy's role is cut back. "It cost about \$85,000 on the certification side, and on top of that was retrocommissioning and ongoing commissioning," he says. "So that's pretty expensive, and we know it's not sustainable to do it this way every year. The reason we did it this way was we were doing it from the staff side."

Institutions using faculty to teach the course shouldn't need as much consultant involvement, Gulich says. The LEED Operations and Maintenance rating system is one in which all the work can be done in-house without necessitating outside consultants, Van Mourik says. "So it's really up to the institution and depending who they have on staff, particularly who they have in their facilities group."

Ideally, students are able to fulfill the entire role of LEED consultants. It's that experience gained in project management that inspires many of them, as they communicate with rectors and deans along with students and staff.

"The student group acts as 'consultants' that are assigned with documenting and identifying how credits can be obtained in the various categories," says Richell Fosu, a computer graphics technology Ph.D. student who is taking her third semester of LEED Lab at Purdue. "We make recommendations, formulate policies and procedures, and present business cases to our clients—

Purdue—in order to demonstrate the impacts and benefits the investment in such a venture would be in the long term of the building's life cycle."

Documenting the business case for LEED is one reason, among several, that LEED Lab attracts such a diverse group of students, from future architects and engineers to those interested in business and politics. Eric J. Yee, a master of business administration student who took the LEED Lab course at Purdue for two semesters in 2012-2013, was the project leader for the entire project and relished the position. "The best thing I did was get those project management skills," he says.

The Mount Trashmore event was one he coordinated with members of a campus business sustainability group called Net Impact and students taking the LEED Lab course. Because a large part of achieving the LEED Operations and Maintenance certification is about changing the behavior of building occupants, Yee and his colleagues decided to make the trash audit public.

"We made a whole event around it where we were showing participants—students and faculty and staff in the building—what waste we used in a 24-hour period and how this stuff should have been recycled," he says.

The experience of having to create behavioral modifications among occupants in a building to achieve sustainability goals, as well as physical changes to the building's infrastructure, is one that tends to stay with students.

"I look at buildings differently now," Fosu says. "They seem like living machines to me, as paradoxical as that may sound." 🌱

# Inland Empire Gives Back

**A Californian USGBC chapter brings green principles to its residents.**

By Jeff Harder



**Top:** Through community workshops, residents gain job experience and sustainability training.

**Opposite page, top:** Elementary students learn about making sustainable choices at home such as recycling plastic.

**Opposite page, bottom:** Erica Farr and Rick Fochtman chair of the Sustainable and Healthy Communities Committee.

The Inland Empire begins some 40 gridlocked miles east of downtown Los Angeles. It's a bedroom community comprising Riverside and San Bernardino counties, a place famous for reasonable housing prices and exhausting commutes. It's also a proving ground for a crucial question: Beyond extolling the virtues of energy audits and sealing building envelopes to architects, builders, and contractors, how can the sustainability movement convince ordinary homeowners and community members why going green matters?

The answer looks a lot like the Sustainable and Healthy Communities Initiative, now in its third year under the auspices of the U.S. Green Building Council's (USGBC) Inland Empire (IE) Chapter. It's a plan aimed at exposing the benefits of energy efficiency and environmental consciousness using a simple principle: Show—don't just tell. By partnering with other organizations, the initiative has upgraded more than a dozen homes in the area, given unemployed volunteers skills and experience to build new careers, and brought sustainability education to schools and other local institutions.

"I think our members were thirsting for an opportunity to get out and apply those principles of sustainability in a real way that would help our community," says Rick Fochtman, chair of the Sustainable and Healthy Communities Committee that oversees the program. "This is the perfect venue to do that: We're furthering the message, but we're doing it in a way that's really helped people out and has made an impact."

Michael Peel, the committee's past chair, started the initiative in 2011 as an outgrowth of his day job at a nonprofit that centered on bringing jobs, healthcare, education, and other services to underserved communities in the Inland Empire. "Mike had strong ties to the different organizations that were working with him, and as a project for our chapter, we started to figure out ways we could bring the green message to that community," Fochtman says. The overarching goals of the initiative involved spreading a series of green development zones throughout the Inland Empire—areas that concentrated investments in energy efficiency, renewable energy, and other practices.

The following year, when USGBC-IE teamed up with the city of Rancho Cucamonga—which had instituted its own program linking environmental consciousness with healthy, active living—the Sustainable and Healthy Communities Initiative took off. In particular, the initiative geared its efforts toward a Hispanic audience—a large demographic in the Inland Empire, and one often overlooked when it comes to spreading the message of sustainability. "It's extremely difficult to find anything having to do with sustainability conveyed in Spanish," Fochtman says. After partnering with a civic group in the city's Northtown neighborhood, they began hosting presentations and seminars on basic energy efficiency practices for homeowners.

"But rather than just talking to people and putting on another class, we wanted to actually demonstrate [how to do these things], and that's how our program got some great attention," Fochtman says.

Thirteen homeowners volunteered their homes for no-cost energy audits and energy-saving upgrades. Using grants from USGBC, the Southern California Gas Company, and Home Depot, a coalition of community members and contractors ferreted out inefficiencies with rented heat guns and blower doors, then made an average of \$2,000 worth of improvements to each home to reduce their monthly energy bills. "More



importantly, we taught the homeowners and their neighbors what the process was and why it was important," Fochtman says.

At the same time, these projects boosted the résumés of roughly 50 out-of-work volunteers in a region with unemployment rates higher than the state average. The Inland Empire Chapter helped organize classes on sustainability, the Leadership in Energy and Environmental Design (LEED) rating system, and technical training, and the workers put their education into practice doing modest tweaks to insulation and air tightness, like adding weather stripping and insulation. "We provided them basic training in the principles of sustainability, and then through these workshops and employing energy efficiency measures on houses, we gave them job experience," Fochtman says. On one project, USGBC-IE partnered with GRID Alternatives to outfit a home with solar panels. The program has produced a few notable success stories—one alumnus from Northtown who completed the training program even started his own home energy auditing company.

More recently, the Sustainable and Healthy Communities Initiative has spread to community institutions elsewhere in the Inland Empire. Fochtman himself has led four presentations on energy efficiency, waste management, and other topics at different churches. "We'll start with a general interest topic, like sustainability or global warming, and from there we follow up with

more practical, applied seminars, like how to change out fixtures in your home to improve water efficiency," he says. "The idea is to intrigue them with concepts, then come back with concrete ways that they can make improvements in their own lives."

Underscoring the Sustainable and Healthy Communities Initiative is a simple, crucial truth: Outreach only resonates when it speaks to the demands of the residents. "It's a matter of really getting in, finding out what the group wants, and being adaptable," Fochtman says. "Some people don't want to talk about global warming—well, then we don't need to. We can talk about other things."

Fochtman talked about other things in spring 2013, during an assembly in front of his children's elementary school. In response, he received a book full of handwritten thank-you notes. One message read: "Thank you green speakers for coming to our school. I promise I will save electricity." Later on, at his kids' soccer game, children ran up to Fochtman and boasted about the lessons they took home to their parents. "It was really fun hearing how they asked their mom to put out a new trashcan for the recyclables," he says.

Saving electricity and recycling are simple gestures, but the assembly clearly made an impression on the pint-sized audience. It was exactly what this crowd needed to hear—and it embodies what the Sustainable and Healthy Communities Initiative does to make a lasting impact. ●



# Winner's Circle

**Sustainability in Louisville is all about taking the reins.**

By Cecilia Shutters

**H**ow does a city design for a sustainable future? Answer: Begin by having the right people at the starting gate. In a Derby City-style trifecta, leadership from the city, the university, and a new innovation incubator—the Nucleus Innovation Center—aim to place Louisville, Kentucky, in the winner's circle of sustainable development.

Louisville's Mayor Greg Fischer is unequivocal about his commitment to put the city's 400 square miles on the map as an eco-friendly hub. Maria Koetter, director of the office of sustainability for metro Louisville, actualizes this commitment. Mayor

Fisher tasked her office with developing a comprehensive sustainability plan, Sustain Louisville, which the office released in March of 2013. Key successes from the first year have already been reported this past June.

"For a new office of sustainability like ours, leadership means bringing the right pieces together and building from there, rather than trying to 'reinvent the wheel,'" Koetter says. "We are fortunate to be able to reach our goals faster and better because of the organizations that already exist. For example, one of our nonprofit partners, the Louisville Sustainability Council, coordinates monthly working groups

**Louisville's Nucleus Innovation Center offers a rooftop garden and a 100 percent reflective roof.**



for five action teams dedicated to the initiatives we set in Sustain Louisville.”

Sustain Louisville outlines goals along six sections: energy, environment, transportation, economy, community, and engagement. Within these goals, 69 individual initiatives are set, each on a path to move from planned to completed (four of which have already been completed since the initial 2013 plan was released). The city has reported on the plan’s outcomes, which include an energy savings performance contract expected to result in \$27 million in energy efficiency upgrades for city-owned buildings; 83 ENERGY STAR commercial buildings in the city; an update to the Land Development Code to allow for more community garden space; and grant funding to complete the most comprehensive heat island effect study in the country.

The study, conducted within the Georgia Tech School of City and Regional Planning, is the first step in addressing concern that the city has one of the fastest growing heat islands in the country. To address the issues Koetter says, “We set out to identify ways we can improve. The initial results of the heat island study show that we have lots of work to do. Much of this work is related not only to tree canopy but also to the built environment as well.”

The University of Louisville is also taking its sustainability initiatives to a new level. Dr. Shirley Willihnganz, provost of The University of Louisville (UofL), oversees all aspects of university academics and operations. Her goal is to fulfill a state mandate to become a premier, metropolitan research institution. She interprets this, in part, to be an imperative to strengthen the community surrounding the walls of the university as much as the community within—enumerating sustainability as a priority in this mission.

To start, UofL has committed to actively reduce greenhouse gas emissions and achieve climate neutrality by 2050. Their Climate Action Plan outlines sustainability goals across the spectrum of the university’s activities from purchasing practices to behavior change, and from green buildings to food and transportation options, and everything in between.

At the beginning of 2014, UofL reported in the plan that they estimate an emissions drop of over 27 percent—from 246,929 to 178,679 metric tons (equivalent to taking 14,167 cars off the road) from 2006 to 2013. Currently nine Leadership in Energy and Environmental Design (LEED)-certified buildings—almost one million LEED-certified

square feet—exist on campus. Willihnganz affirmed the university’s ongoing policy to stick to LEED guidelines even after 14 years of budget cuts, a decision that predates the state requirement that new public buildings receiving more than 50 percent investment from the state achieve LEED certification.

“Every building that we have built since we made that commitment has gone forward with the intention and gotten LEED certified. Even a building that’s basically a computer, can do that,” says Willihnganz. “I also think that policy is really important, because policy helps guide behavior.”

For Louisville’s Nucleus Innovation Center, the emphasis on an innovation “ecosystem” cannot be overstated. Vickie Yates Brown, president and CEO at Nucleus, is the force making Louisville’s aspirations for innovation a reality.

She attributes the development of this ecosystem, officially serving as the economic development extension of the University of Louisville Foundation, to partnerships and a shared vision between the city and state government, university, private sector, and the entrepreneurial spirit of the city.

“We felt that we needed to lead by example. So if you’re in an innovation park and you have the local and state government, and everyone coming together in a partnership to work together to build an innovation park, you are expected to embrace best practices, you are expected to lead by example,” describes Yates Brown.

Housing office space, dry labs, and even a test kitchen, the new 197,000 LEED-Silver space on the edge of NuLu, a LEED-registered neighborhood, seems to epitomize Nucleus’s quest. The building offers some impressive green building strategies such as the 6,000-square-foot roof with reflective pavers and an expansive native plant garden. The 100 percent reflectivity of the roof is especially important to the city’s heightened awareness of heat island effect. The Nucleus is modeled to achieve a 35 percent reduction in indoor water usage and captures 90 percent of stormwater runoff via a retention basin under the building made possible via a partnership with the Metropolitan Sewer District.

Willihnganz synthesizes what is happening in Louisville best, “The world needs all of us, we all have gifts, all have things to bring, and everybody should be counted for what they can bring; [we need to] find the very best, biggest use for that.” ●



**Top: Maria Koetter. Middle: Dr. Shirley Willihnganz. Bottom: Vickie Yates Brown.**

Photo credit for Dr. Shirley Willihnganz: Power creative

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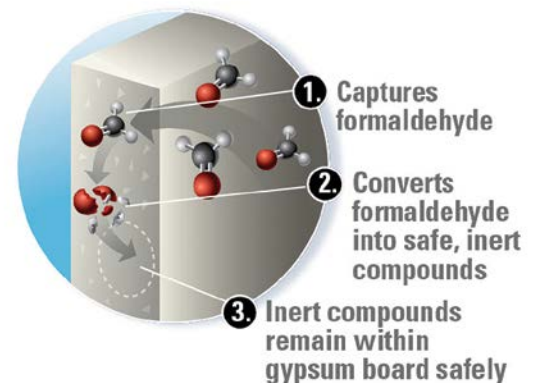
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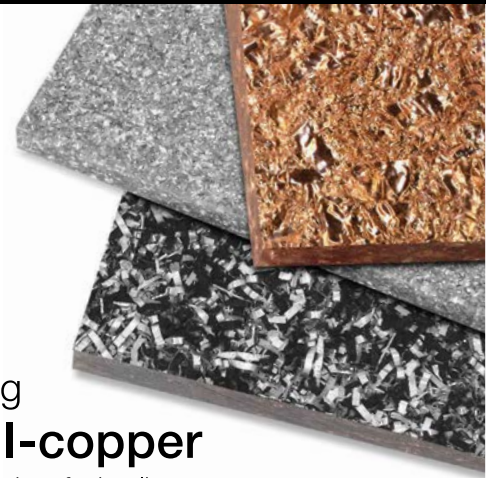
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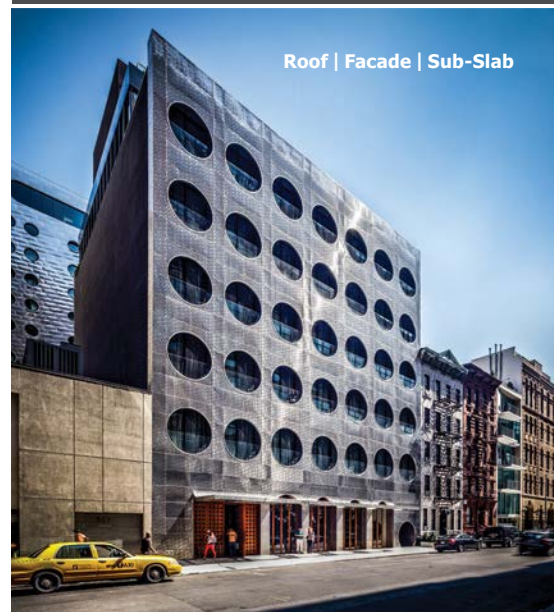
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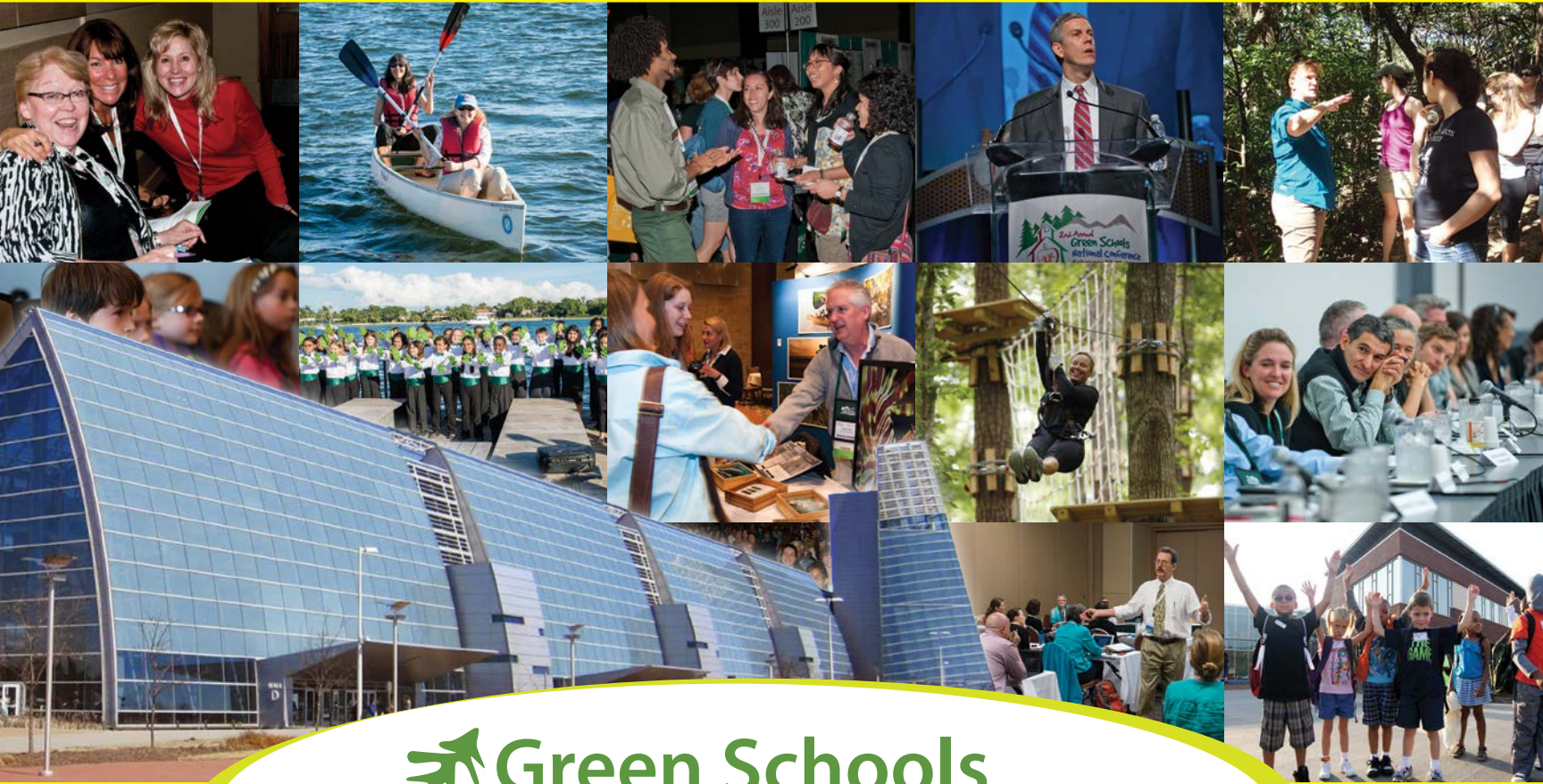
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# Can green building make China's cities more competitive?

By Christopher Gray

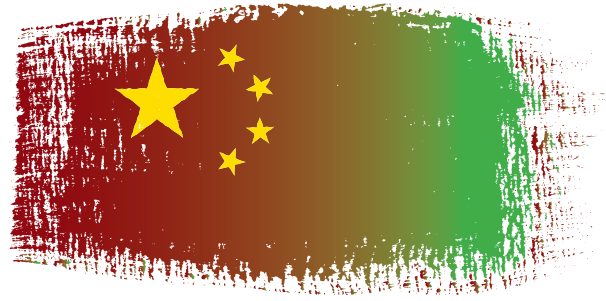
November's historic climate change agreement between China and the United States provides the green building community with another opportunity to evaluate our movement's importance to China's long-term economic and environmental forecast. Leadership in Energy and Environmental Design (LEED) has already become a major driver of market transformation in China, but how does green building fit into the complex puzzle of China's overarching economic and demographic trends?

Now that President Xi Jinping has signaled the full extent of China's commitment to combating climate change and greening its economy, several questions remain regarding the long-term strategic direction that China should take to ensure that it reaches its ambitious goals.

Given current conditions and projections, it is clear that China's best chance of reaching its goal of capping carbon emissions by the year 2030 is to focus on a rapid green transformation of its urban centers. The most logical first step in this process would be to focus on the transformation of China's built environment, not only in established international cities such as Beijing, Shanghai, and Hong Kong, but also in China's emerging industrial megacities. Making this form of investment would not only improve the quality of life for China's enormous urban population, it also has the potential of elevating the economic and cultural competitiveness of China's lesser known megacities.

The problem that emerging economic powerhouse cities like Tianjin, Guangzhou, Shenzhen, and Hangzhou are all collectively facing is that the industries that have driven their rapid transformation into megapolises are no longer sustainable. The historic climate change agreement reached by Beijing and Washington this week was not simply prompted by a desire for increased cooperation and better relations; the United Nation's Intergovernmental Panel on Climate Change (IPCC) has unequivocally stated that drastic and far-reaching cuts in greenhouse gas emissions will be needed almost immediately if we have any hope of avoiding the most catastrophic impacts of climate change.

Because many of the long-term impacts of climate change are only beginning to occur, many of the achievements of green buildings are currently seen as



positive features versus essential economic conditions. This perception will change as the negative effects of climate change become more frequent and severe, and the necessity of living in a city with a built environment that maximizes its water resources, uses energy efficiently and effectively and utilizes smart urban planning and design to minimize travel distances for its citizens becomes more obvious.

Cities that are unable to rely on the sustainable design of their built environment will struggle to compete with their internal and international competitors for a number of reasons:

- These cities will be unable to offer the same quality of life to their citizens that other greener cities can offer and they will similarly struggle to develop and retain top talent for their workforces.
- The increased scarcity of material resources such as water will also cause the costs of everyday life to skyrocket, and this will force the cost of economic activity to soar in cities that do not make substantial investments in green buildings.
- Cities that fail to use the principles of sustainable design to situate buildings along mass transit routes will also struggle with substantially higher costs of living and doing business in comparison to cities that demonstrate a commitment to making those investments now.

Chinese cities are still heavily reliant on economic activities that are largely dependent on the burning of fossil fuels. As momentum builds toward the establishment of an international consensus aimed at phasing out these very activities, Chinese industrial cities will need to dramatically reduce the emissions attributed to their built environment if they have any hope of avoiding harmful economic disruptions while they transition toward greener methods of industrial production.

China's internationally established cities have already begun to take aggressive steps toward greening their built environments, with Beijing, Shanghai, and Hong Kong already ranking among the top cities in the world for LEED.

As more recently developed cities in China attempt to reach their full economic, social, and political potential they too will need to focus on controlling the environmental impacts of their built environment. Failure to make important investments in global, internationally recognized green rating systems like LEED today will make avoiding large economic and social disruptions tomorrow a difficult proposition to manage. ●

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