

March/April 2016

USGBC+

TRANSFORMING OUR BUILT ENVIRONMENT



FUTURE

In myriad ways, through multiple projects, Rocky Mountain Institute unearths avenues leading to a clean-energy future.

CLIMATE

Municipal leaders see City Hall as ground zero in the effort to reduce carbon emissions and adapt to a changing climate.

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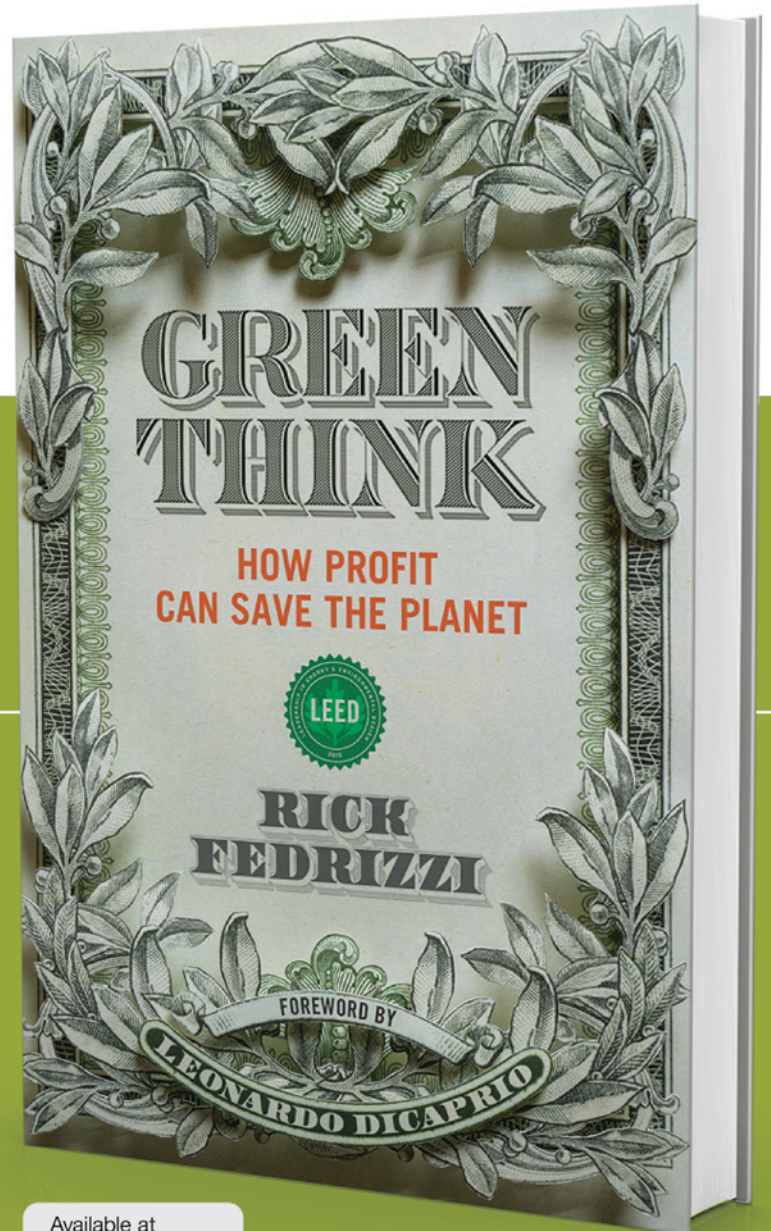
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**RICK
FEDRIZZI**
CEO AND FOUNDING
CHAIRMAN, USGBC



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ON THE COVER

Wiradjuri Murray Darling

By contemporary indigenous artist Naomi Grant.

The Murray Darling Basin in eastern Australia is one of the most severely impacted and damaged regions due to climate change. The acrylic on canvas painting focuses on a spiral design that changes as areas of land are eroded due to the effects of climate change.

This painting is one of just 10 in the world chosen to be featured at the United Nations Climate Change Conference in Poland in 2008 (COP14).



FEATURES | CLIMATE

28 Future
PATHWAYS TO PROGRESS

In myriad ways, through multiple projects, Rocky Mountain Institute unearths avenues leading to a clean-energy future.

49 Collaboration
LIVING LAB

Saint-Gobain's new headquarters is a lesson in employee comfort and productivity.

38 Climate
CITY LIGHTS

Global climate conferences may be the ultimate stage for nation-to-nation negotiations, but municipal leaders see City Hall as ground zero in the effort to reduce carbon emissions and creatively adapt to a changing climate.



WIRADJURI MURRAY DARLING ACRYLIC AND COLLAGE BY NAOMI GRANT

LEED On

7 LETTER FROM OUR LEADERS

Anne Hidalgo

Mayor of Paris and Co-host of the Climate Summit for Local Leaders

LEED Impact Categories

12 human health

Clif Bar's headquarters promote sustainability and wellness for its employees.

16 ecosystems

Sonoma County's wine region is on the verge of a new identity—the first of its kind.

24 green economy

Rick Fedrizzi's new book explores how the country can reduce its carbon footprint while thriving economically.

Departments

56 community

A Pittsburgh program is giving local schools the tools they need to sprout their own green revolutions.

64 local pulse

Q & A with Oakland Mayor Libby Schaaf

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



World View

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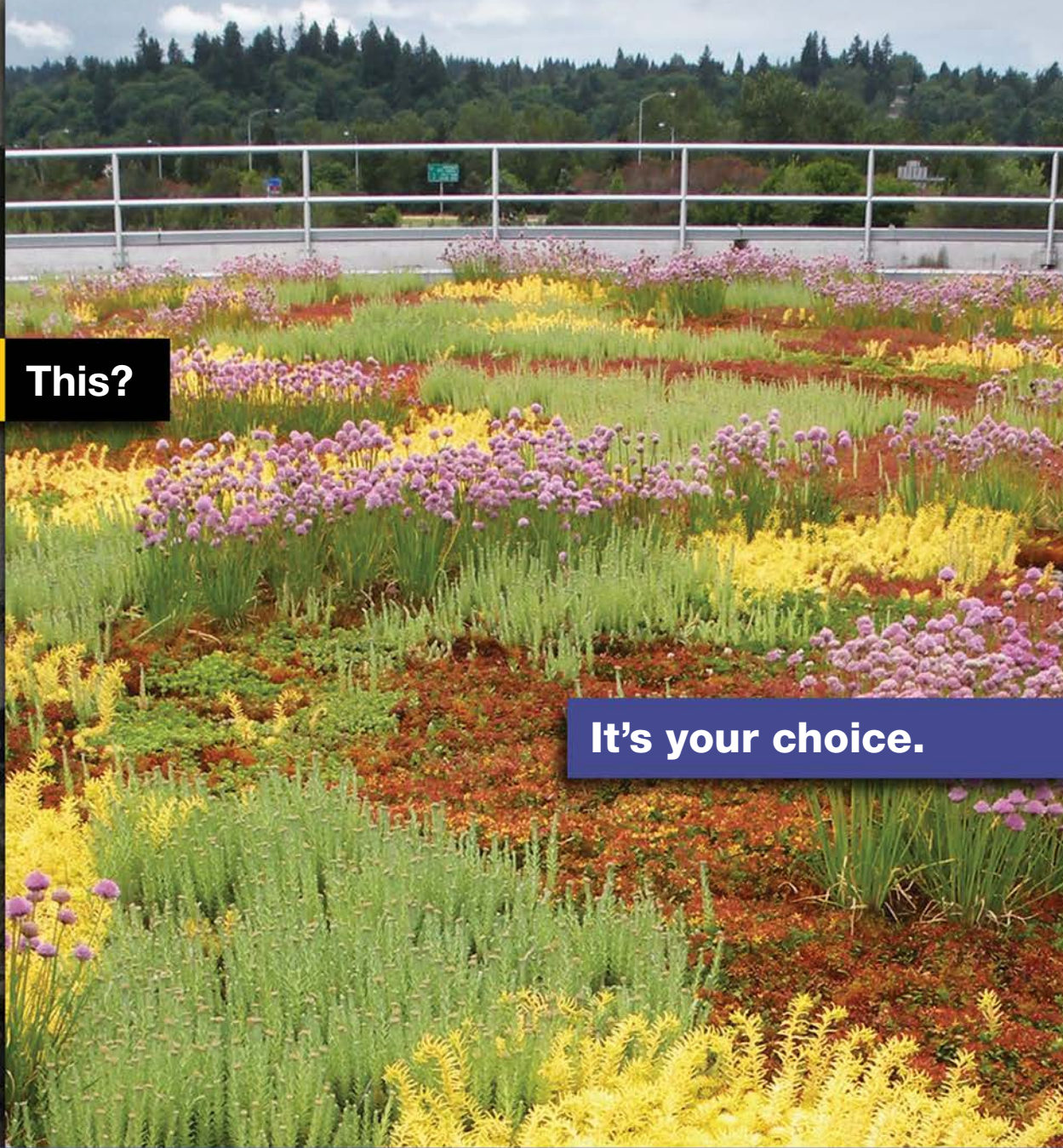
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LEED ON

Creating Sustainable Cities



ANNE HIDALGO

Mayor of Paris and Co-host of the Climate Summit for Local Leaders

Climate change endangers people's health and poses serious economic threats. Yet by protecting the environment, we not only invest in the future but we also bring immediate public health and economic benefits. By acting boldly to address the perils of climate change, cities can improve millions of lives today—and build a safer, healthier future for the generations to come.

Cities around the world are taking the lead in the battle against climate change, and, in doing so, are determining the course of our planet's future. Cities are more agile than national governments—cities have immediacy in their relationship to the impacts of climate change. They can take bolder actions and can see the benefits of climate action directly.

Here in Paris we introduced a Climate Action Plan unanimously approved by the Council of Paris in 2007, updated in 2012, committing our city to decrease its overall emissions by 75 percent in 2050 compared to 2004. In this perspective, Paris implements ambitious programs of construction of green buildings and retrofitting of municipal and privately owned buildings, as part of a major energy saving initiative.

On transportation, Paris is expanding Autolib', an electric car sharing system inspired by the success of the Parisian bicycle sharing system Velib'. Our city also announced a major plan to ban diesel cars from Paris by 2020 and an adaptation and resilience strategy for 2015 through 2020.

City leaders have already emerged through their commitment to the Compact of Mayors and their participation in COP21 at the Climate Summit for Local Leaders hosted by the City of Paris and Michael Bloomberg, UN Special Envoy for Cities and Climate Change. The Summit built on the ideas and efforts of the Compact of

Mayors, which was established in 2014 by UN Secretary General Ban Ki-moon and Michael Bloomberg, in partnership with city-networks, to create pathways for a data driven framework for reducing local greenhouse gas emissions, enhancing resilience to climate change, while tracking their progress transparently. Currently more than 460 cities around the world are committed to the Compact of Mayors representing over five percent of the global population.

The Climate Summit for Local Leaders was instrumental in providing mayors from all over the world who are taking action in their community with the opportunity to come together to collaborate on policy, public engagement strategies and professional development to promote sustainability and progressive leadership. As a result, these leaders went back to their communities with a stronger commitment to implementing climate solutions, setting targets, and measuring progress.

As we turn toward implementing the Paris Agreement, we must recognize that climate change represents an urgent and potentially irreversible threat to society and the planet and requires the largest possible cooperation by all countries and the greatest possible action by all cities.

We also need to make sure mayors continue to look outward, to commit to the Compact of Mayors and work with cities near and far to reach the emissions standards set by the Paris Agreement and help to fill the gaps left by national commitments.

Our world faces many serious environmental challenges. We can meet them—but only if we act now.

LEED ON



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28 FUTURE



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38 CLIMATE



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49 COLLABORATION



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Sustainable ENERGY

Clif Bar's headquarters promotes sustainability and wellness for its employees.

BY JEFF HARDER

Step into Clif Bar and Company's headquarters, look up, and the bikes and kayaks dangling from the ceiling are among the quirky clues that suggest the leading energy bar maker is not content to leave the outdoors outside. Daylight beams through floor-to-ceiling walls of windows and changing colors fall onto workers spread across the open floor plan. A quartet of open-air atrium gardens offers a genuine slice of nature inside the building's 115,000-sq-ft footprint. Step into one of the conference rooms built from reclaimed wood and the atmosphere feels a little like you have arrived at a trailhead.

Clif Bar's offices on 66th Street in Emeryville, California, are more than a Leadership in Energy and Environmental Design (LEED) Platinum testament to a sustainability commitment that began more than 15 years ago. It is a green building rich in biophilic design elements that have made for a happier and healthier workforce while the company has simultaneously grown into one of the biggest brands in the market.

Working and playing outside is a cornerstone of Clif Bar's identity. Founder Gary Erickson famously conjured the idea for a better-tasting energy bar during a 175-mile bike ride, and the bars quickly became bestsellers among cyclists, climbers, and the rest of the outdoors crowd after their introduction in 1992. But the company's first serious sustainability pledge came after an uncertain time, when Clif Bar found itself among the many natural food brands targeted for corporate consolidation. Erickson rejected a buyout offer, and soon after, called old friend and ecologist Elysa Hammond to help the privately owned company make its products organic. "In that process, we realized we needed a holistic sustainability program—a systems approach that looks at the connections between food and agriculture, climate, energy, and natural resources," says Hammond, now Clif Bar's director of environmental stewardship. "Plenty of other companies have sustainability programs, solar arrays, and so on, but we made a commitment to organic agriculture as the starting point and moved forward from there."

Right: As the leaders of a family- and employee-owned company, Gary Erickson, along with his wife, Kit Crawford, developed an innovative business model that integrates social and environmental responsibility into every area of the business.





Left: Clif Bar's director of environmental stewardship Elysa Hammond.

Below: The headquarters has a rock wall in its gym.



Clif Bar first announced its sustainability commitment on Earth Day 2001 and deployed sweeping measures across every facet of its business—from purchasing more than 630 million pounds of organic ingredients and earning organic certification for the majority of its products, to financing wind farms that offset the company's carbon footprint and offering \$6,500 toward the purchase of a hybrid vehicle (among other incentives) to encourage alternative modes of commuting. Along the way, publications from *Fortune* to *Outside* endorsed Clif Bar as one of the best places to work.

By 2010, that happy workforce had relocated from its original headquarters in Berkeley into its new home in Emeryville. Designed by ZGF Architects and housed within a repurposed World War II-era manufacturing plant, the two-story building is lined with an abundance of wood that is either salvaged from old barns and railroad ties or harvested from sustainable forests certified by the Forest Stewardship Council. A smart solar array provides about 80 percent of the building's electricity, while a separate solar thermal system covers 70 percent of its hot water needs. Repurposed sports equipment abounds—skis, snowboards, and surfboards are refashioned as artwork, and logo-bearing pieces of bike frames are repurposed as door handles. An onsite café, Kali's Kitchen, serves an ever-changing menu of food made largely from locally sourced organic ingredients. The building also includes other amenities for its 410 employees, like a childcare center, a full gym with a yoga room and rock climbing wall (where employees are paid to exercise 30 minutes a day), and an area for company-subsidized massages. On any given day, you will find at least a dozen dogs roaming the floor.

In 2012, the headquarters became the first LEED Platinum building in Emeryville. "Clif Bar is all about health, performance, and a connection with nature," says Brenden McEaney, director of USGBC Northern California. "It's great to see how they embody those values by providing a healthy, productive space for their workers that has a lighter environmental footprint through LEED Platinum design."

The building is also rich in biophilic design elements that conjure the outdoors to foster a more productive, content workforce. "For Clif Bar, it was a really natural fit because the connection to nature is a very strong part of their brand identity and corporate culture," says Bill Browning, partner at the sustainability consulting firm Terrapin Bright Green and an expert in biophilic design. "It's an expression of who they are, but it then has direct benefits for the health, well-being, and



Left: Located in Emoryville, Clif Bar's new headquarters were designed by ZGF Architects.

Right: Bill Browning is a partner at the sustainability consulting firm Terrapin Bright Green and an expert in biophilic design.

happiness of all the people who work there." Low partitions lend the open floor plan a quality called prospect—an unimpeded view across the natural-light-soaked space—and allow workers' screen-addled eyes to relax. The windows provide occasional glimpses of birds and wildlife, views that have restorative effects on focus and creativity. Plantings in the atriums and throughout the office evoke even more of the great outdoors.

Now, Clif Bar is finding ways of bringing the restorative power of nature to the up-to-code sterility of its bakery under construction in Twin Falls, Idaho. When it came time for Clif Bar to build its first bakery from the ground up, the company approached Browning to expand on its initial green design by adding biophilic elements into a 275,000-sq-ft space that was much more strictly regulated. Keeping a sterile environment, for example, means prohibiting plants, wood, and other natural materials in the kitchen, and the 3-shift, 24-hour-a-day nature of operations means the benefits that come with enhancing daylight disappear when the sun goes down. Nonetheless, Browning says, "Even in a sterile white box, there are still things you can do to introduce [a] connection to nature."

That approach likely means doubling down on the same sorts of biophilic features evidenced in the common areas and break rooms of Clif Bar's headquarters: a rock wall that mimics the strata of Idaho's local geology, an outdoor

community garden, and an outdoor walking path. "There will be a lot of these features that are very similar to what they've done at their headquarters, but almost on overdrive to compensate for what you can't do within the sterile space," Browning says.

Within the bakery itself, along with adding windows so workers can see the landscape outside, there are tentative plans to project a changing lineup of images shared on Clif Bar's social media pages onto the bakery's blank white walls. "It could be the Grand Canyon, climbing Mount Kilimanjaro, biking in a forest, or on a kayak paddling through some other amazing, beautiful place," Browning says, noting that data shows that simply looking at a picture of nature has many of the same psychological and physiological benefits as being in nature, like lowering heart rate and blood pressure. "The idea is that you have a view of nature inside the space."

While it's hard to attribute Clif Bar's low turnover and generally buoyant disposition solely to natural light, or the luxury of stepping into an open-air atrium to take a phone call, those biophilic elements have an aggregate effect as part of a culture that puts sustainability at the forefront. Hammond relays an anecdote: "One woman [who works in Emeryville] said, 'At the end of the workday, I used to always feel exhausted. But here, I don't feel that—I feel refreshed.'" Maybe it is because it felt like she'd been outside all day. ●

SUSTAINABLE SipS

Sonoma County's wine region is on the verge of a new identity—the first of its kind.

BY KILEY JACQUES

Two years ago, Sonoma County Winegrowers (SCW) put forth a comprehensive sustainability initiative—one that aims to position the county as the nation's first completely sustainable wine region. The county's wine industry has always been a forerunner when it comes to sustainable farming. This latest move is a prime example of regional winegrowers' efforts to ensure agriculture remains the vanguard of the local economy. A 100-year business plan—thought to be the first of its kind in the global wine industry—outlines the ways in which they will protect agriculture into the 22nd century.

Originally known as the Sonoma County Grape Growers association, SCW pushed for commission status in 2006. At that time, 1,800 growers voted to impose a self-assessment on the sale of their grapes, which meant that any vineyard in Sonoma County selling 25 tons or more would pay half of 1 percent to help fund SCW. "When the growers voted to do that, it became state legislation to create the commission, and growers vote every five years to continue the referendum," says Karissa Kruse, SCW's president, noting that the California Department of Food and Agriculture (CDFA) oversees the commission.

"From the very start, a lot of [SCW's] marketing efforts and initiatives have revolved around the preservation of agriculture in Sonoma.... historically, this has been a farming community," Kruse adds. Only in the last 60 to 70 years has the economic driver become viticulture, and many local growers have long family histories as farmers of prunes, dairy, apples, and other fruit trees. A major emphasis of the initiative is on continuing that legacy.

Right: Karissa Kruse is the president of the Sonoma County Winegrowers.

PHOTOGRAPHY BY EMILY HAGOPIAN



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According to Kruse, the SCW thinks of sustainability in three parts: leaving the land in better condition than it was when initially settled, which includes protecting rivers, wildlife, and biodiversity so that it can be farmed long term; treating employees and neighbors with respect; and making it a sustaining business venture. “We want to be good members of the community and we want to give back,” says Kruse. “[The initiative] takes a triple-bottom-line approach to sustainability.”

To start, they looked at applicable existing programs. “We didn’t feel that we needed to start our own program from scratch. The best thing to do is use programs that

have been well vetted by experts and already have a lot of credibility,” explains Kruse. Ultimately, they chose the model used by California Sustainable Winegrowing Alliance (CSWA), which consists of 138 assessments (questions) or best practices that a grower must address. The program considers things like water conservation, soil and canopy management, protection and promotion of biodiversity, energy efficiency, employee benefits and training, and external communications, to name a few.

The initial phase of this effort focuses on helping grape growers ascertain and assess sustainable vineyard and business practices already in place. Then, a third-party auditor



Many of the region's multigenerational winegrowers and winemakers have been practicing sustainable farming techniques and winemaking practices for decades.

conducts a site visit to confirm they are doing what they claim to be doing. Those auditors are chosen by CSWA, and tend to be educated in fields like environmental science and biology. Once they approve a property—indicating it meets the sustainability criteria—the grower is certified as sustainable. To maintain certification, they must repeat the process every year. Of third-party participation, Kruse says: “It’s not enough for us to just say we are doing these practices. Instead we wanted to make sure there was an independent [auditor] who was reviewing what our growers were doing on their properties.” It confirms that what is happening on the vineyards is in keeping with the initiative’s goals.

Kruse stresses that transparency is critical to the initiative’s success, which will be accomplished through regular progress updates, an annual “sustainability report card,” and monitoring with a vineyard/winery real-time tracker on SCW’s website. The plan is to assess 15,000 vineyard acres per year for the next four years until every acre of planted vines is under assessment for sustainability status.

In two years’ time, approximately 60 percent of the vineyards have gone through the assessment process (it’s a five-year plan). In other words, Sonoma County’s vineyards have reached the halfway mark to becoming 100 percent sustainable by 2019. “We are way ahead of where we





Sonoma County has a heritage of farm families preserving their land for future generations. The vineyards use a drip irrigation system, which is more efficient than conventional watering.





The weather station is located within Shone Farms' vineyard in Sonoma County. The device monitors the rainfall totals, wind, humidity, temperature, and other aspects of weather conditions within the vineyard and sends the data to grape growers to help them make important sustainable farming decisions.

thought we would be at this point," says Kruse. "Almost half of our vineyard acreage is certified sustainable. It's pretty incredible." She is quick to recognize the board and staff for their commitment to pushing the initiative through.

In general, Kruse says growers are very supportive. Any resistance is usually because they do not understand what is being asked of them. Typically, once things are made clear, they find they are already doing many of the things that qualify as sustainable. Other times, it is a lack of awareness or the fact that they may be less engaged in the grape-growing community, which requires greater outreach efforts on SCW's part.

SCW sustainability efforts apply to both the vineyards and the wineries. "We took the lead on this from the start because if you want to have a sustainable wine, you have

to start with the grapes. ... That's why there's been such a strong push toward the vineyards," explains Kruse. They have begun working with wineries, too, which have a different set of assessment questions based on energy efficiency, packaging, emissions standards, building materials, solar power, etc.

In terms of progress, SCW has been recognized globally for its efforts and has been invited to speak at some prestigious industry events including Wharton's Initiative for Global Environmental Leadership's Annual Conference. In time, Sonoma County labels will be synonymous with sustainably grown and made wines. "As a region, it has allowed us to become leaders in sustainable growing in the global wine industry," says Kruse proudly. "We are really starting to be the example of how you commit to sustainability and make it happen." ●

Greenthink

Rick Fedrizzi's new book explores how the country can reduce its carbon footprint while thriving economically.

BY MARY GRAUERHOLZ

When Rick Fedrizzi's name comes up in conversation, it is often about his experience at UTC Carrier Corporation, when he got a directive from the CEO to create a "green agenda" for the air conditioning and heating division of the company—a pivotal moment that began the journey toward creation of the U.S. Green Building Council (USGBC).

But the life path that unfurled for Fedrizzi, USGBC's CEO and founding chair, began much earlier, at the feet of his father. Fedrizzi's dad, Arigo Fedrizzi, worked with his Italian parents and sister as farm labor throughout central New York, living in poverty and growing their own food in the backyard. "They picked everything imaginable," Fedrizzi says in a recent interview. "It's a reality for many people throughout the world."

Arigo Fedrizzi, burdened in his young life, took comfort in nature in his parenting years. "Whenever he could break away," Fedrizzi says, "we would walk in the woods, go frogging—catch and release—to smell the clean air and feel the refuge nature gives you."

Those times with his father taught Fedrizzi a healthy respect for work. But more importantly, it gave him a deep reverence for the earth—what Fedrizzi calls his "ability to recognize that our biosphere needs to be respected."

Under Fedrizzi's direction, USGBC now leads a segment of the global real estate industry with an expected value of more than \$3 billion by 2020. The catalyst for that growth has been USGBC's Leadership in Energy and Environmental Design (LEED) rating system. Currently there are LEED projects in more than 150 countries and territories, encompassing 14.4 billion square feet of space (including 4.5 billion square feet that is already certified).

Right: Rick Fedrizzi is USGBC's CEO and founding chair and has authored the new book *Greenthink*. Photo: Michael Dambrosia





Proceeds of *Greenthink* will go to the HOK-designed William Jefferson Clinton Children's Center in Port-au-Prince, Haiti.

Now, Fedrizzi has explored the role of construction in the future of the planet—in the context of how our country can reduce CO2 and thrive economically—in his book, *Greenthink: How Profit Can Save the Planet* (Disruption Books). Proceeds of the book go to USGBC's Project Haiti and Center for Green Schools initiatives.

Leonardo DiCaprio, who calls Fedrizzi's work "revolutionary," lays out the potential peril to the earth in the book's foreword, in which he states: "We are living during a period of change unprecedented in the history of our planet."

In *Greenthink*, Fedrizzi demonstrates that environmentalism and profit-based business can do much more than simply coexist. They can work together in sublime, syncopated fashion, building on each other for the benefit of the planet and its people. As Fedrizzi writes in his book, "The most successful environmental organizations today work *with* business, to show them how much money they can save—and/or make—by transitioning to sustainable business practice."

It is a matter, Fedrizzi says, of rising above the divisive mood of politics, learning how to collaborate, and staring down the old-school attitude that profit and environmentalism do not mix. In fact, business has the potential to succeed in environmentalism in a way that the government has not, he says.

Fedrizzi reflected on the global agreement to reduce global warming, reached this past winter, at the United

Nations Climate Change Conference in Paris. The unprecedented consensus was a big step forward, but now, Fedrizzi says, governments must ratify it.

"It's the best intentions and the best strategy," Fedrizzi says of the agreement, "but now the governments have to put their intentions into action."

Fedrizzi says there is a clear way around the slogging nature of Congress today. "The real change won't happen in the Paris conference rooms; I think it will happen in business boardrooms," he says. "Business is the answer; incentives matter. We have to do it the right way."

Environmentalists, he writes, have traditionally treated the business community as an antagonist, and with good reason. "For a long time, industry was the opponent," Fedrizzi says. "Today the game has changed—completely. Sustainability is now profitable."

He mentions businesses that are taking big steps with no urging by government. "Look at companies like Colgate-Palmolive, which has its own carbon-reduction strategies," Fedrizzi says. "That's exciting." Other companies are linking with environmental nonprofits to act more sustainably, he says, such as the Environmental Defense Fund convincing McDonald's to change its packaging.

The caveat: Such work must be third-party certified, to prevent greenwashing and incidents such as the Volkswagen debacle, in which the German carmaker admitted to cheating on emissions tests in the U.S. "I think



Proceeds also benefit the Center for Green Schools, which promotes global initiatives such as the annual Green Apple Day of Service.

everything must be data driven and transparent," Fedrizzi says. "Everything needs to be third-party certified." When third-party certification is in place—as it is for LEED through Green Business Certification Inc. (GBCI)—consumers get solid information they need to make confident choices in the marketplace, he adds.

Fedrizzi mentioned the Global Real Estate Sustainability Benchmark (GRESB)—operated by GBCI—an industry-driven organization that assesses the Environmental, Social, and Corporate Governance (ESG) performance of real estate assets around the world. Collection of real data, Fedrizzi said, means that sustainable assets then become a basis for large investors' decisions for their portfolios.

This concept—incentivizing businesses to embrace sustainability—took root for Fedrizzi in the 1990s, when he was a marketing executive at Carrier. "When I was asked by the CEO to help green the company, I knew ozone was just one piece of the story," he says. "We looked at the refrigerant, the packaging, recycling, transportation, acoustics, air quality, and thermal comfort. When you put that together, you've got a holistic story." It was an enormous success. From there, Fedrizzi teamed with David Gottfried and Mike Italiano to create USGBC.

When USGBC was established in 1993, there were 13 member organizations, 11 of which represented business. "There were 13 members for a very long time," Fedrizzi says. Today there are more than 12,000 member organizations.

Buildings are a substantial piece of climate change, accounting for 40 percent of the world's energy consumption and a third of all greenhouse gas emissions.

Fedrizzi predicts that in the next 10 to 20 years, LEED certification levels will rise and displace what we know as current building code. As the floor for what is acceptable rises, says Fedrizzi, everybody benefits. "And, at some point, we quit measuring sustainability in square feet; we begin measuring in buildings and entire communities. We have to keep our minds open and think about the context of what world we're moving into."

That is what is required, because climate change is such a massive issue, Fedrizzi says. It can be mind-boggling: "Peel back the onion one more time, and we discover another layer."

"People think, 'What could I possibly do?' We could eat less beef, carpool, make better choices. There are so many things we could do, but we get paralyzed." Setting ourselves on the right course, he says, boils down to education, inclusion, and collaboration. At the end of the day, it isn't about worlds of government and industry sectors: "It's all about the people."

Greenthink implores environmentalists and millennials not to waste an opportunity to participate in what could be a new environmental movement. "Don't ignore the marketplace," he writes, "embrace it."

"Profitability," Fedrizzi writes, "is sustainable." ●

PATHWAYS TO PROGRESS





In myriad ways, through multiple projects, Rocky Mountain Institute unearths avenues leading to a clean-energy future.

WRITTEN BY **KILEY JACQUES** | PHOTOGRAPHED BY **MARK OSLER**

With offices in Colorado, New York, and Washington, D.C., Rocky Mountain Institute (RMI) works in two capacities. It is a combined research and consulting institution whose mission is to drive the efficient and restorative use of energy-related resources worldwide. The brainchild of Amory Lovins, RMI demonstrates alternatives to traditional building practices and transportation infrastructure. Of his creation Lovins says: “At RMI we’re practitioners, not theorists; we do solutions, not problems; we do transformation, not incrementalism.”

Lovins, an experimental physicist and 1993 MacArthur Fellow, is widely considered to be a leading innovator of super-efficient buildings, factories, and vehicles. As RMI’s chief scientist, he works on the “large-picture dimension” and studies ways of transitioning the planet away from a fossil fuel-based energy system to a clean-energy system. “We believe there is a way to do that that doesn’t compromise economic prosperity,” says managing director Iain Campbell. “It is generally far cheaper to use less energy than to deploy clean renewable energy and all the associated infrastructure.”

Founded in 1982—and winner of the 2015 Greenbuild Leadership Award—RMI works to solve global issues as a small nonprofit. Part world leaders, part “on-the-ground practitioners,” the people behind RMI look for “pathways for the market to follow,” according to Campbell. RMI’s publication, *Reinventing*

Fire, describes those pathways as what is needed to replace the fossil fuel-based energy system with renewable sources by 2050 without compromising economic growth. Why 2050? “It had to be far enough out that innovation and creativity wouldn’t get stifled,” answers Campbell. Even then, however, he doesn’t predict a zero-carbon energy future...yet.

“The whole premise of *Reinventing Fire*,” explains Campbell, “is that the energy system that was developed over a century ago [enabled] industrialization and growth...it has served humanity. There are so many things we are able to do because we have this underlying energy system. Looking back, we can say it has done a lot of good. But we have discovered, over the last few decades, that the sources of energy we are using are causing serious damage to the climate and potentially to humanity if we continue on the path of business as usual.” RMI is a major forerunner in the movement to reroute that path.

There is, however, concern that moving away from a system that has resulted in such prosperity will impair future gains. Such concerns are most prevalent among leaders of developing countries; they see the current model as one that leads to economic security. What will it mean for them if it changes altogether? *Reinventing Fire* explains how those ideals are achievable through different means—the burning of fossil fuels is not the only road to financial stability.

Today, according to Campbell, people rarely look beyond three years in terms of investment and the



Rocky Mountain Institute co-founder and chief scientist Amory B. Lovins, a self-described “recovering scientist” and “born-again Bornean,” has had a lifelong affinity for orangutans. The photograph in Lovins’ office is a gift from Seattle-based photographer Daniel Suckow. An accomplished photography enthusiast himself, Lovins has photographs of the natural world on the walls throughout the RMI offices in Basalt, Colorado—many by his wife, Judy Hill Lovins.





Cement floors are a big part of the environmental control, which hold ambient heat.

energy profile of their building. “Are people making decisions based upon the 50-year life cycle of the asset? Probably not.” He believes all resources need to be equally valued—the idea being that transitioning to renewable sources will result in a drop in demand because efficiency will be foremost. “There needs to be an equalization and revaluation of all resources so that market forces can steer us most economically toward the future clean-energy system,” explains Campbell.

RMI has what it terms “a practice area,” where they work to solve problems and demonstrate solutions to help “catalyze activity within the market.” They seek mechanisms for stimulating demand and cost-efficient delivery. Then, they explore methods for making new systems viable and available. Their work is about adoptability and applicability on a large scale, with a focus on buildings, transportation, and electricity—the major components that need addressing to reach the overarching goal of a clean-energy future.

Among their current projects, Campbell spotlights the Commercial Energy+ initiative, which aims to reduce energy use by 20 percent across more than a billion square feet of commercial building space, thereby saving 9.2 million metric tons of carbon dioxide. Their work with Retrofit Chicago’s Commercial Buildings Initiative—a public-private partnership that promotes energy efficiency among commercial and institutional buildings—demonstrates those efforts. A related project, targeted for a yet-to-be-identified city in China, is also getting underway. Both systems will be built following an entirely new approach to commercial building energy retrofits.

“We have been working to develop a program for rapid scaling of energy retrofits in commercial buildings,” explains Campbell. “I think we do a really good job in the energy efficiency of new buildings, and I think there is an element of that which is driven by codes and standards.” He notes how energy retrofits of existing commercial buildings significantly lag behind that of new construction—capital constraints are usually given as the reason for that. (The threshold for return on investment is typically not much more than three years.) He is quick, however, to credit the USGBC’s LEED certification with helping to drive down the cost of green building, which increases scalability.

Right: Iain Campbell is a managing director at Rocky Mountain Institute, where he leads the Buildings practice.

“The cost has come down to be almost a negligible increase over and above building to code,” he says, adding that building green is not only environmentally responsible, but also fiscally responsible because of the impact on the building’s future value.

Campbell sees deep energy retrofits typically integrated into major renovation projects or as he puts it: “as part of a capital refresh or repositioning of a building.” He feels the supply side of the market has yet to come up with a good solution for a stand-alone energy retrofit that is meaningful and persists over time. “We believe a big part of that is due to the retrofit process, which has been designed to deliver single building retrofits that are custom by nature.”

RMI has identified 452 possible energy-conserving measures that can be deployed in a large commercial building. What is important is to determine how a building’s characteristics match up with those possibilities. If energy retrofits are to be scalable in any significant way, Campbell and his team believe they need to be industrialized, what they call “mass customization.” He explains it as an approach that takes “specific high-value energy-conserving measures that are relevant to many buildings and [pre-engineered]...for a portfolio of buildings.” In other words, it identifies which measures are applicable for the majority, if not all, of the buildings at hand. Campbell notes that this mass customization model has been used in many industries with huge success because it is cost efficient.

They have identified four core measures: LED lighting, HVAC optimization, variable speed motor retrofits, and a real-time measurement platform that ensures consistency and sustainability of measures deployed over time. This bundle of measures—intended for buildings of over 250,000 square feet—results in an average 23 percent energy savings (without replacing major pieces of capital equipment). The Chicago retrofit is the model for the application of this bundle.

In the end, RMI plans to provide “a package of configurable, ready-to-deploy efficiency measures and technologies that will make buildings immediately smarter, more energy efficient, and more interactive with the electricity grid,” according to Campbell.

Beyond energy savings, they are structuring the model to take advantage of utility incentives, the 179D tax credit, and local financing programs such as PACE.

“The concept is: Wherever this model is deployed, it is able to leverage the financial enablers that are already in place in that local environment, whether that’s tax [or] utilities incentives, or financing mechanisms.” Clearly, the idea is in line with finding cross-spectrum applicability and enhanced scalability.

RMI manager Cara Carmichael discusses an equally impressive project: the Innovation Center. Located in Basalt, Colorado, and completed in December 2015, it is a 15,610-sq-ft office building and state-of-the-art convening center, as well as RMI’s new headquarters. “To advance our mission and propel the industry, RMI developed the Innovation Center to demonstrate how deep green buildings are designed, contracted, constructed, and occupied,” explains Carmichael. Having received the Passive House certification and anticipating LEED Platinum certification, they are also pursuing Living Building Challenge certification. “It’s going to be the most efficient building in the coldest climate zone in the United States,” she says.

In their effort to produce a net-zero-energy building, they employed the Integrated Project Delivery (IPD) contracting method, to which Carmichael attributes their success. “It was great because it really aligned our team around the goals and the vision.” She believes that to achieve such aggressive efficiency, an integrated approach is vital. “It essentially put our money where our mouth is in terms of integration and teamwork.”

As a starting point, they explored (and redefined) how occupants experience and engage with their own thermal comfort. The building includes an expanded range of “set points” in terms of temperature (64 to 82 degrees). Carmichael names six factors that affect an individual’s thermal comfort: what one wears, what one does, humidity, temperature, air velocity, and mean radiant temperature—the surface temperature of a space, which has the ability to impact an individual’s comfort level as much as, if not more than, air temperature. “We’ve really made sure that every surface in this building is aligning with our set points.”





Approximately 50 percent of the building on the south side is windows and 23 percent on the northside. This creates ambient lighting to minimize how much electrically-supplied light is needed.

The design plan called for a massive, thermally tight building envelope, which results in very little air infiltration, thereby significantly reducing energy use. In addition to hyperinsulated windows, building features include: SIP structural panels, natural ventilation, the capacity for night-flushing in warm months (there is no mechanical cooling system), and a small distributed heating system that uses the same amount of energy as 1.2 homes. "Through all these passive measures we were able to completely eliminate any kind of cooling equipment," notes Carmichael.

In fact, passive efficiency was the primary focus. "It's a critical part of our thermal-comfort strategy." Several measures were employed to that end: In addition to the super-insulated envelope and air tightness, they maximized the building's orientation to take advantage of southern exposure and applied an exterior sun-shade system to control heat gain in the summer and during the "shoulder seasons." They also used fixed shading on the south side, a newer system not yet widely used.

A narrow floor plate—60 feet from north to south—has daylight autonomy and bilateral elimination.

With natural light coming in from the north and south, the need for electric lighting is minimal. Further features include controlled glare through interior light shelves and the blind system, exposed concrete in key south side areas to help retain heat, an 84-kw solar array on the roof, and a 34-h battery system, which helps reduce demand on the grid. Eventually, a bidirectional vehicle charging system will enable them to pull energy from cars to charge batteries in the building.

The center is the result of a from-scratch design, and intended to be replicable in the industry. The integration of passive efficiency and active energy generation of renewables was a core theme during the project—one that Carmichael describes as "very forward-thinking."

The Business Renewables Center (BRC), another of RMI's ultra-progressive projects, is principal Lily Donge's area of expertise. She describes its function as "a scaling



The shades on the outside of the building automatically lower when the inside temperature hits 77°F. The shades are able to completely block out the sun, but can also articulate to let in varying amounts of light.

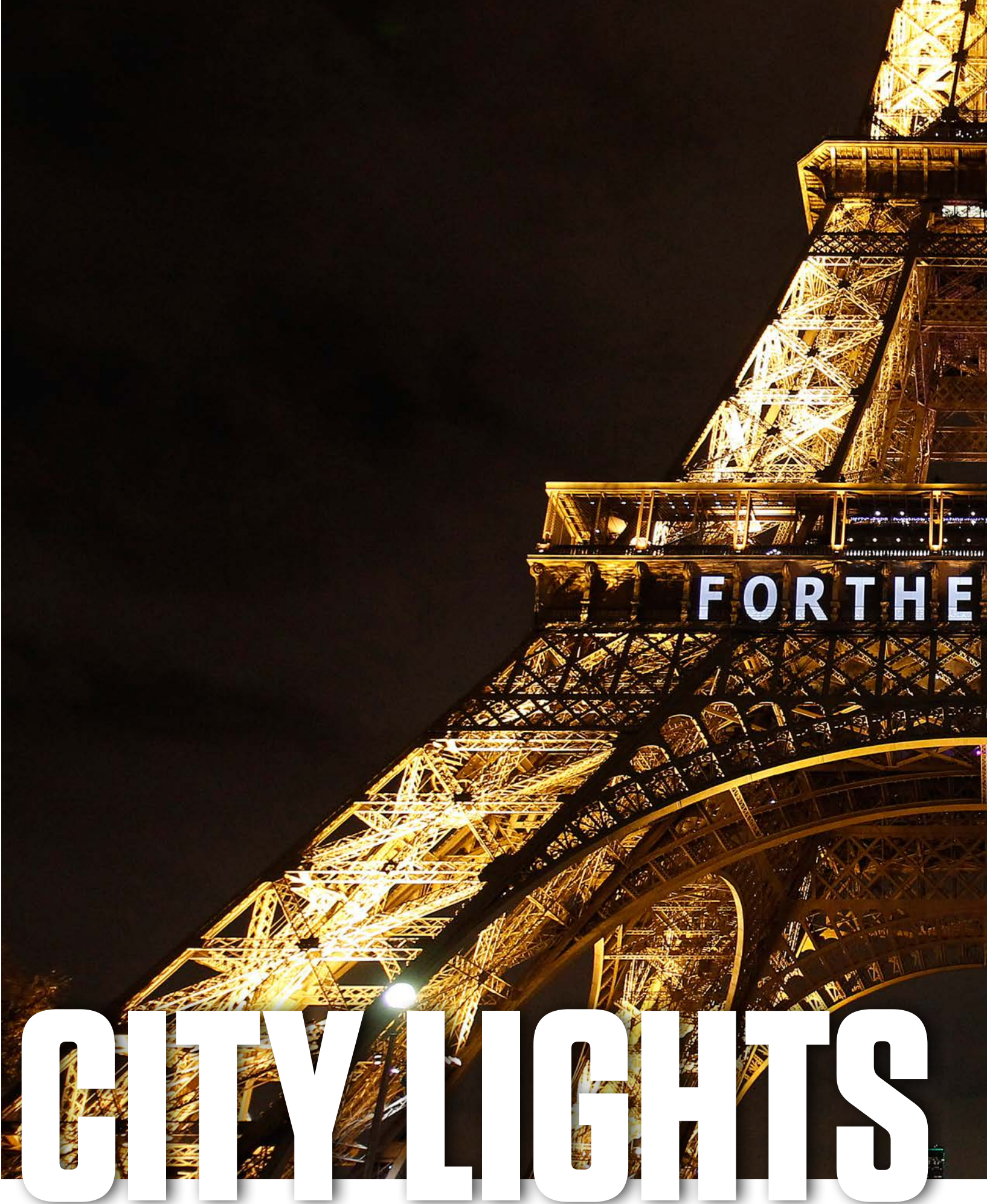
up of corporations using their capital to create new renewable energy in the marketplace.” In short, BRC streamlines and accelerates corporate procurement of wind and utility-scale solar energy. Corporations like Bloomberg, General Motors, Johnson & Johnson, and Microsoft, among others, are behind the effort.

Major progress has been seen already. In 2013, corporations were buying half a gigawatt of renewable energy power. In 2014, that number increased to 1 gigawatt, and by 2015—the year BRC was born—their efforts resulted in an increased 3.4 gigawatts of corporate-purchased clean-energy power. (BRC clients are responsible for more than 80 percent of those transactions.) To put those numbers into perspective, Donge explains that a 4 GW increase every year (among companies alone) would result in 60 gigawatts by 2030—that is a 70 percent increase in wind power in the United States.

BRC’s work includes the compilation of case studies intended for study. “We create a marketplace in which

it is safe to learn...so people are not always selling and buying and feeling like it is a risky market—it is a platform where companies and developers can talk about their obstacles, and then improve the marketplace,” says Donge. Beyond supporting the clean-energy market, there are also profits to be made, which, of course, is part of why the idea has gained such traction.

With every undertaking RMI focuses on what can be done here, now, and in a big way. That drive is critical for a fossil fuel-free future that includes a sustainable supply of clean energy. Their work is essential in determining which turns to take on a new path to progress. In the words of the man at the helm, Lovins says: “Integrative design is further accelerating what’s possible—both new and retrofit offices can now be over twice as efficient as they were five years ago, using the same technologies but combining and applying them in smarter ways.... I can scarcely imagine what wonderful things we’ll all do together in the years ahead.” 🌱



FORTHE

CITY LIGHTS



PLANET

Global climate conferences may be the ultimate stage for nation-to-nation negotiations, but municipal leaders see City Hall as ground zero in the effort to reduce carbon emissions and creatively adapt to a changing climate.

WRITTEN BY **CALVIN HENNICK**

I am convinced that our people want clean air," declared the mayor of Pittsburgh in his inaugural speech. "There is no other single thing which will so dramatically improve the appearance, the health, the pride, the spirit of the city."

These words were spoken not by Bill Peduto, the city's current mayor, but by former Mayor David L. Lawrence at his 1946 inauguration. Lawrence campaigned on a slogan of "Smoke Must Go" and championed local clean-air legislation after decades of dense industrial activity had earned Pittsburgh the nickname "the Smoky City." Photographs from the time show a city choking on smog, with dark clouds obscuring building tops and enveloping everything else in an ashy haze.

"Seventy years ago, trees couldn't grow on our hillside," says Peduto, mayor since 2014. "Our streetlights would come on at noon because of the soot from the pollution. We had destroyed our environment."

At 51, Peduto isn't quite old enough to remember the city's smoggy heyday. Lawrence's 1949 anti-pollution legislation lifted the smoke clouds, and although the city's industrial reputation lingers (its

pro football team is the Steelers), over time the local economy has come to revolve around universities, nonprofits, and financial institutions more than it does smokestacks.

Still, things are not perfect. The Pittsburgh metro area continues to rank near the top of "worst air" lists published by groups like the American Lung Association. But the situation is vastly improved since decades past, and the city continues to make strides. Peduto, who joined the Sierra Club in his mid-20s, championed a new clean-air ordinance as a member of the City Council, and as mayor he has taken steps to reduce energy consumption in the city and encourage green building practices. The streetlights do not turn on at noon any more, and when they do light up, many are powered by money-saving, energy-efficient LED bulbs.

"We're no longer a model of a postindustrial city, but a model of a 21st-century city," Peduto says.

There is a lesson for other cities in Pittsburgh's transformation, Peduto thinks. Pittsburgh saved itself, in a sense—not waiting for federal legislation like the Clean Air Act (which came more than a decade after the city's own legislation) to clear the skies—and

Previous spread: The Eiffel Tower displays messages as part of the 21st Session Conference on climate change in Paris.
Photo: Thierry Chesnot/Getty Images

Below: Pittsburgh mayor Bill Peduto believes his city is the perfect example of a city moving from a post-industrial metropolis toward a 21st century clean energy solution. Photo: Ryan Smith



Right: Former Mayor of New York City, Michael Bloomberg, and Mayor of Paris, Anne Hidalgo, pose with leaders from different cities at the Paris city hall during the COP21 Paris Climate Conference. Photo: Thierry Chesnot

Peduto believes that cities are central to solving today's environmental challenges.

He brought this message to the world this fall at the 2015 United Nations Climate Change Conference in Paris (commonly referred to as COP 21), as part of a delegation of local officials. Several dozen mayors from the U.S. attended the conference, joining several hundred from across the world, in a show of solidarity and support for aggressive emissions reduction goals. Peduto traveled as part of the Local Climate Leaders Circle, a group of municipal officials organized and sponsored by the U.S. Green Building Council, the National League of Cities, the International Council for Local Environmental Initiatives (ICLEI), and the World Wildlife Fund.

In addition to Peduto, the 11-member delegation included mayors from Atlanta, Georgia; Boulder, Colorado; Chula Vista, California; Des Moines, Iowa; Grand Rapids, Michigan; Oakland, California; Salt Lake City, Utah; and West Palm Beach, Florida. Joining them were council members from Santa Monica, California, and King County, Washington. Each of the communities is a signatory to the Compact of Mayors, an agreement by cities to conduct greenhouse gas emission inventories, develop climate action plans, and report on their progress.

While the city leaders played no formal role in conference negotiations around emissions targets (that was left up to the representatives of national governments), their presence in Paris was not merely symbolic. In addition to pushing their national governments to adopt ambitious goals, city leaders flocked to France to share their ideas and success stories with one another, and to lay claim to a seat at the table in the climate conversation.

"There's an understanding that the world's complex problems no longer have to be solved by nations," Peduto says. "They're better solved by a coalition of local governments. With an issue like climate change, the biggest impact is happening in cities around the world."

While even the world's largest cities lack the standing and resources of national governments, cities are more nimble, able to effect policy changes quickly, and experiment with new strategies and ideas. While

cities contribute disproportionately to the problem of climate change—accounting for 70 percent of global greenhouse gas emissions, according to the United Nations—they also can have an outsized impact on solutions. If every city in the world took steps to reduce energy use and invest in renewables, there would be very little left for national governments to do.

Peduto sees the manageable size of Pittsburgh as a strength, and thinks the city's past sets it up as an example of what is possible, even in the dirtiest of metropolises. "Pittsburgh is small enough that we can implement things, but big enough that the entire world will take notice," he says. "I was [in Paris] to say to the world, 'Look, if we can do it, certainly the rest of the world could do it.'"

"In Paris, there were really two approaches," Peduto says. "The first was the ability to be there to show our support for an agreement coming out of COP 21. The second was to be able to work with other mayors around the world to basically say, even without an agreement, we're still going to [fight climate change], and we're going to be able to implement the changes that the countries are calling for."

"The Leaders Circle cities were instrumental in shoring up the United States position in Paris," says Elizabeth Beardsley, senior policy counsel for USGBC. "In the run-up to COP 21, these leaders helped inspire other cities to commit to greenhouse gas reductions, and by the start of the conference, 119 U.S. cities had made commitments." She notes, that collectively, the city commitments to reduce greenhouse gases were a significant supplement to federal actions. "At the COP, city leaders demonstrated that we can be successful in tackling the cause of climate change—with example after example, from cities building highly efficient and even net-zero buildings, to retrofitting their streetlights, to adopting policies to support private sector efforts to transition towards efficiency and clean energy."

Cooper Martin, program director for the Sustainable Cities Institute at the National League of Cities, helped organize the delegation of local leaders. He echoes the notion that the city officials were in Paris not only to push for a solid emissions reduction agreement, but also to announce their status as change makers in their own right.



“We felt it was necessary to get cities sort-of on the record in support of the agreement,” Martin says, “and show the rest of the world that it’s not just the president versus Congress, but that there are already lots of other entities that can work toward these goals and are already achieving them.”

“We wanted to highlight the fact that some of the largest, most economically successful cities across the country and across the world are actually the ones that are taking the most aggressive [environmental] action,” Martin adds. “We wanted to push back on the notion that we have to choose between our economic success and averting climate change.”

George Heartwell, who made the trip to Paris as mayor of Grand Rapids, Michigan, but retired from the position at the end of 2015, previously attended the United Nations’ 2013 climate change conference in Warsaw, Poland. He walked away from that event disappointed that the agreement stemming from the conference didn’t include language about the role of cities. “I wanted to be back in Paris because this was going to be the one where we finally got standing,” he says. “When you come [several hundred] strong, and you’ve got access to your diplomats—far better access than we had in Warsaw—you feel at least that your voice is being heard. It was important for us to say that cities play a key role in this, and if we’re going to achieve these goals, it’s going to be because cities have moved the needle on energy efficiency, public transportation, and building design.”

Throughout the conference, U.S. Department of Energy officials regularly briefed the city leaders on the negotiations, giving them a window into how the talks were proceeding. The mayors also participated in workshops, meetings, and information sessions throughout the conference, including sessions where several U.S. mayors talked about what they were doing to make their cities more resilient in the face of climate change.

“It was an opportunity to meet with leaders who are instituting these programs in their cities, and compare what one city was doing differently from another,” says Mary Casillas Salas, mayor of Chula Vista, California.

A highlight of the trip came during the Climate Summit for Local Leaders, when more than 400 city leaders from around the world descended on Paris City

Hall. The event, cohosted by Paris Mayor Anne Hidalgo and former New York City Mayor Michael Bloomberg, was billed as the largest-ever global meeting of local leaders to discuss climate change, and featured an all-star lineup of speakers including Al Gore, Elon Musk, Robert Redford, and Leonardo DiCaprio.

“There was an overall sense of optimism, separate from the treaty,” says Peduto. “It was a powerful feeling, sitting in a City Hall with hundreds of mayors from every continent on earth. Not only do we have a common interest in tackling this issue, but also the commitment to do it.”

Ultimately, the conference resulted in the Paris Agreement, a landmark treaty lauded by French Foreign Minister (and head of the conference) Laurent Fabius as “ambitious and balanced” and a “historic turning point.” The accord is the first to require action on climate change from even developing countries, and represents an agreement by nearly 200 countries to voluntarily commit to greenhouse gas reduction targets. The agreement also requires countries to reconvene every five years, beginning in 2020, to update their plans with more ambitious emission cuts.

Additionally, the agreement includes language directly addressing the role of cities, encouraging municipalities and other “nonparty stakeholders” to address and respond to climate change by scaling up efforts to reduce emissions and build resilience.

“It was a recognition that cities and urban centers will play a key role in achieving the goals of the agreement,” says Heartwell. “You’ve got half the people in the world living in cities, and that percentage is growing every year. The greatest impacts that can be made are going to be made in cities.”

“Cities are where it’s happening,” says Jeri Muoio, mayor of West Palm Beach, Florida. “We are taking [climate change] on, when at the national level they’re too busy fighting with each other. Being mayor is one of the coolest jobs you can have in politics, because you can actually get things done.”

“Cities are where it’s at,” echoes Chula Vista’s Salas. “You can implement things a lot easier on a micro level than you can on a macro level.”

This is not just bluster. The Paris Agreement does not go into full effect until 2020, and while individual



Retired mayor George Heartwell led Grand Rapids to become the nation's most sustainable mid-sized city. Photo: Ara Howrani

nations are ratifying the accord through their own governmental processes, many of the carbon-curbing initiatives that help the countries meet their goals will come at the subnational level. It's a responsibility that city leaders are taking seriously.

"For me the big takeaway [from the conference] was not new information as much as it was inspiration," says Heartwell. "It's the sense that Grand Rapids is not alone out there, and there are cities around the world that are ready to do what it takes to achieve the goals of the Paris accord."

Kevin Taylor, senior specialist for local engagement at the World Wildlife Fund and an organizer of the local leaders group, argues that cities are uniquely positioned to enact change on a number of levels—not only through direct action, but also by helping to create a market for sustainable materials, and by exerting influence on state and national governments.

"Cities are a major customer for things like electricity, things like paper products, furniture," says Taylor. "When they set a new [sustainable] direction for what they're going to choose to value—one type of system or provider over another—that's certainly at a scale that makes a dent. They have influence in both directions: down to the individual level, as well as up to the national governments."

In West Palm Beach, city officials have committed to turning the city's fleet of vehicles over to non-fossil-fuel models by 2025, have installed LED lights throughout the city, and have made electric car charging stations available for public use. The city has also set targets around reduced emissions for city facilities and operations (including an overall 37 percent reduction in greenhouse gas emissions by 2035 from a 2008 base), and is providing free trees to residents and businesses.



Foreign Affairs Minister and President-designate of COP21 Laurent Fabius (C) celebrate the adoption of a historic global warming pact at the COP21 Climate Conference in Paris. Photo: Jonathan Raa/Pacific Press/LightRocket via Getty Images

As a coastal city, West Palm Beach will likely be disproportionately affected by climate change (although Muoio notes that, with an elevation of around 13 feet above sea level, the city is actually better positioned than some other neighboring communities). Still, climate change is a global problem, and West Palm Beach—or any other city—cannot prevent increasing temperatures or rising sea levels alone, even if it stops emitting carbon completely.

This means that most cities taking environmentally friendly actions are doing so for a mix of the same reasons that businesses, schools, nonprofits, and individuals are—namely, officials are worried about the long-term health of the planet, and the changes often have operational benefits as well. “It’s becoming more obvious that we have to look at our carbon emissions,” Muoio says. “I think young people are pushing us in this direction. They’re saying, ‘We’re going to be living in this world.’” At the same time, the city is saving money through initiatives such as the LED lighting, and various water management improvements have left the city better positioned to handle crises. “When I became mayor in 2011, we were going through a really bad drought,” Muoio says. “Now, it wouldn’t even be a blip on our radar.”

In Pittsburgh, officials have committed to reduce greenhouse gas emissions by 20 percent below 2003 levels by 2023. The city also gives density bonuses to Leadership in Energy and Environmental Design (LEED) development and requires LEED Silver certification or

higher for any publicly financed development over \$2 million or 10,000 square feet.

In August of 2014, Chula Vista began a program to help property owners finance projects centered around energy efficiency, renewable energy, and water conservation, and had completed or begun 57 projects by the end of that year. Also, over 30 percent of the city’s vehicle fleet has been transitioned to operate on electricity, propane, compressed natural gas, or biodiesel.

Grand Rapids received the title of “Nation’s Most Sustainable City” from the U.S. Chamber of Commerce in 2010. The city has set a goal of sourcing 100 percent of its power from renewable sources by 2020, and this spring will start construction on a 38-acre solar field.

And the list goes on. Not long ago, one might have had to search around for examples of cities taking the lead on sustainability issues. Now, they abound. Heartwell says he was labeled a “tree hugger mayor” when he first came to the post in 2004, but that, over time, attitudes shifted and sustainability became embedded in the culture of Grand Rapids. It is a shift that Heartwell sees happening nationally, too.

“If you attend the National League of City conferences, or the U.S. Conference of Mayors, a dozen years ago, you rarely heard anything about climate change or energy efficiency,” Heartwell says. “Today, it dominates the agenda of most of our meetings. I think it’s a growing movement.” 🌱

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Saint-Gobain's new headquarters is a lesson
in employee comfort and productivity.

WRITTEN BY **MARY GRAUERHOLZ** | PHOTOGRAPHED BY **RYAN SMITH**

Previous spread: CertainTeed's Malvern, Pennsylvania, headquarters; President and CEO of Saint-Gobain, John Crowe. Photo: Jeffrey Totaro

Right: Monica Brogan is the manager of sales support at CertainTeed Corporation.

Right below: Saint-Gobain's new headquarters is about comfort and sustainability.

Monica Brogan, manager of sales support at CertainTeed Corporation, knew she had a crackerjack team. But when her department moved last October to the new North American headquarters of CertainTeed's parent company, Saint-Gobain, she was in for a shock.

The move, from the company's former headquarters in Valley Forge, Pennsylvania, to nearby Malvern, turned out to be a game changer. "We can actually go back and see that the week we moved in there was a huge shift," Brogan says. "Our performance has increased 150 percent since last year."

Brogan's voice carried a note of happy disbelief. "We've double- and triple-checked the numbers," she says with a light laugh. The steep uptick, Brogan attests, had to be the new quarters: its open, collaborative setting, air that simply smells and feels better, lighting without glare, and a high-tech noise-reduction system. The staff is more engaged and more collaborative. As Brogan says, "They're just more energized."

Today Saint-Gobain's sleek new \$80 million headquarters, which replaced a dilapidated abandoned life insurance company center, is awash in natural light, filled with the scent of clean air, and almost noiseless—all of it centered on an open architectural plan where the 800-plus employees have a view of the outdoors. The 320,000-sq-ft headquarters debuted on October 15, 2015, the same day that Saint-Gobain was founded 350 years ago by King Louis XIV of France, when he oversaw the construction of the Hall of Mirrors at the Palace of Versailles.

Almost every aspect of the new headquarters, situated on a gently rolling 65-acre suburban property, has been designed for sustainability and employee comfort. 17,000-sq-ft of electronically tintable SageGlass, a Saint-Gobain product, is installed on the building's west and south sides. The product's high-tech nature means that SageGlass can reflect three different zones of tinting within one pane of glass; this maximizes daylight and gives employees unobstructed views of the natural environment, which boosts productivity and workplace satisfaction.

Other high-tech Saint-Gobain glass is used in most of the headquarters' common areas, providing an optimal light-to-solar gain ratio in the summer and warm comfort in cooler weather, while also reducing cooling and heating loads.

High-tech Ecophon® Focus™ Ds and Solo Circle tiles, made by CertainTeed, hang in reception areas and other open spaces. With its content of recycled spun glass and a plant-based binder, the tiles absorb sound and allow employees to speak at normal levels and still be heard, yet retain privacy.

Saint-Gobain ADFORS wall-covering products, installed in the headquarters' interior, help sanitize the air and repel and kill fungus.

Duct materials by CertainTeed in the HVAC systems improve acoustic performance, air quality, and noise levels. Speakers tucked into the building's ceiling create a barely perceptible "pink noise" to help conversations stay private without affecting hearing.

Ergonomic workstations, a cafeteria with the feel of home, an amenities-filled gym, and an ever-present





Stan Gatland is the manager of building science technology at CertainTeed.

visual connection to the outdoors also aid in physical and mental well-being.

"Every element of the site was intended to show how committed we are to providing a comfortable and collaborative work environment for our employees," said John Crowe, president & CEO of Saint-Gobain and CertainTeed corporations. "We have sought to set a new standard for the modern workplace." (Of Saint-Gobain's many subsidiaries, CertainTeed is the largest in North America.)

The new headquarters—with core, shell, and lobby designed by the architectural firm Bernardon and interior by Jacobs—contains more than 40 building products from the portfolio of Saint-Gobain, the world's largest building materials company. Through its heavy use of Saint-Gobain and CertainTeed products, the new building has created a "living laboratory," Crowe says, where the company's research team is able to measure the physical impact the products have on productivity, well-being, and overall satisfaction. The living laboratory is overseen at the nearby Malvern Innovation Center, CertainTeed's 43,000-sq-ft facility for research and operations teams.

"It's a 'multicomfort program,'" says Stan Gatland, manager of building science technology for CertainTeed. "We're looking at the human experience and overall satisfaction."

The concept of a multicomfort program first arose at Saint-Gobain more than a decade ago. The idea, Gatland says, is based on five types of comfort, coupled with an aim to minimize environmental impact: thermal comfort, health comfort, acoustic comfort, visual comfort, and modular comfort (promoting accessibility and safety).

Gatland and his colleague, Lucas Hamilton, watched the evolution of the building from a stripped-down frame of steel and concrete, when construction began in spring 2014, to its sophisticated new headquarters.

Hamilton, manager of building science applications for CertainTeed, recalled sensing the dramatic change of headquarters literally in the air. "In the old building, there was no air barrier," Hamilton says. "It did not have good insulation; it was leaky. People in the new building asked if we were pumping oxygen in."

Actually, the inquiring employees were on to something. Using the standard for fresh air (set by



The building is designed to minimize environmental impact and maximize thermal health, acoustic, and visual comfort.

the American Society of Heating Refrigeration Air Conditioning Engineers), the sealed building is equipped with carbon dioxide sensors to modulate the HVAC system, keeping air at its best. In Hamilton's words, the solution brings the issue back to the employees: "We're giving you the fresh-air ventilation you deserve."

Overall design features create a sense of unity and collaboration: a corporate suite located away from the traditionally status-branded corner office; more than 100 collaborative meeting spaces; an outdoor amphitheater, pond, and stream; walking trails; and a high-performing gym. "The design of our new North American headquarters has significantly changed the ways in which employees go about their professional lives," Crowe says.

The sustainability theme is clear from a first glance at the headquarters' front façade, where a water feature utilizes harvested rainwater (as does the irrigation system). Rainwater is collected from a 7,000-sq-ft area of the roof and stored in a 20,000-gal onsite cistern. Commuting has been made simpler and greener, with bicycle storage facilities, preferred

parking for low-emission and fuel-efficient vehicles, electric-vehicle charging stations, and a free shuttle to and from the Paoli train station.

Not so obvious are many other features that contribute to sustainability, with an emphasis on recycled content and water savings. Low-flow plumbing fixtures mean the building is projected to use 40 percent less water than a traditional building, saving 640,000 gallons of water each year. A fiberglass architectural membrane (by Saint-Gobain Performance Plastics) in the building's sweeping front façade is coated with Teflon and is Energy Star certified, and creates a canopy over the entranceway of the headquarters, lowering air conditioning and lighting costs. Reflective roofing (by CertainTeed) lowers energy consumption and minimizes the building's environmental impact. Mold-resistant insulation from sustainable sources creates a quiet environment and conserves energy and resources. A stormwater management plan is in place, including an underground detention system, infiltration trench, and four rain gardens to infiltrate stormwater onsite and prevent pollution of local waterways.



Saint-Gobain is seeking a LEED Platinum certification under the LEED 2009 Core & Shell rating.

Major construction often takes a destructive toll on landfills. In fact, construction and demolition waste makes up 17 percent of Pennsylvania's municipal waste stream. The Saint-Gobain headquarters project took aim at the environmental damage done by this type of waste. An estimated 79 percent of construction and demolition waste was diverted from landfills, and building materials emphasize recycled content and local sourcing. In total, the project's materials consist of 19 percent recycled content, 16 percent regional materials, and 67 percent FSC-certified wood. Furniture in workstations, for instance, was manufactured in East Greenville, Pennsylvania, and Toronto, Canada.

Interior finishes and furnishings installed in the building contain little or no VOCs. Low-emitting products used in construction include adhesives, sealants, paints, coatings, flooring, and composite wood—as well as furniture.

The sustainability theme that is woven throughout the project—including materials, design, and specific strategies—naturally dovetailed into an effort to

seek Leadership in Energy and Environmental Design (LEED) certification. Two sustainability consultants from the Sheward Partnership in Philadelphia—Michael W. Pavelsky, AIA, LEED AP BD+C, associate sustainability director, and Chloe Bendistis, LEED AP BD+C, sustainability project manager—have been with the Saint-Gobain project since mid-2013. Of all the sustainability consultants in the project, Pavelsky and Bendistis are the only ones to have touched every single aspect of the sustainability piece. They are also leading the effort in LEED certification.

Saint-Gobain is seeking a LEED Platinum level certification under the LEED 2009 Core & Shell Rating System (LEED-CS v2009) and a LEED Platinum level certification under the LEED 2009 Commercial Interiors Rating System (LEED-CS v2009).

Bendistis recalled the early days. “We started with an investigation into sustainability, examining goals and strategies, and evaluated all of it and how it would impact Saint-Gobain’s goals and the LEED checklist,” she says.

Right: Interior finishes and furnishings contain little or no VOCs. Low-emitting products include adhesives, sealants, paints, coatings, flooring, composite wood, and furniture.

The most important strategy, Bendistis says, was the decision to install SageGlass on the south and west sides of the building, the locations that were most vulnerable to heat gain in the afternoon. "That was the most significant," she said. "It improved performance and the energy model and addressed indoor comfort. That was definitely an influential piece."

Pavelsky says Saint-Gobain's forward-thinking strategy is a boon to the LEED effort. "At the time this project started in earnest, in mid-2013, the newest version of the LEED Rating System, LEED v4, was not yet out for use by the general public," Pavelsky says. (All projects registered to pursue LEED certification starting this October will be required to register and seek certification under LEED v4.)

"Saint-Gobain took the leadership position of integrating specific LEED v4 credits into the LEED 2009 certifications," Pavelsky adds, "to illustrate how their products and approach to designing a 21st-century corporate headquarters drive sustainability further."

The project's success regarding employee well-being—and the charting of it through the living laboratory model—is reflected in anecdotal information that suggests greater satisfaction, productivity, and workplace collaboration.

But a data-driven measurement system for employee well-being is pushing the story deeper. Saint-Gobain is collaborating with Associate Professor Ihab Elzeyadi, of the University of Oregon's School of Architecture and Allied Arts, to measure the impact of headquarters' design on employees with real data. Saint-Gobain plans to have complete results by early 2017, Gatland says.

The new headquarters has received extensive media coverage, and Saint-Gobain predicts the project will make its mark in the annals of innovative commercial construction.

It is also making an impression with the traditionally difficult-to-impress Parisians, who are flocking from Saint-Gobain's world headquarters to Malvern to see the new building. This is very meaningful to Saint-Gobain. As Carmen Ferrigno, the company's vice president of communications, says, "When the French come to the U.S. to learn about style and design, you know you've done something right." 🍷



Teaching the Teachers

A Pittsburgh program is giving local schools the tools they need to sprout their own green revolutions.

By Calvin Hennick

Years ago, Jenna Cramer's high school alma mater called her up looking for advice.

Cramer had just recently begun working at the Pittsburgh-based Green Building Alliance, and her former high school was in the middle of a building project. School district officials wanted to pursue Leadership in Energy and Environmental Design (LEED) certification, but much of the design for the new building had already been completed, and the cost of going back and starting over proved to be prohibitive. Despite district leaders' interest in building a green school, it did not happen. They had simply waited too long.

For Cramer, the scenario felt familiar. "It was the repetitive story of always being called a little too late," Cramer says. "One of the barriers we found is that schools were calling us after they had their design and building teams onboard, and the teams were not steering them in the direction of building green and healthy schools." The architects often lacked experience with sustainable design, she says, and as a result they tended to emphasize the costs of going green while downplaying the benefits.

Cramer felt that the Green Building Alliance, the local aligned chapter of the U.S. Green Building Council (USGBC), needed to get involved earlier in the process to help schools follow their green instincts. But, she says, "We had no way to be there at the right point and be seen as a trusted resource [to] help influence the decision-making process."



PHOTOGRAPHY BY RYAN SMITH



Since 2008, the Green Building Alliance has been working with K-12 school leaders, students, outside groups, and citizens to help them create sustainable learning environments. The organization held green schools conferences during the first couple years of the effort, but even those events were not enough to create the deep relationships necessary for Cramer and her colleagues to effect change within the schools.

Then, in 2012, the organization launched the Green Schools Academy, a more formal partnership in which select schools work closely with the group. (The name was changed to the Green & Healthy Schools Academy in 2014.) The academy comprises several different programs and services, including a lecture series, energy conservation workshops, technical assistance, and help for schools participating in the Green Apple Day of Service, an initiative of the Center for Green Schools at USGBC. But at the



Opposite page: Jenna Cramer, vice president of transformation & community.

This page: The Academy hosts several programs and services, including a lecture series and energy conservation workshops.



Left: Guest speaker David Orr discusses the reality of climate change, how to talk to students about the climate, and his work with Oberlin College.

Left, below: Workshop attendees receive a personal tour of the Phipps Conservatory and Botanical Gardens, Center for Sustainable Landscapes.



heart of the academy is the two-year School Sustainability Culture Program, an immersive experience that brings stakeholders from six to eight schools (or districts) together for monthly meetings, with the ultimate goal of integrating sustainability into the schools' buildings, curriculum, and culture. The idea is that schools will come out of the program not only with new knowledge, but also an increased focus on sustainability—so that whether they are building a new school or choosing cleaning supplies, they will do so from an environmentally friendly perspective at the start, rather than trying to green the project halfway through.

“We can’t be there every time a school has to make a decision,” Cramer says. “If we start out by building this really strong ‘why’ that is connected to their values as a school, they can’t unlearn that ‘why.’ From that point, they think about these values every time they do a building project,

Right: Kirsten Christopherson-Clark, head of school of the Waldorf School of Pittsburgh, relies on the expertise of the Green Building Alliance.

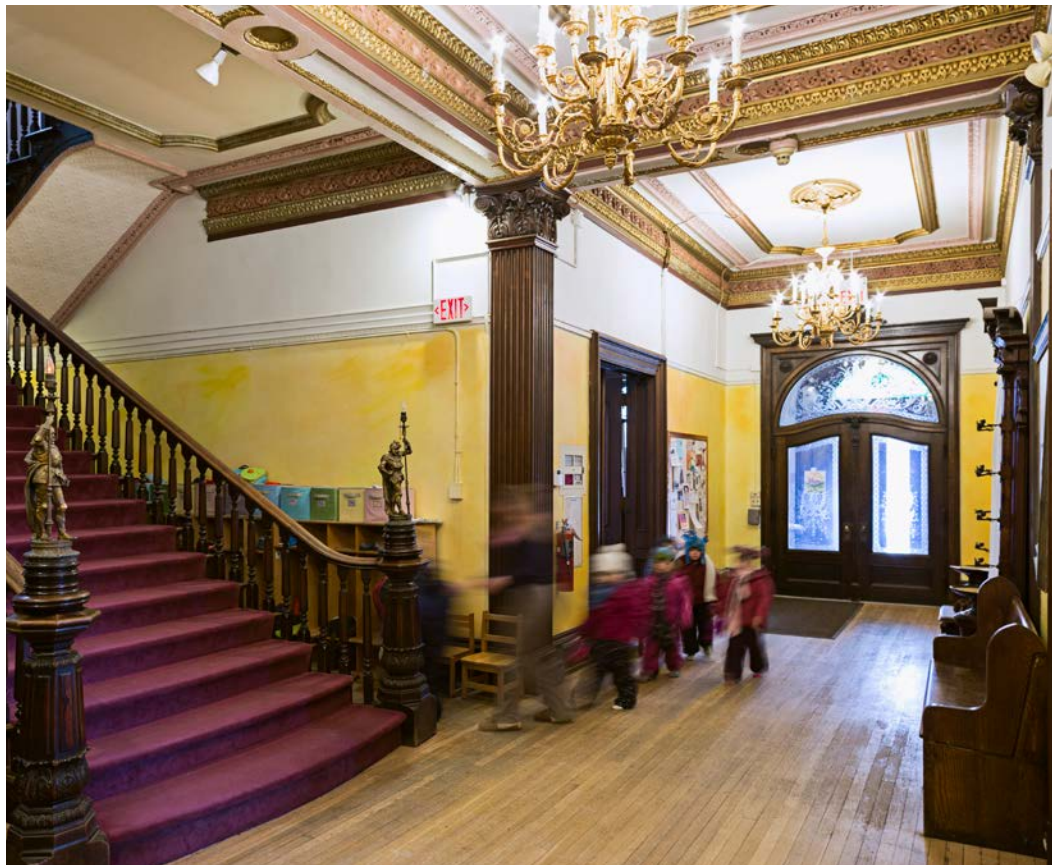
Right, below: Founded in 1993, the Waldorf School of Pittsburgh is housed in a Victorian-era mansion that is a city-designated historic landmark.



or they have to purchase new supplies, or they develop a new curriculum. It becomes a part of who [they are].”

“We wanted to create a program that would have a very big impact in a short amount of time,” Cramer adds. “Rather than trying to reach every school, we decided to focus on a few schools and make them models of what a healthy, sustainable school could look like.”

The program was so successful in the city of Erie, Pennsylvania, that the local school district created a new sustainability plan. Doreen Petri, chair of the science department at Northwest Pennsylvania Collegiate Academy (a magnet high school in Erie), says the plan has already led to big changes in the district’s elementary science curriculum, with kids at some schools planting trees, maintaining pollinator gardens, building birdhouses, and conducting energy audits as part of sustainability-focused units. After a pilot, Petri says, the superintendent wants to expand



Alumni Notes

“This program has changed the way I look at teaching, work with my students, and think about change itself. I came away with a whole different mindset and way to live my life.” —**Kim Bliley, Teacher, Erie School District**

“We’re already doing this sustainability stuff. We thought, ‘What can they teach us?’ In the program, we learned so much, and realize we have so much more to learn.” —**Bob Gold, Facilities Director, Chartiers Valley School District**

“The Culture Program transformed my leadership style and allowed me to support a change-agent mindset for my organization. We went from checking boxes, to getting an award, to changing hearts and minds.” —**Nikole Sheaffer, Director of Innovation, The Environmental Charter School at Frick Park**



Waldorf School of Pittsburgh students enjoy their “natural playground.”

the curriculum changes to more schools.

Petri says that the new focus on sustainability will definitely last. “Many times, environmental initiatives are serviced by an after-school program or a club, but then when teachers switch schools or retire—when that champion teacher leaves—that program falls apart,” she says. “This is going to be part of our curriculum.”

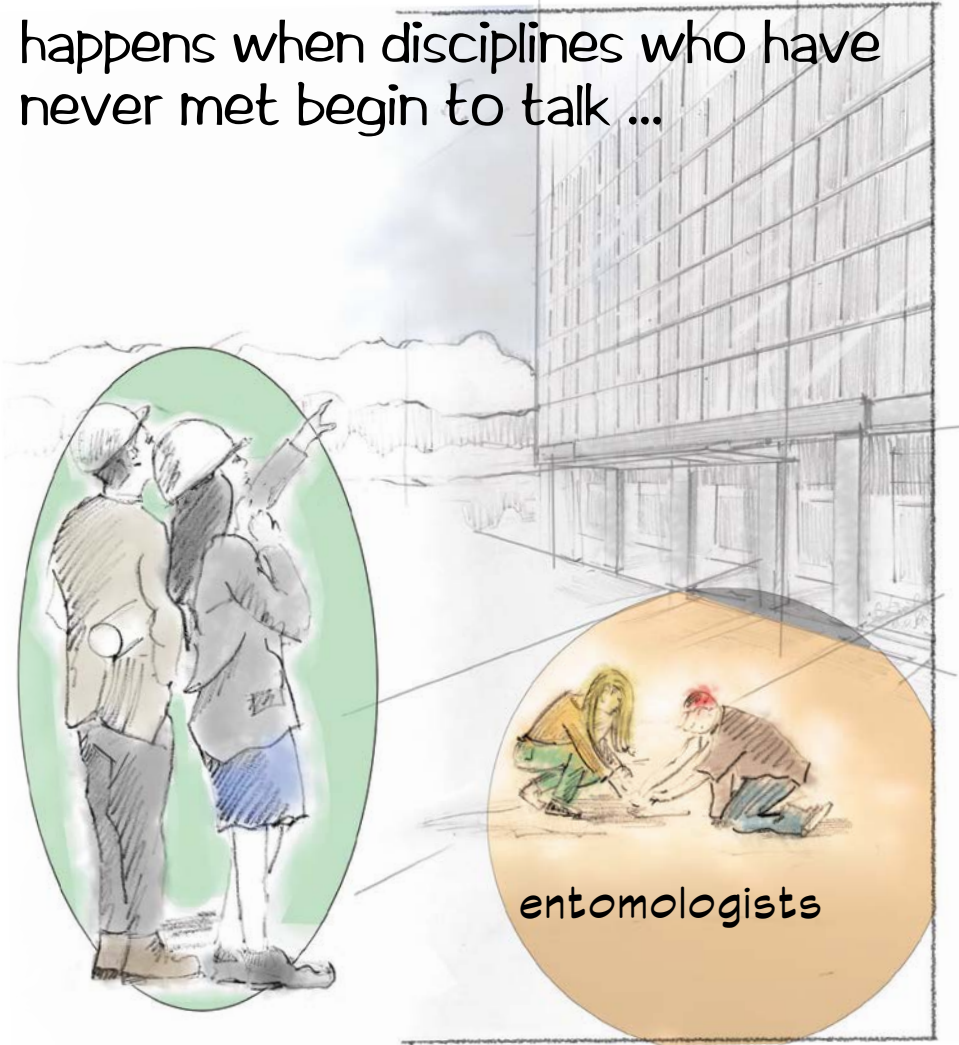
Kirsten Christopherson-Clark, head of school for the pre-K-to-8 private Waldorf School of Pittsburgh, says that participating in the academy’s culture program “was kind-of like having to stretch new muscles” in that it forced her to articulate her vision for the school more fully and clearly than she had before.

As a final project, the Waldorf School engaged its surrounding community in a place study. “We worked with students, parents, and neighbors to look at our campus and see what was there and imagine what could come,” Christopherson-Clark says. In one outcome of that process, a neighboring charity passed along grant money it had available for a “natural playground” featuring boulders and logs.

One benefit to the academy, Christopherson-Clark says, is that schools can continue to draw on the expertise of the Green Building Alliance even after they are done with the program. “The connection isn’t lost,” she says. “At any time, we know we can reach out and ask them for advice, bounce ideas off of them. The investment and the commitment to seeing your school succeed, it’s really genuine. It’s not one-and-done.” ●

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ILLUSTRATION BY MELISSA MCGILL

Q&A

Oakland Mayor Libby Schaaf

Mayor Libby Schaaf was inaugurated Oakland, California's 50th mayor on January 5, 2015. She is committed to revitalization that preserves and celebrates Oakland's diversity and leads to direct prosperity for long-time residents and newcomers. Her four areas of focus as mayor are holistic community safety, responsive trustworthy government, sustainable vibrant infrastructure, and equitable jobs and housing.

Q. What are some of the threats of climate change to the city of Oakland?

As a waterfront city, Oakland is threatened by sea level rise. Our airport, seaport, and low-lying neighborhoods are all at risk as sea levels rise and tidal and storm influences change. In addition, climate models predict more intense droughts and storms, which will affect our entire community as wildfires and floods grow stronger and more damaging. However, the most critical threat that Oakland faces is the impact of climate justice. Ensuring that the City can protect the lives, homes, and well-being of our most vulnerable community members in the face of a changing environment is key to our sustainability strategy.

Q. Who will be most affected?

Communities of color, low-income residents, and other disadvantaged groups are disproportionately affected by climate change impacts. These groups occupy much of the lower elevation lands closer to the waterfront, placing them directly in the path of both sea level rise and flooding. Unfortunately, these are also often the people with the fewest resources available to help them recover once impacts occur. We know this is true not only in Oakland but also around the world. We must act together as a global community to solve this challenge.

Q. What changes has Oakland made in recent years to address climate change?

I am proud to say that we, as Oaklanders, have a long history of focusing on sustainability and reducing our carbon footprint. I was asked to be part of the Local Climate Leaders Circle, one of 11 mayors selected to represent U.S. cities in Paris at COP21. I shared with the global community the successes that Oakland has had in reducing its emissions by more than 16 percent since 2005, and lowering our per capita emissions to among the lowest anywhere in the nation. The American Council for an Energy-Efficient Economy (ACEEE) recently rated Oakland as the sixth best city in America on their City Energy Scorecard, and it is part of a communitywide effort to make Oakland the greenest city on the planet.

Q. What were some of the highlights for you during COP21 in Paris this past December?

COP21 was an amazing experience. Seeing the nations of the world come together to address climate change was incredible, but the true highlight for me was seeing the power of mayors in action. More than 500 mayors from 115 countries came together in Paris to demonstrate that change can happen. Cities are not only where the majority of emissions occur, but are also the home of the technologies, companies, and leaders who will achieve the needed greenhouse gas reductions. Seeing Oakland companies and the Oakland community so well represented at this landmark event is an experience I will never forget.

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

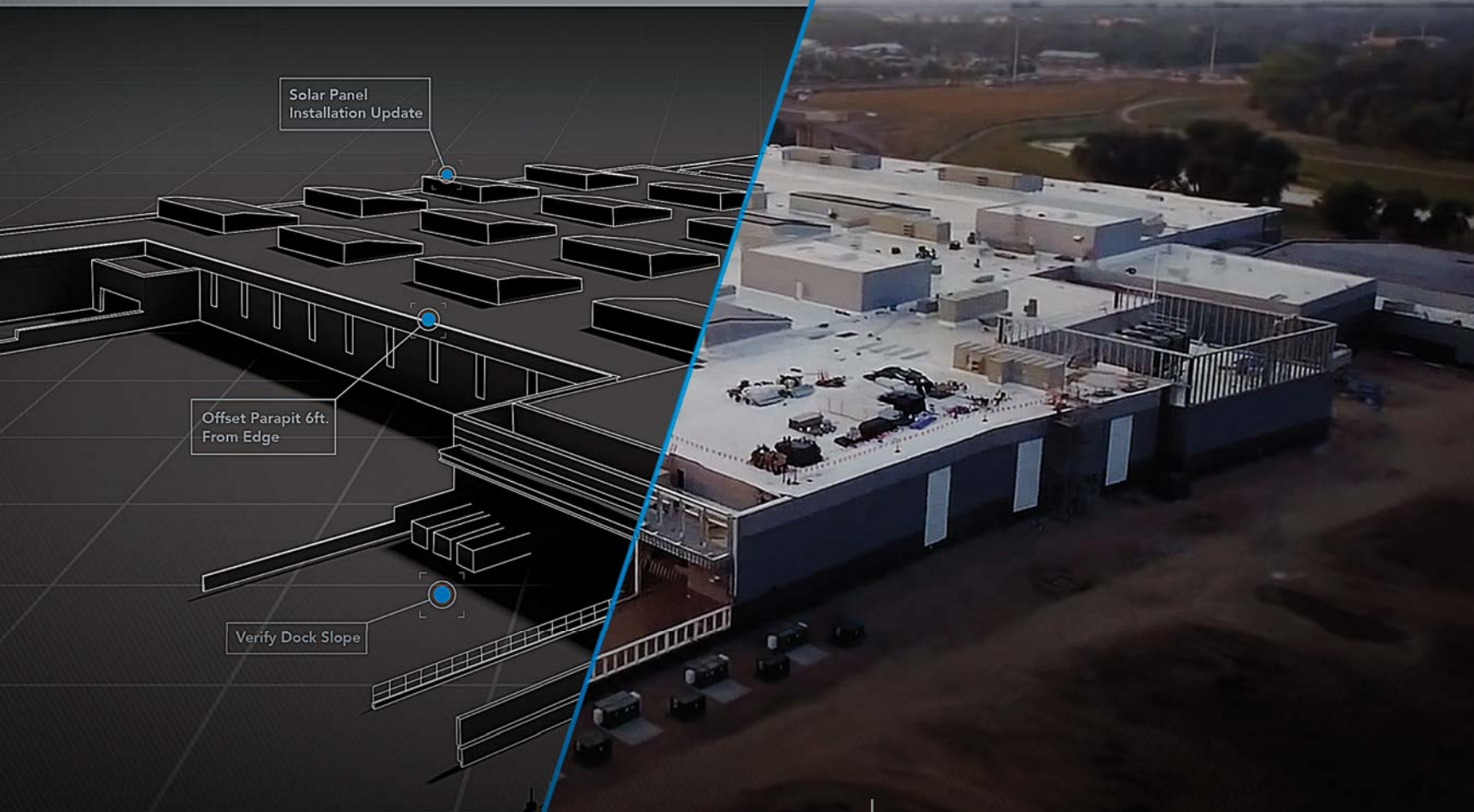
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