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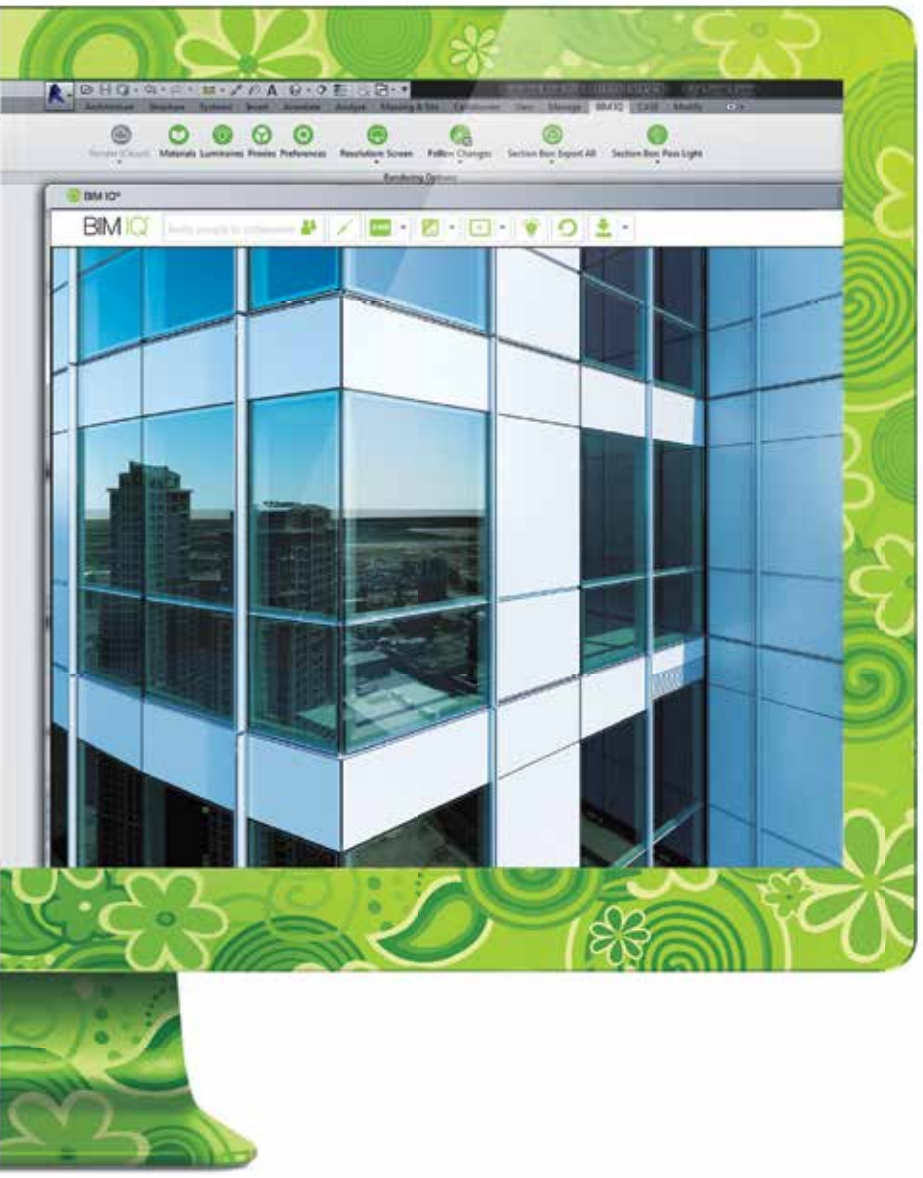

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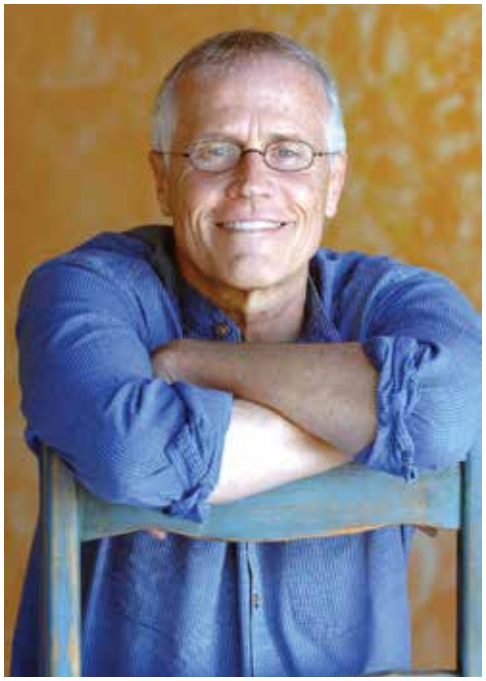

Photo: Raymond Baltar

Paul Hawken

Environmentalist, entrepreneur, and author

There is widespread belief that climate initiatives are either top-down or bottom up, when they in fact exist everywhere and in all areas of human endeavor. A meaningful global climate treaty and carbon pricing are needed but unlikely at the moment. Aside from political leadership, a growing movement within society addresses climate change and works to stop it before it is too late. Climate change is no longer a prediction, but a fact of life. What we can do together as practitioners, designers, manufacturers, architects, developers, builders, and citizens is the theme of the 22nd annual Greenbuild Conference.

At the opening plenary, Tom Steyer will present "Project Drawdown." In partnership with the USGBC and Steyer, scientists, NGOs, universities, colleges, students, foundations, elected officials, and government agencies are working together to create a book (and website) that details what it would take to achieve year-to-year CO_2 reductions in the atmosphere within 30 years. Drawdown describes how we can reduce carbon in the atmosphere using solutions already in place—measuring the beneficial financial and ecological impact they deliver over this period. It is a mirror held up to the world, which reveals what we are doing about carbon and greenhouse gases today. The underlying precept of Drawdown is that if something is happening, it is possible.

Drawdown describes the full gamut of solutions, both practical and social, that either reduce carbon emissions to the atmosphere or bio-sequester greenhouse gases. This calculation has never been done. Bill McKibben penned the "Terrifying New Math" article in July 2012. It described what would happen to our cities, homes, farms, economy, and security if we do not take action on climate change. However, no one has done the math on what we are doing.

The climate debate today is similar to a decade ago. The science is robust and unequivocal, and most who grasp it are frightened by the predictions. Due to corporate and political disinformation, polls show that fewer people are interested in climate science than ten years ago. Climate-deniers make themselves look like optimists and brand activists as pessimists. In between, many Americans are still confused, but this is changing rapidly in the face of people's experiences of floods, droughts, and heat.

The full range and impact of climate strategies have not been clearly explained and explored. Dr. Leon Clark, one of the lead authors of the International Planet Protection Convention 5th Assessment on solutions, writes, "We have the technologies, but we really have no sense of what it would take to deploy them at scale."

Drawdown will be published in 12 countries and will be accessible on the web. It will provide impeccably researched information, open source models, and calculations on impact and cost that can inform government policy on all levels. A great number of these solutions involve the built environment. Whether new or existing stock, every building has a lifecycle of components that need replacing over predictable time frames, from carpets to fenestration to mechanicals. Burgeoning innovation in green building delineates clear pathways for retrofitting the 1.6 trillion square feet of buildings in the world.

We welcome those who wish to participate on the project as science or technical advisors, copy editors, readers, foundations, and company funders. This is our earth, our climate, and our responsibility. Please join us at Drawdown.org and create the future.

LEED ON,

Paul Hawken


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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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Judith Nemes is a journalist specializing in green issues and urban/corporate sustainability. Her news stories and features have appeared in publications including the *Chicago Tribune, USA Today's Green Living Magazine, Michigan Avenue Magazine*, and GreenBiz.com. She's also an adjunct professor in the journalism department at Columbia College Chicago, where she designed a class on reporting on green issues and urban sustainability. She received an M.A. in journalism and public affairs at American University in Washington, D.C., and a B.A. at Vassar College. Follow on Twitter @JudithNemes and Google+: JudithNemes.

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Illustrations by Rosanna Giorlandino

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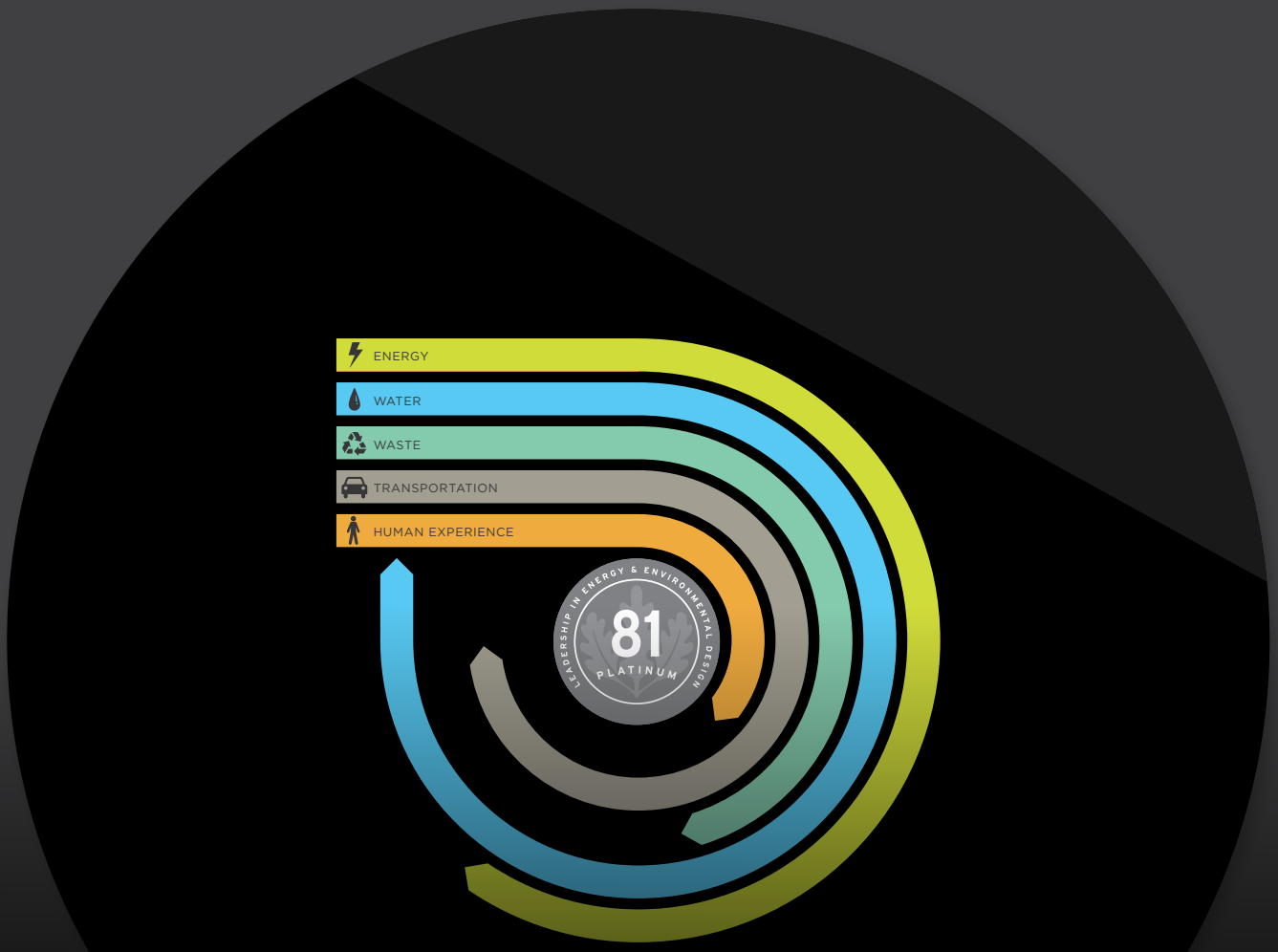

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Restoring nature

The Audubon Louisiana Nature Center enters its first phase of rehabilitation after Katrina.

By Katie Sherman

In the quarter century after it was first built in New Orleans East, the Audubon Louisiana Nature Center grew to become a hub for environmental education. When Hurricane Katrina swept through the Gulf region, it left the center broken, its darkest hour prolonged into nearly nine dim years. But in 2014, rays of light began shining onto this community favorite near Lake Pontchartrain.

The Audubon Louisiana Nature Center is in the midst of the first phase of an $8.4 million revival intended to restore the center to its former glory. A part of the Audubon Nature Institute—a nonprofit that operates a network of museums and parks around New Orleans—the center has long educated, entertained, and engaged visitors about the importance of wildlife education and environmental conservation, and that ethos has made sustainability a guiding principle behind the building's reconstruction. Its designers have used common-sense strategies and innovative technologies to achieve LEED standards, and visitors can see the results for themselves when the center opens its doors in late 2015.

The design of the new nature center is finally underway nine years after Katrina. It will consist of three pavilions linked by 5,800 square feet of covered exterior boardwalks that will replace trails destroyed during Katrina.

Rendering: Billes Partners

Kyle McGehee

Patrick Kraft

"The return of the Nature Center will represent a significant milestone in the ongoing recovery of the New Orleans East community," says Kyle McGehee, director of architectural design for the Audubon Nature Institute. "Audubon Nature Institute is proud to help restore this treasured asset. And it is our hope that the new and improved Nature center will once again inspire a deep and enduring appreciation of our natural world for all who visit."

First built in 1980, the Audubon Louisiana Nature Center sat on 86 green acres wrapping around a lagoon. Its facilities reflected its ecological focus: at its height, the center included the largest planetarium in New Orleans, an interpretive center with live animals and wildlife exhibits, a greenhouse and botany center, classrooms, a network of trails, covered boardwalks, and extensive landscaping. By 2005, the center welcomed 85,000 visitors—including 45,000 students—and enthralled them with tactile, tech-savvy installations.

But in the aftermath of Hurricane Katrina, the center became another casualty of the costliest natural and manmade disaster in U.S. history. For more than a month, it was submerged under six feet of water. Its deciduous forests were severely damaged and its interpretive spaces were destroyed. Once a vibrant community green space, the center languished, and its doors have been shut for nearly a decade.

In subsequent years, Audubon Nature Institute leadership collaborated with a number of different groups on a strategy to revive the site, including the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers, the Governor's Office of Homeland Security and Emergency Preparedness, the city of New Orleans, the U.S. Army Corp of Engineers, and Friends of Joe Brown Park, a community nonprofit devoted to the adjacent property in eastern New Orleans. These organizations shared common ground: They knew that the center's imminent return would create a much-needed green space for family recreation and environmental education.

Eventually, the project received $7.6 million in FEMA grants, and Audubon began working with New Orleans-based design firm Billes Partners. "At Billes, we treat all projects with sustainability in mind—with a holistic approach that balances tech, sustainability, and conceptual methods for all projects," says Patrick Kraft, lead architect at the firm.

On January 24, 2014, after many quiet years, builders broke ground on the first phase of the restoration of the Audubon Nature Center. Upon completion, that first phase is expected to revive the planetarium, the exhibit pavilion, and many of the other features that made the center such a treasured destination—and it's all being carried out under LEED guidelines.

A restoration done under a LEED framework was a priority from day one, says Kraft. From an architect's standpoint, he adds, "LEED gives you a nice set of rules to bounce these ideas off of and make sure you're going in the right direction. It's an exciting time in designing buildings."

McGehee says his organization was ecstatic when they got confirmation that the center's design was LEED certified at minimum, and he hopes for a LEED Silver or LEED Gold designation. "Our ultimate goal is to share an appreciation for

Far left: The Billes Partners architectural rendering shows the Audubon Louisiana Nature Center Complex's covered exterior boardwalks that will link the complexes three pavilions.

Left: Volunteers from Holy Cross plant trees at Audubon Louisiana Nature Center.

Photos: Audubon Louisiana Nature Center

the natural world," McGehee says, "and this building is one of the ways we can do that. We immerse people in the environment we're teaching them about. Not just the animals: We talk about the ecosystem, the positive and negative impacts. That's why LEED certification was so important from the onset."

The project emphasizes environmentally friendly and hurricane-resistant construction techniques, and centers around three major goals: reducing site impact, reducing energy consumption, and reducing maintenance.

Reducing site impact stems from the terrain itself. The land on which the center is built is a bottomland hardwood forest, common to the Gulf Coast's floodplains, and its changing environment played a part in planning the restoration: Periodic flooding in the wet season leaves standing water. In addition, the land is surrounded by developed neighborhoods in a lively eastern New Orleans locale, which puts increased pressure on the natural environment through drainage and wildlife impact.

In response, the design employs strategic solutions to combat the site-impact challenges below, like moving the building closer to the street to minimize visitors' impact on the grounds while entering and exiting the center, using a one-foot lift to raise the buildings and walkways to allow unobstructed flow of drainage and mitigate impact on water runoff, and creating a firm 25-foot radius guideline to minimize the impact of contractors on the surrounding grounds. Ultimately, Kraft says, the reconstruction should affect fewer than two acres.

To reduce energy consumption, the revived Audubon Louisiana Nature Center champions old-school passive systems, many of which can be found in the city's shotgun houses that were built before the advent of air conditioning. "We like to take local cues, because they still work as well as they did 120 years ago," Kraft says. Some of those concepts adapted into the center include positioning the building to avoid sun; large overhangs, covered porches, and canopies to lower building temperature; and high ceilings to improve air circulation.

The project uses several innovative energy-reduction solutions as well, like structural insulated panels (SIPs) on the roof to create a tighter building envelope, high-performance window glazing to form a continuous thermal barrier, and LED lighting. Kraft says that the designers have converted 99 percent of the lighting in the institute's Aquarium of the Americas and 100 percent of the lighting in the Butterfly Garden and Insectarium to LED systems. "It brought our energy consumption down from 8,000 kilowatts in one gulf tank to 500 kilowatts," Kraft says. Additionally, he adds, Audubon has switched out incandescent lighting in other facilities.

Finally, the nature center project aims to create a low-maintenance facility. "We're out in the middle of nowhere so it needs to take care of itself," says Kraft. The design calls for long-lasting materials like concrete, self-renewing cork and rubber flooring, and anti-termite cement-board siding.

The Audubon Louisiana Nature Center has miles to go before once again becoming a publicly accessible beacon in its community. In the meantime, the thoughtfulness behind the approach and the effort undertaken so far signal something just as encouraging: progress.

How Green Is Your Microgrid?

Lessons learned from Superstorm Sandy and Princeton University.

By Rachel Kaufman

Superstorm Sandy in 2012 knocked out power to more than six million people in the Northeast, but in some small parts of the region, the lights stayed on. Princeton University, especially, received kudos (and a visit from President Obama) for keeping the main campus's 180 buildings, including mission-critical research equipment, running after the storm, with a downtime of only a minute or so.

Students, freed from having to worry about heat or light, began mobilizing to help the surrounding city, where families were still in the dark, traffic lights failed, and most of the city remained devastated for days. The school also provided hot meals for 150 first responders and invited locals to warm up, charge their phones, and use the school's wi-fi.

The university did it with its microgrid, a hundred-year-old idea that is regaining popularity. More cities, institutions, and developers are turning to microgrids not just as a way to save money, but to become more resilient in the face of changing climate and to be greener.

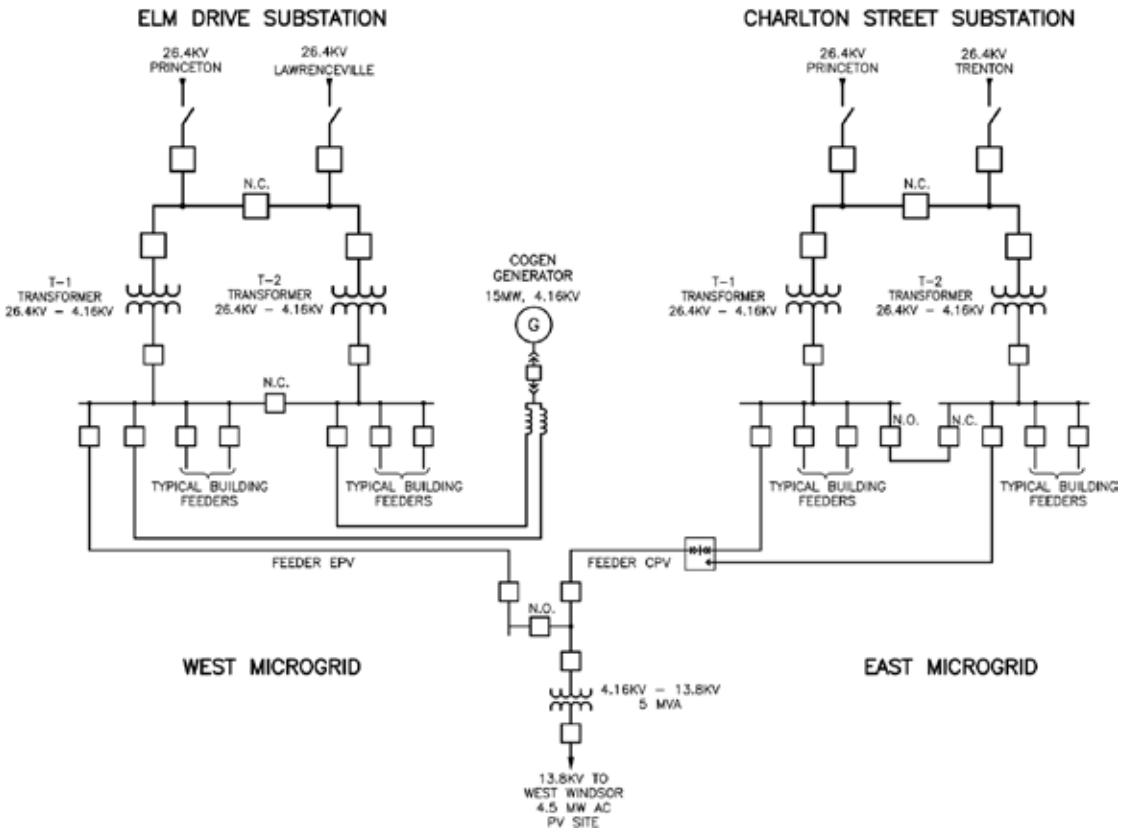
A microgrid is a group of buildings connected to locally generated power and to the main energy grid. Some of the advantages to a microgrid are obvious: If you can generate your own electricity locally, then it doesn't matter if a tree falls on the power line five miles away. Some are less intuitive but just as important: Princeton's microgrid, which supplies not just electricity but heating and cooling through its cogeneration system, helped cut its CO2 emissions to 106,764 metric tons in 2012, down from 131,377 five years prior, despite adding more than a half million square feet of building space in the same period.

Princeton's cogeneration plant uses a gas-powered jet engine to spin a turbine to create power. But two thirds of the fuel going into the engine, instead of producing thrust, is simply wasted as excess heat. By capturing that heat and using it to warm buildings (or power air conditioning compressors) through the school's district energy system, the school increases its efficiency to 80 percent.

Campus Microgrids

Right: Princeton's microgrid supplies not only electricity but heating and cooling through a cogeneration plant (shown below right). The campus also employs solar arrays to capture energy.

Diagram and photos: Princeton University



Of course, Princeton's district heating system is over a hundred years old—so the school has been generating its own steam for a century. Switching to a cogeneration model, then, was an easier sell. And from there, turning the whole enterprise into a true microgrid—one that can disconnect from the grid if necessary—was only an incremental cost more. "It costs more to install [district energy systems]," says Ted Borer, energy plant manager at Princeton, "but the lifecycle cost is much lower because the energy savings pay you back and more. If you're looking to solve a problem, these things don't have a payback in your election cycle."

But it has had a payback in savings, resiliency, and good public relations. "Mayors are competing with the next town to attract that blue chip employer, like a Google or a pharma company," says Rob Thornton, president and CEO of IDEA, the International District Energy Association. "They're not looking for the lowest price power, they need reliable power. They want cleaner energy. They want it to be resilient. That all points to district energy [and] microgrids. So after Sandy—we've been around 105 years. We're now getting calls from mayors, planners, city leaders, saying, 'I want what Princeton has.'" The plant has built up a reputation, as well.

"When I saw the news that a 100-year-storm was about to slam Princeton while I visited, I was immediately grateful that I would be on campus," a former student wrote to Borer a few days after the storm. "I was pretty confident that it would be one of the most reliable places for power in the whole region."

Because Princeton has a near-constant need for heat or chilled water, its cogeneration plant runs all the time. What changes is the amount of power it buys from the local utility (PSEG) and the amount of energy it gets from a 5MW photovoltaic array. During the day, when rates and demand are both high, its power comes from the gas turbine and the sun, and it buys a small amount from PSEG. At night, when power is inexpensive, it lowers the turbine's output and buys cheap power. "And typically, in New Jersey, I'm buying a whole lot of nuclear power and not a lot of fossil fuels [at that time of night]," Borer says.

Microgrids can be more efficient than tapping into the macrogrid, even if they don't accompany a district heating and cooling system, because of "line loss," which causes anywhere from 3 to 7 percent of energy vanishing when transmitted over long distances. But, said IDEA's Thornton, the real green really is in the synergy between district energy and electrical generation. Any part of a city that's being redeveloped all at once, rather than piecemeal, is a candidate for installing a district energy system: Boston's 1,000-acre "Innovation District" is installing a district energy system. In Vancouver, the Olympic Village that was built for the 2010 games included one that reduces the neighborhood's emissions by half.

Other prime candidates for district energy (and by extension a microgrid): sports arenas, says Thornton. In Phoenix, Arizona, Chase Field has 8,000 tons of air-conditioning capacity "to serve that arena for 82 home games a year," he says. "The other 283 days, that capacity is idle, which is a waste of capital." So instead, it makes use of a district chilled water plant that serves 30 buildings in downtown Phoenix when there are no games on.

However, despite the green qualifications of both microgrids and district energy, the reason they're getting attention now is for their resiliency. Superstorm Sandy was a wakeup call for many cities. Climate change means that extreme storms, floods, tornadoes, and blizzards are becoming more commonplace. And it's only getting worse. Miami's building codes require multifamily buildings to have generator capabilities, and have done so since Hurricane Andrew in 1992; how long before other major cities, maybe those that never thought they were vulnerable to storms, require the same—or a more stringent microgrid requirement?

Resiliency is important even without the threat of major storms. Sandy was the most high-profile time Princeton's microgrid stayed on when the power went off elsewhere, but Borer says that the local utility, PSEG, has a dozen very brief outages a year, during which Princeton's generator seamlessly takes over. (The school also improved reliability by adding a second set of wires from the utility to its substations.) "It could be 20 seconds up to 10 minutes," Borer says. "But if you're running some really fancy experiment, or even if you're stuck in an elevator, 10 minutes matters." ●

H2O in 2100

What will California's water resources look like at the end of the century?

By Matthew Heberger

A great deal of research on climate change over the last decade has focused on changes to the hydrologic cycle—the continuous process by which water is circulated throughout the earth and the atmosphere—which naturally impacts water supply. These changes—earlier spring snowmelt, increased evaporation from higher temperatures, and more frequent and intense droughts—are obvious. And the changes are alarming. Water suppliers and large water users simply cannot afford to ignore climate change as they plan for the future.

Many water suppliers have begun to consider how climate will affect their water supplies, whether it is from a lake or river, stored behind a dam, or drawn from underground aquifers. Not as much attention has been paid to the other side of the equation: What will climate change do to water consumption?

Most people familiar with the state of climate change expect that a warmer climate will drive up water demand for landscapes and the inevitable evaporative cooling. Yet there has been little research on this subject and even less practical guidance for water planners and managers.

Two recent research projects have contributed to this emerging field of study, to better predict how climate change will affect future water demand. In 2012, my colleagues and I at the Pacific Institute developed a planning tool focused on the state of California that forecasts water use out to the year 2100. A year later, in 2013, the Water Research Foundation published a nationwide study, "Changes in Water Use under Regional Climate Change Scenarios."

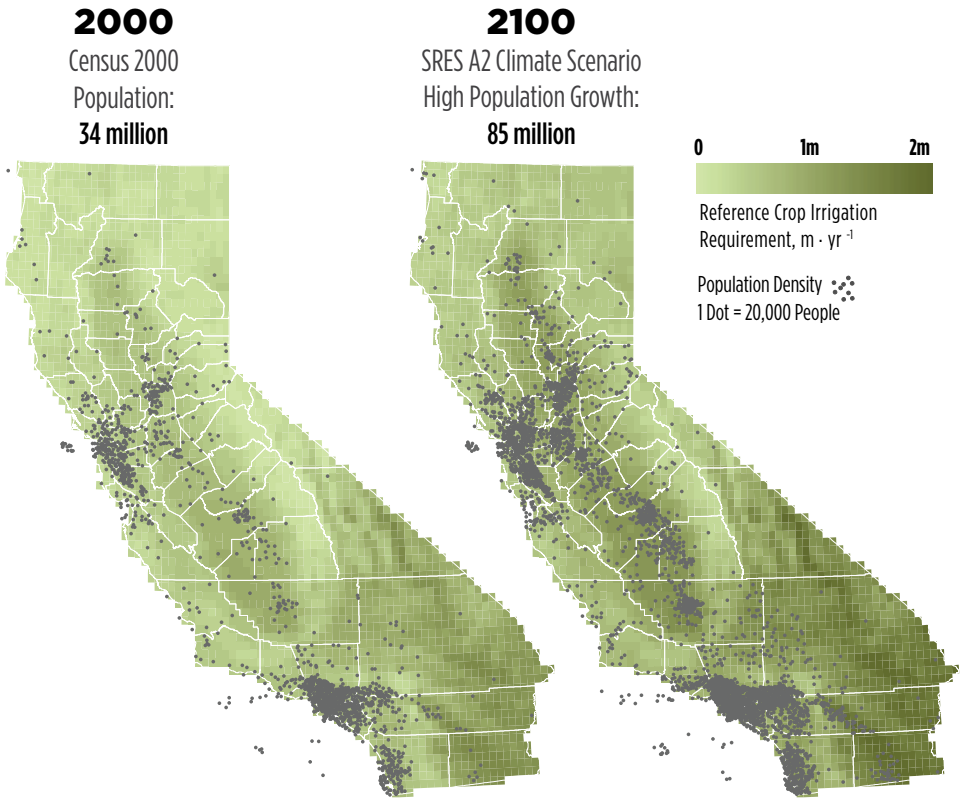
Both of these groundbreaking studies demonstrated how climate change can help predict future urban water use. We worked closely with climate scientists to translate the output from their models into information on water demand for use by water managers. Our work focused mostly on how temperatures are causing

Sustainable landscaping with agave plants.

an increase in evaporation and water lost to the atmosphere by plants. In California, as in much of the West, more than half of publicly supplied water is used outdoors. Some of this is used for washing cars or sidewalks, or for filling pools and spas, but most is for landscape irrigation.

The two maps here show irrigation requirements. The first reflects recent conditions; the other reflects a warmer climate at the end of the century. Grid cells represent how much water is required to grow turf grass—the depth of irrigation water required in meters per year. The darker green color indicates higher water needs. The gray dots represent population clusters now and in the future, considering one scenario of population growth.

Our model of future water use took into account the effect of higher irrigation water demand due to warming. Our conclusion: With all other factors holding constant, climate change could contribute to a 15 percent increase in future urban water demand in California by the year 2100.



The green building trade is on the forefront of the effort to use water wisely and more sustainably. Every time someone designs a water-efficient building or landscape, they are leading the charge.

It's clear that where growth occurs has a big impact on future water use. This is especially true in California, where the future population growth is expected to occur mainly in the hot, dry Central Valley. New greenfield development can lead to big increases in water use, even when they are planted with low water-use landscapes. A better approach may be to promote water-neutral development and minimize the creation of new landscapes by encouraging urban infill or brownfield development.

Strong evidence suggests that the effects of climate change are already driving changes in water consumption; regional models show that temperature, evaporation, and crop water use are slightly higher today than they have been over past decades.

It's not inevitable, though, that water consumption will continue to rise. Forecasters often made predictions in the past of skyrocketing water use that never came true. Water use in many areas of the country has held steady or even declined, despite a growing population, because we adopted more efficient appliances and fixtures for homes and businesses. For example, all toilets sold countrywide since 1994 must use just 1.6 gallons per flush or less, a big improvement over the old 3.5 gallon models. Today's ENERGYSTAR washing machines use only 15 gallons of water per load, a major savings over standard machines and even those produced ten years ago.

Despite these gains, a great deal of wasteful, inefficient water use continues. The U.S. Geological Survey estimates that domestic water use in the country is 170 gallons per person per day. There certainly is significant room for improvement: Australians use an average of 54 gallons per person per day (for both indoor and outdoor uses); and residents of the Australian state of Victoria use only 40 gallons each. Australians have not always been water misers, but they have lowered their consumption dramatically over the past decade, after the unprecedented Millennium Drought. The Australians' solution was simple: adopting new water-efficient technology and water-saving habits. For instance, dual-flush toilets are now in nine out of ten Australian homes.

Climate is only one factor influencing future water demand. Landscape water use is driven mostly by plant types and the efficiency of irrigation systems. Programs have cropped up across the West to encourage the planting of native plant species that require minimal irrigation. Besides having colorful blooms that attract birds and pollinators, these plants have other benefits, such as easier maintenance and less need for fertilizers and pesticides.

Promoting water conservation and efficiency is one of the most important things we can do to climate-proof our cities and create more resilient water systems. When we use less water to meet human needs, we can better withstand future droughts, in addition to saving energy and reducing greenhouse gas emissions.

The green building trade is on the forefront of the effort to use water wisely and more sustainably. Every time someone designs a water-efficient building or landscape, they are leading the charge.

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Lighting THE WAY

Entrepreneur Ajaita Shah brings sustainable energy to low-income households in India.

By Barbra Murray

Ajaita Shah is dedicated to her work. She's practically apologetic about taking one day off a week, Sunday, despite the necessity of downtime for humans. "I love what I do, I'm obsessed with what I do," she says. She is the founder of Frontier Markets, the India-based sales and distribution company providing product solutions to facilitate the end of indoor pollution and related deaths. She is also president of the Frontier Innovations Foundation, Frontier Markets' New York-based nonprofit arm that works primarily in India to help overcome obstacles to widespread clean-energy solutions through partnering with governments, businesses, and agencies around the world. And she's only 30.

Her main pursuit at the moment is bringing light, literally and figuratively, to poor households in rural areas across India in the form of solar energy. Clean energy in India is not exactly an issue that is sweeping the global green community at present, so to say that Shah's pursuit—bringing solar power to poor households in underserved areas of the country—is a progressive endeavor would be an understatement.

The U.S., home for this pioneering Indian American, is certainly a trailblazing country but solar-powered homes haven't precisely caught on like wildfire, and most definitely not in low-income neighborhoods. Shah, however, sees solar energy as a potentially life-transforming form of power in India's poverty-stricken communities, and is working through Frontier Markets and the Frontier Innovations Foundation to facilitate that change. Currently, it's her life's work, and while some may see a solar-powered rural India as a lofty notion, Shah views it as a practical pursuit.

For the poorest of the poor in India, those in bottom-of-the-pyramids (BOP) markets, solar energy is not just about cost savings and certainly not only about the environment. It's about a basic necessity: electrical power. It's an essential utility that, while so ubiquitous in the U.S. as to be considered an absolute necessity, if not a virtual right, is sorely limited and wholly unreliable in rural India. Shah knows; she's spent the better part of the last six years on the ground level in rural India. "Having spent an enormous amount of time in blackouts, and actually seeing kerosene fires and seeing the damage that lack of electricity has on rural households, I believe if we're going to be really addressing a challenge, it needs to be the energy challenge," says Shah.

Shah speaks to a community on the benefits of solar energy.

Photo: Frontier Markets

Frontier Markets has been moving full-steam ahead toward achieving this ambitious endeavor of supplying Indian residences in BOP markets with solar energy, which would address not only cost and environmental concerns but, more importantly, it would provide low-income Indian residents with the electrical power that continues to elude them. Solar energy is the most practical route, she believes.

"If you look at the alternatives for rural India, there really aren't that many," Shah notes. "The [electrical] grid's not coming to rural India anytime soon. People are using kerosene as their alternative, which is disastrous. And in terms of affordability they can't keep affording to pay for battery-based solutions, which really only covers lighting, not power. And so it kind of keeps them in this level of a vicious cycle of unproductivity."

She goes on to point out that solar as a concept has existed in India for over 25 years, and she and her team questioned why, with the country's ample amount of sunlight, solar energy has not made "the last mile." The grids aren't there, but the sun is. It was a moment of clarity; they realized, Shah says, "There's a clear need, there's a clear demand, there's a clear solution."

However, Shah found that a solution was just part of the issue. She had to convince solar-wary residents that solar energy really is a viable option for them. It was just one more challenge that Shah was determined to overcome. As she explains, "While the need is there, people either don't have access to the solution; they don't know about it; they're very uneducated about it; or they've had very bad experiences with it." Bad experiences, indeed. When the Indian government

"I know that you're spending 50 cents a month on kerosene today. If I can get you to spend 25 cents a month on solar, you will immediately see your return on investment ... So you quickly see the value of what you're putting your money in."

– Ajaita Shah

first tried bringing solar in from Iran, it was faced with poor-quality products and no technical assistance. The experience left citizens with little more than distrust of solar.

Wariness is one obstacle; money is another. So, as Shah notes, for these residents who have little, if any, funds to spare, the proof is in the pudding. Her pitch: "I know that you're spending 50 cents a month on kerosene today. If I can get you to spend 25 cents a month on solar, you will immediately see your return on investment or at least I'll show you your ROI within, at the latest, three to six months. So you quickly see the value of what you're putting your money in."

As for lack of access, the answer is building retail points, which Shah has been doing, supported by the Foundation. But it's not just a business move. "We spend a lot of time building up the fact that incorporating special service is our biggest motto, and not necessarily pushing a product but really caring about the needs of the customer." The benefit is twofold, as the very same residents Shah is trying to sell on solar are also being wooed with the potential for income. Frontier Markets is converting them into retail points, thereby allowing them the opportunity to earn money on the solar revolution.

These retail points take two different forms: new entrepreneurs and existing business owners. Those residents who are new to retail open shops branded by Frontier Markets. These new businessmen and women are trained about clean energy and the products offered, which range from cost-effective solar lanterns and torches to home-lighting systems to street lights. Business owners with their own retail destinations stock Frontier Markets products and are instructed in the selling of solar products as well.

The best-selling items at Frontier Markets entrepreneurs' shops and local retail stores are solar lanterns and torches, which harkens back to the impetus for Frontier Markets: safe residential lighting.

And then there is the limited but growing number of service centers designated to provide customer service and execute repairs. Customer service is one of Frontier Markets' biggest mottos, Shah says. "We're not necessarily pushing a product, but really caring about the needs of the customer—so we really do a lot of brand-building and a lot of it is to build trust with the rural customer."

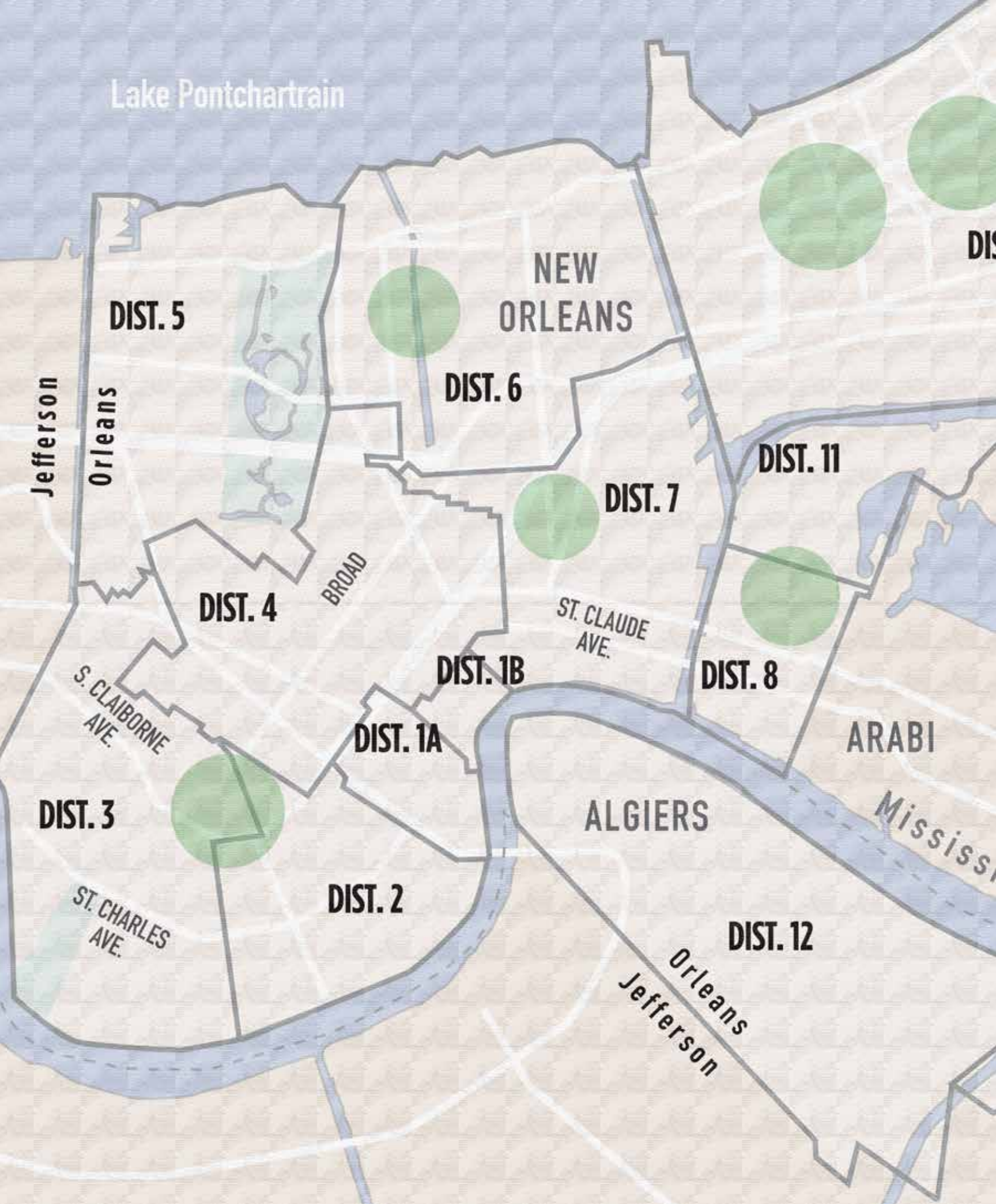
On all fronts, progress is being made. "People are understanding the concept; they're understanding why they can trust us, they're starting to think it through in their own innovative ways as to why they need power and what they are actually going to use it for."

Frontier Markets' partnering is proving fruitful in its goal of spreading solar energy solutions in rural India. The Government of India is being very supportive of Frontier Markets' efforts, and in general, solar energy has become a massive initiative for the country; it's a new part of the government agenda. "They know that electrical grid systems will not be reaching their constituents anytime soon and there are a lot of other challenges so there's a lot of support," Shah says. "It's also an industry that's booming in India. You have hundreds and thousands of manufacturers now, focusing on the solar as part of the government's agenda. So suddenly, economies of scale is in your favor when it comes to the price point of technology."

There's government advocacy, but Frontier Markets' endeavors also benefit from the global push for alternative energy. The organization has found assistance from, to name a few, the World Bank, the Clinton Initiative, and the Asian Development Bank, all of which are investing in making reliable energy available in developing countries.

Shah has achieved so much. She has been recognized around the world for her efforts. Frontier Markets, since 2009 inception, has sold 10,000 solar solutions to date and made clean-energy retailers of 125 rural residents. And she's not done yet.

"Our fundamental desire is to really start addressing some of the base challenges that rural households face through distribution," Shah adds. "We really want to become one of the largest solar distributors and actually have retail points at every village level in India, but we want to be able to replicate this model in other countries because I believe that if you don't have sustainable points of service, you're not going to ever be able to address the rural household's needs on a regular basis." ●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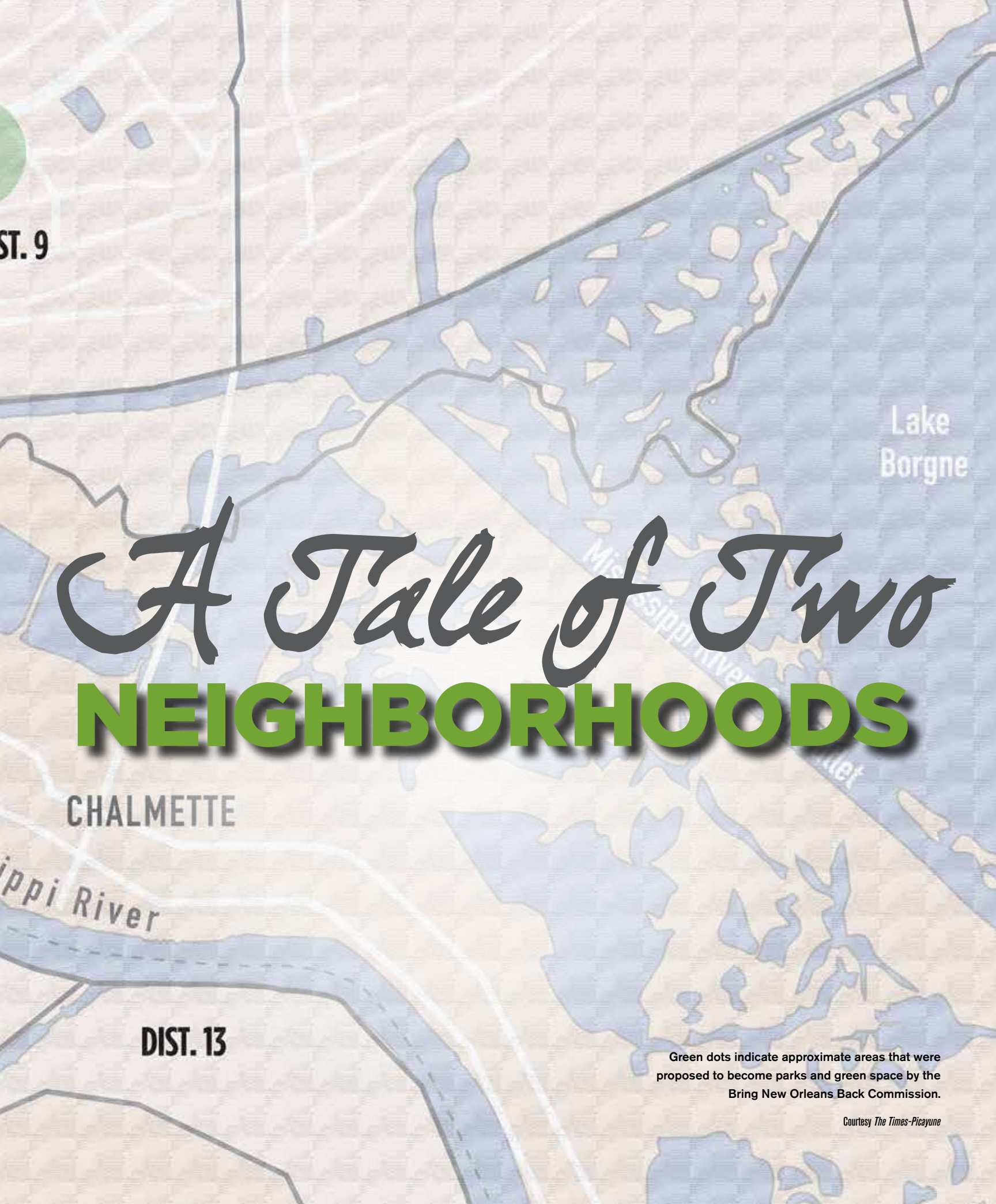


A Tale of Two NEIGHBORHOODS

Green dots indicate approximate areas that were proposed to become parks and green space by the Bring New Orleans Back Commission.

Courtesy *The Times-Picayune*

After Hurricane Katrina, officials considered turning the New Orleans neighborhoods of Broadmoor and the Lower Ninth Ward into parkland, stamping them with green dots on a planning map of the city. Nearly a decade later, the districts are dotted with green development instead.

WRITTEN BY **Calvin Hennick**

Water rushed into the Lower Ninth Ward. The Inner Harbor Navigation Canal—better known as the Industrial Canal—separates the neighborhood from the rest of the city, and when the levee protecting the Lower Ninth gave way to Hurricane Katrina's storm surge, the water came as a tidal wave, a 25-foot wall that tore some homes off their foundations.

"If you were under three years old, or over seventy, you died, generally," says John C. Williams, an architect who serves as the master planner for the neighborhood, and who speaks passionately and at length about it before he's even been asked a question. "Anywhere in between, if you got up in your attic, and you couldn't hatchet your way out—if you weren't strong enough—you died in your attic. That's how all of them died. And there were hundreds."

"Everybody had a cousin, a grandmother, a baby sister that died," Williams continues. "It devastated this neighborhood, and they're still recovering."

In Broadmoor, the water came more slowly, but it didn't stop until it had flooded every home in the neighborhood. The triangular, centrally located neighborhood—10 minutes from practically everywhere—sits in a bowl several feet below sea level, and it was marshland until improved pumping and drainage allowed the area to be settled around a hundred years ago.

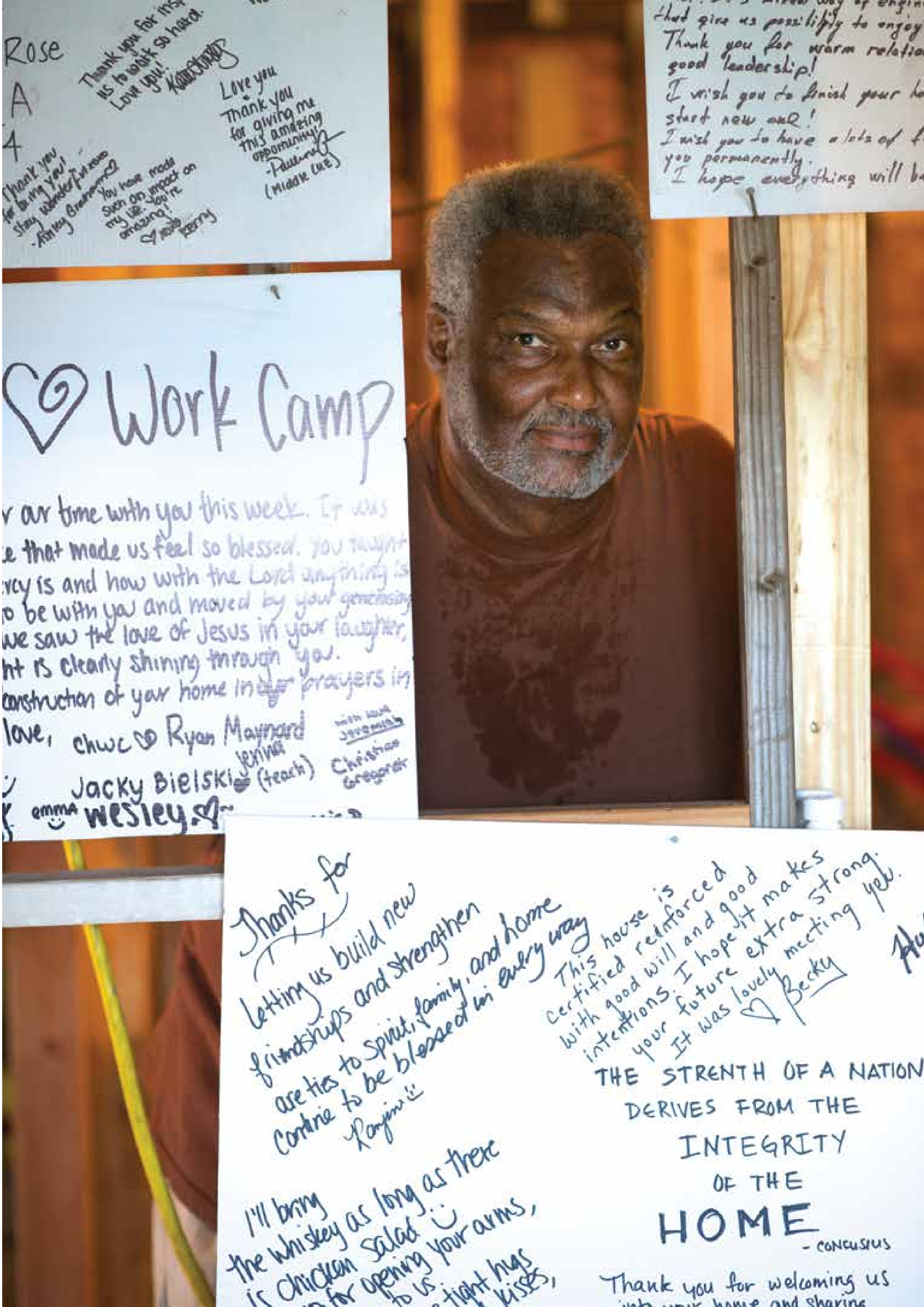
Although the homes in Broadmoor weren't leveled, they were uninhabitable—with ruined electrical systems and infestations of black mold. Adolph "Duffy" Voigt, now a board member of the Broadmoor Development Corporation, bought a house in the neighborhood with his then-fiancée just two weeks before Katrina hit. Four weeks after the storm, when he finally made it back into New Orleans, he saw the high-water mark four feet up on his house—seven feet above street level. Since he'd only recently moved in, his possessions were mostly piled in boxes, and he hoped that the ones on top would be spared from damage. But the water had turned the boxes on the bottom into mush, and when they collapsed, everything on top was sucked down into the water, too.

"It was very surreal," coming home for the first time, Voigt says, "because everything was brown and dead. There was no sound, no birds. The smell from chemicals and dead vegetation was atrocious."

Even before Katrina, Broadmoor and the Lower Ninth Ward—two of more than 70 distinct neighborhoods in the city—were different from one another in a number of fundamental ways. For instance, Broadmoor is so completely surrounded by other neighborhoods that many New Orleans residents would struggle to identify its boundaries, while the Lower Ninth Ward is geographically isolated, sandwiched in between the Industrial Canal on one side and the border of St. Bernard Parish on the other.

Demographically, Broadmoor was a near-perfect mirror of New Orleans as a whole: 68 percent black, 26 percent white, 4 percent Hispanic, and 1 percent multiracial, according to the 2000 U.S. Census. The Lower Ninth, by contrast, was more than 98 percent black. Broadmoor was the wealthier of the two neighborhoods, with an average household income of $50,000 (in 2012 dollars), compared to $38,000 in the Lower Ninth Ward; but homeownership was actually higher in the Lower Ninth, where many families had passed homes down from generation to generation. In 2000, 59 percent of homes in the Lower Ninth Ward were owner occupied, and more than half of those were owned free and clear—with no mortgage on the property.

These differences were relevant during the storm (when, for example, some residents in the Lower Ninth stayed in their homes because they lacked the resources to evacuate). And they surely played a role in the two neighborhoods' very different paths forward in the years after Katrina.


Work Camp
love,
Jacky Bielski
Thanks for letting us build new friendships and strengthen our ties to spirit, family, and home. Continue to be blessed in every way
This house is certified reinforced with good will and good intentions. I hope it makes your future extra strong. It was lovely meeting you. Becky
THE STRENTH OF A NATION DERIVES FROM THE INTEGRITY OF THE HOME - CONFUCIUS
Thank you for welcoming us
I'll bring the whiskey as long as there is chicken salad
Thank you for warm relation, good leadership!
I wish you to finish your house
I hope everything will be
Love you
Thank you for giving me this amazing opportunity

But on January 11, 2006, just weeks after the floodwaters had receded, residents of Broadmoor and the Lower Ninth found themselves bound by predicament. The Bring New Orleans Back Commission released its final report, which designated the two neighborhoods, and a handful of others, as "areas for future parkland." The *Times-Picayune* published a map illustrating the plan on its front page, and both Broadmoor and the Lower Ninth Ward were covered with large green dots.

The plan was quickly scuttled due to uproar from residents, and today there's some controversy over whether officials really meant to turn entire areas of the city into parks, or if they were simply suggesting that green space could help fill the void of blight in areas that they assumed would be difficult to repopulate. But at a time when some across the country were questioning whether New Orleans could be rebuilt at all, residents of the "green dot" neighborhoods understandably feared the worst. Many still hadn't returned to the city, and now those displaced residents questioned whether they would even have a neighborhood to come back to.

Even after the green dot plan was ditched, city officials told residents that they would have to prove that their neighborhoods were "viable" to receive city services—a proclamation that did nothing to boost the confidence of residents in Broadmoor and the Lower Ninth that the city would support their redevelopment efforts. The question still seemed to be not when the areas would be rebuilt, but whether they would be rebuilt at all.

And, in the minds of many, it was every neighborhood for itself.

Page 33: Homeowner Errol Joseph stands within the framing of his house nine years after Katrina. He is hopeful that he will move back into his home one day.

Opposite: Laura Paul, executive director of the rebuilding nonprofit organization lowernine.org with Lower Nine resident Errol Joseph.
Photos: Marc Pagani

Right: Make It Right's atypical roof designs are angled on one side to capture solar power and cantilevered on the other side to shade the house from the sun.
Photo: Kevin Scott

"You're going to start seeing a lot more empty lots," says Laura Paul, executive director of the rebuilding nonprofit organization lowernine.org. Her gray Chevy pickup truck has just crossed over St. Claude Avenue, the boundary between the Holy Cross neighborhood and the Lower Ninth Ward, and the pink fuzzy dice hanging from the rearview mirror bob up and down with the streets' ubiquitous potholes.

The area encompassing both Holy Cross and the Lower Ninth Ward is also called—unhelpfully—the Lower Ninth Ward—but when people say "the Lower Ninth" without clarifying further, "they're usually talking just about the area north of St. Claude," says Paul, a Canadian who came to New Orleans to volunteer for a week in 2006 and then never left, and occasionally points out one of the more than 70 homes her organization has helped rebuild.

But more common are the vacant parcels, wild with overgrowth. Paul estimates that these account for 60 percent of the land in the part of the Lower Ninth closest to the Industrial Canal levee breach. Of the homes still standing, she says, maybe two-thirds are uninhabitable. Some are mere skeletons, picked clean first by scrappers. Others are boarded up, their exterior walls still decorated with "Katrina crosses"—the spray-painted X's that rescue workers used to communicate the results of their searches.

"The neighborhood is absolutely taking a long time to recover," Paul says, a fact that she attributes to a number of causes, including mixed messages from the city. "It's almost worse, what they did, than relocating everybody and paying their expenses. What they did is, they said, 'You're not going to be able to rebuild there, so don't bother trying.' And then they came back and said, 'Never mind, you go ahead.'"

Paul also points to the Louisiana Road Home program, which a federal judge found discriminated against black homeowners because it awarded rebuilding grants based on the pre-storm value of homes, rather than on the cost of reconstruction.

Whatever the causes, it's inarguable that the Lower Ninth Ward has failed to draw residents back at the same rate as many of the city's other neighborhoods, even with the help of several dozen outside groups like Paul's. The neighborhood's population hovered under 3,000 residents at the time of the 2010 Census, down from 14,000 ten years earlier. The total number of housing units fell from 5,600 to 2,000 during the same period, and the vacancy rate ballooned from 14 percent to 48 percent.

The neighborhood also still lacks some basics like grocery stores and access to emergency medical services, although a fire station, community center, and new school are under construction, and Williams (the master planner) says he is working to bring in a grocery store.

On 16 square blocks adjacent to the spot of the levee breech, though, sits an island of vibrant density. Dozens of little homes are huddled together here, and their colorful exteriors, manicured lawns, and surprising roof angles bring to mind the surreal suburbia of Tim Burton's Edward Scissorhands (except that almost all of these houses have solar panels). The homes would be striking anywhere, but it's particularly jarring to find a cluster of them here, in a part of the city where it can be a challenge to find two occupied houses in a row.

This is the work of Make It Right, a nonprofit founded in 2007 by Hollywood A-lister Brad Pitt. The group, working with a team of world-renowned architects, started off with a goal of building 150 affordable Leadership in Energy and Environmental Design (LEED) Platinum certified homes, and limited construction to these blocks in order to create a neighborhood feel. Around 100 of the homes are already built and occupied, and the group has since expanded its work to several other areas across the country.

Founded by movie A-lister Brad Pitt, Make It Right builds sustainable affordable housing in New Orleans.

Photo: Make It Right

Wearing a white hardhat with a sticker that says "Defend New Orleans," Cesar Rodriguez—procurement and construction services manager for Make It Right— leads a tour of a four-bedroom house that's currently under construction. He points out how there are no chemical smells present, because of the environmentally friendly construction materials being used.

Moving a few steps down the street Rodriguez shows off a finished two-bedroom home, explaining some of its green features, including fully recyclable carpet, insulated windows that keep out heat, countertops made of 75 percent recycled material, and efficient appliances. Even the odd roof angles are designed to capture as much solar energy as possible. "A Make It Right home puts money back on the table," Rodriguez says. "The house is no longer a financial burden. We have homeowners that literally only have an electric bill for the connection fee."

In addition to making homes that are healthier, affordable, and sustainable, officials for Make It Right hoped that their efforts would act as a catalyst to bring other people back into the neighborhood. But it seems that the organization hasn't spurred much development beyond its own project area borders.

Still, executive director Tom Darden notes that other developers have built 50 homes on the blocks where Make It Right operates. "We've created almost a mini market," Darden says. "We're competing with other developers for vacant lots. I think that's a good sign." He acknowledges that the speed of the Lower Ninth's recovery is less than ideal, and calls Make It Right's work a "drop in the bucket" in terms of repopulating the neighborhood. But even that, he says, represents significant progress. "Even if nothing else happens, or even if the rest of the recovery lags, if we build 150 homes in a relatively dense area, it will start to feel like a neighborhood again. There's a million subdivisions all over the U.S. that are relatively isolated, and they still function as a neighborhood."

Darden speculates that the Lower Ninth could simply become a place with a more rural feel. Certainly, some blocks look more like ones you'd find in a humble small town than in a blighted urban area. But Tanya Harris, Make It Right's community outreach

Make It Right's community outreach director Tanya Harris, executive director Tom Darden, procurement and construction services manager Cesar Rodriguez.

Photo: Marc Pagani

coordinator and a lifelong resident of the Lower Ninth Ward, thinks the neighborhood's rural stage is likely just a temporary step in the redevelopment cycle. "When my grandparents got here in 1946, it was quiet and sparse," she notes. "That growth and development happened over time."

"It's too slow for anybody," Harris says of the Lower Ninth's recovery. "But we've seen the neighborhood coming back to life, slowly. That is something that is a tremendous success in a lot of people's eyes. If you came here in 2005, and you saw what we saw, you would look around and say, 'oh my God.' A lot of people thought that it would never make it past even being green space."

To outsiders, it seems unimaginable that some residents have been working for nine years without success to return to the neighborhood. But just a couple of blocks from the Make It Right houses, Errol Joseph stands in the bones of what used to be his home. In a raspy, high-pitched voice that doesn't seem to match his large build, he rattles off a story that's hard to follow in its complexity, full of delayed insurance payments, false starts, and various bureaucratic runarounds.

What's not complicated is Joseph's depth of feeling for this house. It used to belong to his grandparents, and Joseph—now 63—helped his father build an addition when he was eight years old. "This is home," he says, going on to repeat the phrase over and over like a mantra. "I'm happy when I come here. I used to come here and sit on the porch and just be by myself. This is home. I have another house [in another part of New Orleans], but I'm not happy. This is home."

Joseph surveys his surroundings: the bare wooden beams that volunteers from lowernine.org helped to erect; the unopened sheetrock and bags of insulation piled up in what will one day be a garage; the functioning toilet with only a tarp flap to provide privacy. "This," he says, "is where I want to be."

Broadmoor Improvement Association president LaToya Cantrell protested against the "green dot" plan.

Photo: Marc Pagani

Broadmoor residents didn't run from the green dot. They rallied around it, taking the symbol of their potential destruction and remaking it as a logo of sorts for their recovery campaign. "We used it against them," says LaToya Cantrell, who was president of the Broadmoor Improvement Association when Katrina hit, and now sits on the New Orleans City Council. In the days after they learned of the green dot plan, residents organized a 300-person rally protesting the recommendation, and soon green banners and signs proclaiming "Broadmoor Lives" proliferated in the neighborhood. The ensuing years would be marked by an unprecedented level of activism in Broadmoor, and, in 2008, residents celebrated the neighborhood's progress by cutting a cake in the shape of a green dot.

"It was thumbing our nose at the recommendation," Cantrell says, "but also showing that neighborhood leaders and the community residents are the world's greatest experts on their neighborhood, and we were capable of not only planning for ourselves, but also garnering the resources needed to rebuild ourselves. It became not focusing on them, but focusing on us. The green dot became a symbol for community unity. It means something positive to us, instead of something negative."

The Broadmoor Improvement Association set up a number of subcommittees to tackle specific issues, but the two most important were the redevelopment and repopulation committees. Leaders became obsessed with getting at least 51 percent of the neighborhood's residents back in town, to be able to show city officials that the area was, indeed, "viable," and they aggressively lobbied displaced residents to return to their homes, warning that a wait-and-see approach could lead to the death of Broadmoor. They kept a large map of the neighborhood and colored in parcels orange when they learned that a family planned to return.

Instead of asking the city to incorporate Broadmoor into its planning, neighborhood leaders set out to create their own plan, partnering with faculty and students from Harvard University's Kennedy School of Government. Neighborhood leaders viewed it as key, though, that residents—and not outside groups—

Laurel Street Bakery brings fresh baked goods and a fresh attitude to Broadmoor.

Photo: Marc Pagani

lead the recovery effort. To break up the work, and to invest residents from across Broadmoor, leaders divided the already small neighborhood into three subsections. Each had different socioeconomic demographics, which ensured that people of all races and income levels would have a say in the process.

Central to the neighborhood's 320-page redevelopment plan was the creation of an "education corridor," with a rebuilt community library and elementary school. In addition to the "Broadmoor Lives" slogan, residents adopted the motto of "Better Than Before." It's the sort of stuff that's easy to write down on paper, and that often ends up forgotten in overstuffed binders, collecting dust while the neighborhood in question falls further into disrepair. But in Broadmoor, the plan became a reality.

In 2007, the neighborhood's elementary school was selected as one of five schools across the city to be fast tracked for renovation. In 2010, the school moved into its newly renovated LEED Gold building, which features solar panels, rain gardens, a reflective white roof, and windows that facilitate natural light. Two years later, the sleek and spacious LEED certified Keller Library and Community Center opened. In addition to loaning out books, the facility hosts free classes on topics ranging from Zumba to how to cook healthy meals on a food stamps budget.

Most impressively, Broadmoor is, by some estimates, nearly 90 percent repopulated (in the 2010 census, the neighborhood's population was 5,400, still down quite a bit from the 7,200 people who lived there in 2000, although more residents have moved in since).

As part of its repopulation effort, the neighborhood partnered with the local development and consulting firm Green Coast Enterprises to rebuild 55 of the most blighted properties as affordable housing units. All of the new units meet some sort of green building standards, and four of the homes are LEED Platinum houses with whimsical names like "The Little Easy."

Above: Laurel Street Bakery is located in one of four buildings real estate developer Will Bradshaw has redeveloped as part of a campaign to revive the intersection of Washington Avenue and Broad Street.

Opposite: Mr. Chill, Wilbur Wilson, at his hot dog establishment.

Photo: Marc Pagani

Will Bradshaw, the president and co-founder of Green Coast Enterprises, says that Broadmoor has "one of the best redevelopment stories and redevelopment strategies I've ever seen."

"It was really amazing to watch," says Bradshaw, a Texas native who was in graduate school at MIT when Katrina hit, and who met Cantrell at an event at Harvard. "It was one of the most inspiring things I've ever seen, and it made me want to pick up and move halfway across the country and make my life in New Orleans."

What sets Broadmoor's story apart, Bradshaw says, is the way residents banded together to attract outside help, but still maintained control over the neighborhood's destiny. "In Broadmoor, you had exceedingly strong leadership that was very well organized. They spoke with one voice that was clear, and they utilized that voice to attract extraordinary resources from all over the world." For example, the Carnegie Corporation gave $2 million for the construction of the library and community center, and the neighborhood also received help from the Clinton Global Initiative. "They were able to reach out and say, 'We need this help at this time,'" Bradshaw says. "As a result of the ability to be clear and uniform, they got a lot more done than a lot of people that were in a similar place."

This charity helped provide a boost to Broadmoor, but investment by residents and businesses is what will sustain the neighborhood over time. Bradshaw's firm developed four commercial buildings near a busy intersection in the northern part of the Broadmoor, one of which is occupied by a social entrepreneurship incubator, and one of which will soon be home to a community health clinic.

One of the buildings houses Bradshaw's own office, which sits directly above a vegan café that specializes in baked fries. Across the street stands the shell of an abandoned car dealership, the front adorned with a colorful mural. The artwork shows people dancing under a rainbow, and a large green dot is inscribed with the words, "Broadmoor Lives at the Heart of New Orleans."

It's tempting to look at Broadmoor and label its recovery complete, or at least nearly so. The "Broadmoor Lives" movement started so long ago that some of the major players from its early days have left New Orleans, and by many accounts the neighborhood truly is "better than before." There's still some blight, but few clues point that, only nine years ago, this place was underwater and practically left for dead.

But some people are still in the process of returning to Broadmoor. Mr. Chill, a neighborhood barber, cut hair under a tent at the site of an abandoned gas station for 17 months after Katrina, and eventually reopened his shop a couple of miles away in the Hollygrove neighborhood. A year ago, he opened Mr. Chill's Broadmoor Dogs and Sweet Pastries, a casual restaurant that has a counter decorated with images of dancing frankfurters. It's in the same building where he once cut hair, away from the main roads and surrounded by residential buildings. But Mr. Chill is still trying to get back to his own house, about 10 blocks away.

Mr. Chill (he was born Wilbur Wilson, but earned the nickname "Chill" in middle school for his smooth way with girls, and added the "Mr." after his business success) says the money he received from the state's Road Home program was enough to fix up the home's exterior, but not the inside. He's still staying at a family member's house.

Still, Mr. Chill was overjoyed to get back into business in Broadmoor. He chose to sell hot dogs, he says, because he wanted to create a place that, like a barbershop, was accessible to everyone. "To get back in this building, I felt like a kid that had been sick in the hospital," he says, occasionally chomping on a hucklebuck—a New Orleans treat of frozen Kool-Aid in a plastic cup with fruit cocktail at the bottom. "And when he finally got out of the hospital, he got what he'd been asking for— going on the merry-go-round. That's how happy I was."

Santiago Burgos, who recently wrapped up a four-year stint as the executive director of the Broadmoor Development Corporation, speculates that most of the people who plan to return to the neighborhood have already done so. "The houses that remain vacant have now been vacant almost 10 years," he says, sitting in the neighborhood library's snack shop, which is named—perhaps inevitably—the Green Dot Cafe. "Some of them were vacant before the storm. Those families are probably not coming back. They probably don't have the resources to fix that house."

In particular, Burgos says, blight remains high in the poorest segment of Broadmoor, which was dubbed Subgroup B when the neighborhood split into three sections during the recovery process. "In a place like Subgroup B, I think a lot of people now are recognizing that it would probably make sense to have more green space in the form of athletic fields and parks, than to have hundreds of dilapidated, decrepit properties that people are not going to live in," Burgos says.

And so, ironically, this could be the final step in the recovery of a neighborhood that fought so hard against the green dot plan: bulldozing homes to create green space.

"What we do with this work will define this place for the next hundred years. If we do this work, our children, their children, and their children will be the beneficiaries."

—Ray Manning, Architect and President Pro-Tem
Sewerage and Water Board of New Orleans

It's nearly impossible not to compare the recovery stories of Broadmoor and the Lower Ninth Ward, but to do so is to raise the hackles of stakeholders in both neighborhoods. If you ask, for example, whether the reason the Lower Ninth's recovery has lagged is because the neighborhood sustained more damage than Broadmoor, you're likely to be told twice that your question is badly misinformed: once by someone in Broadmoor, who might argue that the flood damage there was just as bad as anywhere else in the city; and a second time by someone in the Lower Ninth, who might say that the dozens of LEED Platinum homes there are a sign of leadership, rather than lagging behind.

Some of this wariness may stem from the period right after Katrina hit, when residents were told they needed to prove their neighborhoods were viable. "After the green dot, there really was a lack of city leadership in how the city should rebuild, and it was just sort left to everybody to decide on their own," says Jeff Hebert, executive director of the New Orleans Rebuilding Authority. "I think, over time, it has led to a sort of battle of neighborhoods and districts about who's getting what money, and who's not getting what money. There's still, today, competition around resources."

Tom Wooten, an author who studied the recovery efforts of Broadmoor, the Lower Ninth Ward, and three other neighborhoods for his 2012 book "We Shall Not Be Moved," says this competition for resources sometimes led to antagonism between neighborhoods.

"Sometimes neighborhood leaders wouldn't talk to each other," Wooten says. "They felt like they were competing for the same grants. They felt like they were competing for the same limited pie of residents that were going to come back. When I explained that I was doing research in a number of neighborhoods, I would frequently get an explanation about why they and their particular neighborhood had it worse than people in another neighborhood. And I think that had a lot to do with the cutthroat, sink-or-swim environment that had been created."

Really, Wooten says, the need to prove viability was "a prophecy that had already been fulfilled." Whether or not officials were ever really going to bulldoze hundreds of homes was almost beside the point. The neighborhoods were already ruined, and if residents didn't work to bring them back, then the areas would have stayed wastelands, even if the city did nothing.

But the difference in the pace of recovery between different neighborhoods isn't due to residents in one place simply working harder (or smarter) than those in another, says Wooten, careful to stress that residents in both neighborhoods "were doing everything they could to bring life back for themselves and for their neighbors."

"Each neighborhood faced its own unique set of challenges, and both sets of challenges were huge," Wooten says. "But the Lower Ninth Ward faced a set of challenges that made it impossible for residents, without sufficient government support, to bring back most of the neighborhood's population. That could have been changed with different decisions at higher levels of government—letting people back into the neighborhood earlier, making sure that utilities got restored quickly, getting a number of schools reopened quickly."

Opposite: Children playing in the Lower Ninth Ward.

Photo: Make It Right

The delay in letting people back into the Lower Ninth Ward and the level of physical destruction there are just two of the many complicated reasons that observers point to when asked to explain why the neighborhood's population hasn't rebounded in the same way that Broadmoor's has. They also often mention geography, and the way the Lower Ninth is set apart from the rest of the city. Of course, Broadmoor's high level of organization is often cited, but Broadmoor residents also simply had more resources at their disposal than many of those in the Lower Ninth. In addition to having more economic diversity and a higher average household income, Broadmoor was the home to some boldface names who could help connect the neighborhood to outside resources. Walter Isaacson, the former head of CNN, grew up in Broadmoor, as did current New Orleans Mayor Mitch Landrieu.

Laura Paul says this economic disparity created a sort of double hurdle for residents of the Lower Ninth to clear—first, they had less money to rebuild their properties; and secondly, they were more likely to get treated unfairly during the recovery process because of their lack of money and power. She points to the disparity in Road Home payments, and also notes that insurance companies tried to deny claims to some Lower Ninth homeowners whose houses were swept away because they didn't carry "collision" policies on their homes.

"Are they going to get away with that in Broadmoor? They're not," Paul says. "Are they going to get away with that in the Lower Ninth? Damn right they are. Or they're going to try. I get accused of playing the race card, but to me, there's no question that's the issue."

In addition to these big-picture matters, there are obscure, maddeningly technical reasons for the Lower Ninth's sputtering recovery. Because many homes there were passed down from generation to generation—without anyone ever writing out a legal will—there are succession issues with the property titles that sometimes impede development. And, since many of these homes were owned outright, with no mortgage, owners weren't required to carry insurance on them, and many didn't.

"That's the irony," says Shannon Stage, executive director of U.S. Green Building Council (USGBC) Louisiana chapter. "People who might have been wealthier on paper, because they owned their homes, had far fewer resources than those who did not."

A Matter of Principles

In November 2005, only weeks after Hurricane Katrina hit, the U.S. Green Building Council (USGBC) flew New Orleans stakeholders to the Greenbuild conference in Atlanta, where they met with experts from around the country for a charrette on Gulf Coast reconstruction. Out of that process emerged a document called "The New Orleans Principles," which presented broad guidelines for the city to follow as it rebuilt for a more sustainable future.

City officials and neighborhood leaders decisions were subtly guided by the conversations and shift in thinking that produced the principles, says Z Smith, chairman of the board of directors for USGBC's Louisiana chapter. "They are a great, succinct compilation of all of the best thinking about the way to build back sustainably and resiliently. It wasn't an instruction manual. It's more an embodiment of the kinds of conversations that were happening, thanks to USGBC and others."

Smith notes that there was only one LEED certified building in all of Louisiana before Katrina hit, compared to nearly a thousand today. That was the result of conversations like the one that produced "The New Orleans Principles," he says.

New Orleans Ten Principles

1. Respect the rights of all citizens of New Orleans
2. Restore natural protections of the greater New Orleans region
3. Implement an inclusive planning process
4. Value diversity in New Orleans
5. Protect the city of New Orleans
6. Embrace smart redevelopment
7. Honor the past; build for the future
8. Provide for passive survivability
9. Foster locally owned, sustainable businesses
10. Focus on the long term

"We are a single example of a place that has suffered an extraordinary amount as a result of this meteorological event that our behavior is making more risky."

—Will Bradshaw

To green building advocates, it may go without saying why sustainability was part of the recovery effort for both neighborhoods—why it matters whether the schools and the libraries and the homes there are LEED certified or not. But to others, it can seem extraneous, almost wasteful, to worry about solar panels and recyclable carpet at a time when there was so much to rebuild.

Indeed, Wooten says, some residents he spoke with questioned the wisdom behind Make It Right, saying the homes are too expensive and that the organization has siphoned off charitable dollars that might have gone to neighborhood groups instead. Paul argues that her organization is engaging in the greenest building practice of all by renovating existing structures, often with reclaimed material— all on a shoestring budget.

Tom Darden, the executive director of Make It Right, bristles at the criticism he sometimes hears—that the organization is spending too much money to help too few residents. Last year, a blistering New Republic article called the organization a "drag" on the city.

"I feel bad for our staff, or even the families that we serve, when we get slammed," Darden says. While he estimates that Make It Right has spent around $35 million building the hundred homes in New Orleans (plus money spent on other projects around the country), he says those figures aren't helpful in calculating a per-unit cost, since the build out isn't complete. Also, he notes, not all of that money has gone toward construction. Make It Right employs social services staffers who work with families to make sure they're financially qualified to buy a home, because no organization that provides those services existed in the Lower Ninth.

Additionally, Darden says, Make It Right has helped to green New Orleans outside of its small pocket of development. The organization has done solar installations for other housing nonprofits in the city, and Darden says the group is also helping to create a local market for sustainable products. "We pay a premium for the first time that we install, say, a tankless water heater, and none of the contractors know how to do that, or when we install pervious concrete," he says. "That requires increased upfront costs in contractor training, which we just eat. That makes the costs of these houses go up. But that helps not only us, but also everyone else benefits from that too."

Hebert, the redevelopment authority director, argues that sustainability was an important factor in the city's recovery because green building practices help to lower the cost of home ownership. "If you have a person who's moving into a house and has a utility bill that's $25 a month, instead of $300 a month in an old unsealed house where they're running the air conditioner 24 hours a day because it's not insulated, that is a huge benefit," he says.

For Bradshaw, the Green Coast Enterprises president, the focus on sustainability was relevant to the recovery effort precisely because of what the city was recovering from—the water that leveled the Lower Ninth and filled up Broadmoor like a bathtub, brought by the type of storm that's projected to become more common due to climate change. "We are a single example of a place that has suffered an extraordinary amount as a result of this meteorological event that our behavior is making more risky," Bradshaw says. "If we can reverse this trend of putting more greenhouse gases into the atmosphere, that will actually lower the risk that we face as a community."

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Building for the Flood

Boston's Spaulding Rehabilitation Center designed with rising sea levels in mind.

WRITTEN BY **Alison Gregor** BUILDING FEATURED **Spaulding Rehabilitation Center, Boston, Massachusetts**

Architect Perkins + Will | **Project Manager** Partners HealthCare | **Cost** $140 Million | **LEED Certification** Gold

In October 2012, David S. Burson stood in the former Charlestown Navy Yard, at the site of the new Spaulding Rehabilitation Hospital, at high tide during Hurricane Sandy. The water rose to two feet from breaching the site. "It was as high as I've ever seen it, but it didn't come onto our site," says Burson, a senior project manager at Partners HealthCare, an affiliate of the Spaulding Rehabilitation Network. "However, if Sandy had hit at a different hour, we probably would have seen some water."

According to a Boston Harbor Association study, had Hurricane Sandy's storm surge corresponded with high tide in Boston, instead of hitting after it, about 6 percent of the city would have been under water, including the former navy yard. That experience meant that Burson and other planners of Spaulding's new 132-bed rehabilitation hospital could be immensely relieved that they'd designed a building capable of withstanding the rising sea levels projected over the next century. The 262,000-square-foot hospital, which opened in April 2013, includes a panoply of strategies that fall under the umbrella term of "resilience architecture"—in this case strategies specifically designed to thwart rising sea levels.

While Hurricane Sandy was confirmation that the approach was not only a smart one, but an essential one, the original impetus behind designing Spaulding as a resilient hospital was Hurricane Katrina in 2005 in New Orleans. "The failure of hospitals in Katrina led Partners HealthCare to develop a 'top 10' list for resilience features, beginning with setting the base elevation of the building above the current 500-year floodplain,"

says Robin Guenther, the global sustainable healthcare leader for Perkins + Will, the architecture firm that designed Spaulding.

The 500-year floodplain maps the hypothetical inundation of Boston during a flooding event of such magnitude that it might hit the city once every 500 years. The ground floor of the Spaulding tower was raised about 2.5 feet above the current 500-year floodplain elevation. "It's probably fair to expect that someday water will get to the building, given sea level rise projections over the life of the building, and that's what we tried to prepare for in the design," Burson says.

Spaulding, which has eight stories and a two-level penthouse, also has an underground parking garage, an obvious candidate for flooding. However, it was designed so that the ramp goes up to grade before descending to parking areas, and unless water breaches the ground floor of the hospital, the parking garage should stay dry, Guenther says.

On the hospital site, planners designed berms made of granite seawall blocks and some of the old oak timbers, which were uncovered in preparing the site for construction, Burson says. (Most of the timbers were donated to the restoration of a 19th-century whaling ship at the Mystic Seaport Museum in Connecticut.) The manmade berms create a reef of sorts to help protect the hospital from the sea if it floods. "Those stone walls, in addition to providing a landscape amenity, provide some measure of protection against a storm surge," Burson says.

Page 46: Berms created by granite seawall blocks and old oak timbers will help protect Spaulding from rising waters in the future.
Photo: © Steinkamp Photography

Page 47: David Bursons, senior project manager for Partners HealthCare.

Left: Natural ventilation enables patients to experience rehabilitation in an environment full of the sounds and sights of the sea and natural environment.
Photo: © Anton Grassl

Above: Robin Guenther FAIA is principal of Perkins+Will.
Photo: Perkins+Will

Design Resilience Measures

Key design enhancements included:

- A high performance envelope, including triple-glazed windows and exterior shading, to improve thermal performance and prevent low interior temperatures/freezing if conditioning is lost in winter months.
- Daylight harvesting maximizes the use of "free" daylighting in resident rooms, gymnasia, and public/circulation spaces. Reduced dependence on artificial lighting supports sheltering in place during power loss and longer operation on a given supply of emergency generator fuel.
- Incorporation of key-operated operable windows in resident rooms, so that if the building cooling or ventilation system is inoperable, indoor overheating can be avoided in summer months and patients can shelter-in-place. (After Katrina, indoor temperatures in sealed hospitals exceeded 100 degrees F, which caused staff to break windows with furniture items).
- The gymnasia and social spaces are naturally ventilated. When outside weather conditions permit, windows can be opened via remote operation and the building management system automatically shuts off delivery of tempered air in these areas. This system, which can be overridden manually if necessary, not only saves energy that might otherwise be spent on mechanical cooling, it helps residents build stamina through exercising in ambient conditions. Like the resident room windows, operability improves the ability of the space to maintain habitable temperatures if conditioning systems fail. And it allows patients and staff to hear boats, seabirds, and other harbor activity, providing a meaningful connection to the outside world.
- The placement of all critical mechanical/electrical/communications infrastructure on the roof to minimize possibility of interruption. All required program space is likewise above flood elevation.
- Implementation of gas-fired onsite co-generation (CHP), to offer additional redundancy for power generation in the event of grid loss or diesel generator issues. CHP infrastructure is on the roof, as are emergency diesel generators. Onsite power generation is more efficient than utility power, as transmission losses are minimized.
- The building systems are energy efficient. With an Energy Use Intensity of approximately 150 kBtu/sf/yr, Spaulding is close to 50 percent below the industry average energy intensity of hospital buildings. This, coupled with the implementation of onsite CHP, translates into dramatically lower carbon emissions.
- Despite the importance of universal access for rehabilitation patients, the ground floor elevation has been raised more than 30" above the 500-year floodplain level, to account for future projected sea level rise. The site is bermed with landscape elements and gently slopes to achieve this elevation gain.
- Extensive green roofs mitigate stormwater discharge during heavy rainfalls. The green roofs also include a universally accessible vegetable garden (accessible to wheelchair residents) that provides some local food, a Boston tradition.

Besides strategies to thwart seawater from breaching the building, Spaulding's designers also devised myriad measures to keep the building operational should it flood. Anything critical to the continued operation of the hospital is on higher floors, while the ground floor was made largely open to the public, which was also a condition of the Boston Redevelopment Authority for building on the site, Guenther says. Thus, the hospital's ground floor has a public cafeteria-restaurant, a swimming pool used by rehab patients during the day and the community in the evenings, public bathrooms, and conference rooms that can be reserved by members of the public.

The 132 beds start at the fourth floor, and are typically 30 beds to a floor, except the eighth floor, which has 12 pediatric beds with the balance of the floor built out as administrative and support space, Burson says. "The eighth floor also provides some expansion capability in the future, should we ever need to expand the capacity."

In another unconventional move, the building's critical mechanical and electrical gear has been placed in the

Patient room windows are operable for natural ventilation.

Photo: Perkins+Will

penthouse. That required a lengthy negotiation with the electrical utility provider (NSTAR) to allow their utility lines to run through concrete-encased walls up to the roof as well, Burson says. "Their traditional practice has been to locate their primary switchgear down at street level…in a separate vault where they have ready access or in the basement," he says. "We didn't think that was a prudent approach to this site."

NSTAR's primary switchgear vault is now up in the penthouse, and the utility controls access to the vault, sending its workers to the roof with a key. The only remaining vulnerability is flooding at the utility itself. In that case, the hospital, which has a cogeneration plant, can also function for four to five days on natural gas, which is stored in a double-walled 15,000-gallon tank. "The one thing you can't do is elevate your fuel tank for your emergency generators—fire departments don't let you do that," Guenther says. "So the hospital has an underground fuel tank, and then the pump has to be located near it, so they put the pump in a floodproof vault."

The vault is a submarine vault that's completely watertight, so the pump should in theory continue to function despite flooding. "Our emergency generators would still be operational," Burson says. While the chances of losing heating and cooling capabilities are minimized by the redundant systems, the hospital's planners continued to worry about ventilation. "They were really moved by the images and reports from hospitals in New Orleans that people threw furniture through the sealed windows of patient rooms, because the buildings overheated once they lost their ventilation systems, and indoor temperatures in some of those hospitals went well above 100 degrees," Guenther says.

"As thoughtful as the design has been of the hospital's building itself, the dependency on support infrastructure requires a similar commitment from government agencies and utility companies to broaden and deepen a truly resilient strategy."

– Hubert Murray

Thus, planners decided the hospital would have screened operable windows in all the patient rooms, as well as operable windows in the various gyms for maximized natural ventilation. Windows that open for cross-ventilation turn patient lounges into screened-in porches. "Large portions of the building are fully naturally ventilated," Guenther says. "This is actually one of the first hospitals in the U.S. that's tried this much natural ventilation."

Like many features of the hospital, the natural ventilation serves multiple purposes. Besides providing an energy benefit, it enables patients to experience rehabilitation in an environment full of the sounds and sights of the sea and natural environment, she says.

Many of the resilience features also met requirements for environmental sustainability in the hospital building, which received a Leadership in Energy and Environmental Design (LEED) Gold certification. They also helped to enhance the patient experience. For instance, the large amounts of space used for green roofs and terraces moderates stormwater runoff, which can cause flooding, but it also provides some measure of insulation, along with a popular patient amenity. One green roof is used by patients for therapeutic gardening, Burson says.

Because many features would have been incorporated even without concerns about resilience, the actual cost of those features providing only resilience benefits was quite reasonable, Burson says. The hospital's construction cost was $140 million and about half a percent of that, or about $700,000, went to strictly resilience features. "That's largely due to the cost of elevating that electrical switchgear and that concrete-encased service cabling up through the building, which was around $600,000," Burson says.

Despite the reasonable cost, there are those who've pointed out that the hospital could have simplified things by building on higher ground. Hospital administrators, however, such as Spaulding Rehabilitation Hospital's president David Storto, have said the waterfront location serves to provide patients with access to the outdoors for adaptive sports, such as kayaking. As well, the location is a prominent one.

"For far too long, rehabilitative care was an afterthought to many, relegated to the basements of hospitals and out of sight," Storto says. "This hospital makes a bold statement that a new era of rehabilitative medicine is here." As a leader on a par with the major centers of healing in the world, administrators say Spaulding's waterfront location reinforces that role.

"I think it's important to emphasize that a hospital above all is a social institution and must play a leading role in its community," says Hubert Murray, the director of sustainability initiatives for Partners HealthCare. "The new hospital in the Charlestown Navy Yard represents a commitment to the city and the neighborhood."

While Spaulding's administrators took on the challenge of working with a waterfront development site willingly, they said they hope the lessons learned from the design of the hospital enable other organizations to work together to combat rising sea levels.

"One building and one institution cannot do it alone," Murray says. "As thoughtful as the design has been of the hospital's building itself, the dependency on support infrastructure requires a similar commitment from government agencies and utility companies to broaden and deepen a truly resilient strategy."

One of those organizations may even be the U.S. Green Building Council, which could incorporate resilience strategies into its LEED certification program, Guenther says. "I think having a site credit around demonstrating resilience to climate impacts—demonstrating that someone's really looked at the potential climate hazards and risks and then has addressed those, either through site measures or energy measures or resource measures—would be really great actually," she says.

Opposite: Part of the building's sustainable strategies is its green roof.

Photo: © Steinkamp Photography

DUTCH

DIALOGUES

Previous spread: View of Amsterdam, c.1640 (etching), Rembrandt Harmensz. van Rijn (1606-1669).

Source: The Bridgeman Art Library

New Orleans architects look to the Netherlands for ideas on living with water.

WRITTEN BY **Judith Nemes**

As a young boy, Louisiana native David Waggonner's philosophy about solving problems and creating resiliency in communities was being shaped as he watched his dad, a member of the U.S. House of Representatives in the 1960s and 1970s, deliberate with his colleagues in Congress.

Joe Waggonner, a conservative Democrat, sat on two important congressional committees—the House Committee on Science and Astronautics, which focused on the science behind getting American astronauts into space for the first time; and another—the prestigious House Ways & Means Committee—which is in charge of funding decisions for federal projects.

"Those experiences gave me the belief you can do anything if you put your mind to it," asserts David Waggonner, a well-respected, New Orleans-based architect now in his sixties and a founding partner at Waggonner & Ball, an architectural firm regarded for its expertise in adaptive reuse and historic preservation. "Using science is big in the resiliency projects I'm working on now, but you also have to have a mechanism to pay for it."

When young David Waggonner wasn't in Washington, D.C., surrounded by newsmakers and learning how the wheels of government and power worked, he was back in Bossier Parish in northwest Louisiana, soaking up the values of living close to the land. He spent hours playing in the woods, laying in the grass and splashing around in the water with his friends. He described living amid nature, not separate from it.

Fast forward to 2006. Waggonner is now applying those lessons learned as he plays a pivotal role in the ongoing big fix of New Orleans—the Big Easy—in the aftermath of Hurricane Katrina in 2005.

The U.S. Army Corps of Engineers rebuilt the broken levee system soon after the storm to keep water out of the city once again. But some locals—including Waggonner—are working on other aspects of rebuilding the city and region to make it stronger to withstand even more calamitous hurricanes and storms that are expected to occur in the years to come.

In Waggonner's view, a critical factor to solving future problems was overlooked from the start after Katrina. "Understanding the root of the question about water was completely ignored," asserts Waggonner, who became a staunch champion of reshaping the conversation about repair and was frustrated by some of the early Band-Aid solutions.

Right: Mac Ball (left) and David Waggonner (right).

Photo: Marc Pagani

The "Dutch Dialogues" workshops are the outgrowth of extended interactions between Dutch engineers, urban designers, landscape architects, city planners and soils/hydrology experts and, primarily, their Louisiana counterparts.

Above: Dutch Dialogue 3 workshop, held at Tulane University's School of Architecture.

Photos: Waggonner & Ball Architects

Dutch Dialogues enters the American Lexicon of Disaster

Soon after Katrina, the Dutch Dialogues came to play a critical role in jumpstarting an entirely new conversation and approach: looking at collaboration over water management as the best solution. Waggonner, as well as other key players in the region, maintains that beginning that dialogue process in 2006 ushered in a new way of problem-solving for resiliency in communities that would catch fire across the nation.

Indeed, the Dutch Dialogues initiative in New Orleans got rave reviews among professionals and government officials addressing water disaster issues. Leaders in other storm-hit and flood-vulnerable cities and regions have called on Waggonner and others engaged in the Dutch Dialogues methodology to help them replicate the same process in their locales. In addition, a new exhibit at the National Building Museum in Washington, D.C.,—called Designing for Disaster—includes a component about the Dutch Dialogues.

When the devastation of New Orleans and the surrounding region from Hurricane Katrina was seen around the world, there was an outpouring of sympathy and aid from near and far. The Dutch, in particular, had more to offer than most other countries.

People living in the Netherlands are surrounded by water in a delta region and have suffered the harsh repercussions of flooding for centuries. They've experienced tremendous loss of life, destruction of land and community infrastructure, and massive disruption of economic activity. As a result, the Dutch have learned how to address the constant threat of flooding, death, and economic disaster from water, says Dale Morris, senior economist at the Royal Netherlands Embassy in Washington, D.C., and coordinator for Dutch Water Management and Climate Adaptation in the United States.

In the 1980s and 1990s, the Dutch began to change the way they looked at water management, notes Morris. "They just couldn't keep building higher barriers," says Morris, an American who served in the Netherlands while in the U.S. Air Force and learned the language and culture while he was there. "They figured out how they can live more naturally with the water."

Through the Dutch Embassy in Washington, D.C., the Dutch government in early 2006 invited an American delegation, led by U.S. Senator Mary Landrieu from Louisiana, to visit the Netherlands. There, they would meet with local experts and government officials to learn firsthand how the Dutch developed sophisticated, well-integrated

systems that have made them more resilient in responding to the constant threat of potential water-related disasters.

Senator Landrieu assembled a group of state and local officials, and water and planning experts who could benefit the most from those meetings abroad. Waggonner was part of that delegation.

"The Dutch are geniuses in urban design and water design," says Waggonner. "We needed to learn from them how to talk to each other and agree on how to solve our water problem."

In addition, the Dutch are known for how well they pool money to address water problems because everyone benefits from it. "We don't know how to do that here," he notes.

By all accounts, the delegation trip was a big hit. "When David came back his eyes were wide open," recalls Mac Ball, an architect and Waggonner's longtime partner at the firm. "He said these Dutch guys have to come over and analyze our problem and start a series of dialogues to help us tease out solutions."

After the trip to the Netherlands, Waggonner was intent on further engaging Dutch experts. He worked closely with Dale Morris at the Dutch Embassy to develop a patented process that was ultimately named "Dutch Dialogues." They also had lots of input from the American Planning Association, a nonprofit that provides leadership in community development.

"Simply put, the model [of the Dutch Dialogues] brings multiple disciplines together to solve vast resiliency and risk mitigation issues," explains Morris. "As opposed to working in silos, the dialogues allow people to work across disciplines to work on problems as the climate changes. Those challenges could be about drought, flood, or water supply issues."

Two separate Dutch Dialogues workshops took place in 2008 over several days that engaged Dutch engineers, urban designers, landscape architects, city planners, and soils/hydrology experts and their Louisiana counterparts. In the first workshop, the parties exchanged information to show each other how they addressed water issues in their separate regions. The second workshop moved the conversation further with recommendations about how to improve the way they deal with water with ideas that haven't been tried before in Louisiana.

"In the Netherlands, they learned how to embrace the water and its deltas, and live with it in a smart way that's less likely to put them under water."

– David Waggonner

When the first workshop began, local players in New Orleans learned that people in the Netherlands faced similar problems living in a delta region surrounded by water, but there was a fundamental difference in their outlook. Historically, New Orleans' leaders focused on separating people and their buildings from the water, explains Waggonner. Powerful pumping stations are located in strategic points around New Orleans that begin pumping wildly at the first accumulation of rain or any other surge of water. Making the soil so dry has had terrible consequences: the soil is largely composed of sand and because of that, wide swaths of land in the city have been sinking and creating a new set of problems, he says.

"In the Netherlands, they learned how to embrace the water and its deltas, and live with it in a smart way that's less likely to put them under water," adds Waggonner.

The New Orleans participants learned the Dutch work closely together to propose solutions for the greater good of society (and not just special interests), because they saw that rising waters don't discriminate by wealth or social status, says Morris. Everyone was affected by flooding. Their outlook on problem solving was shaped by that knowledge.

The residents of New Orleans—rich and poor—learned those same truths when Katrina forced the levees to collapse and inundated extensive parts of the city with water.

However, there are real obstacles that get in the way of good collaboration in the U.S., which was discussed in the workshops. Special interests and competing government jurisdictions often obstruct collaboration that could lead to better planning for protecting communities and creating wonderful amenities to benefit everyone too, explains Morris. The Dutch have overcome many of those obstacles, he says.

Also, "the Dutch, by nature, are consensus seekers," notes Morris. "They try to give everyone a say before making final decisions."

In the U.S., zoning issues and jurisdiction issues come into play, which is trickier to maneuver when trying to build consensus, admits Morris. "Zoning and pumping are local issues, but dredging and navigation are federal."

At the federal level, the goal was to look at the outer protection system of New Orleans by rebuilding the levees. Waggonner believes the federal government wasn't paying enough attention to urban flooding issues, and federal, state, and local authorities weren't working together to figure out how to move that water around.

"In the Netherlands, flood risk mitigation, zoning codes, drainage systems, road building, and other aspects of urban water management are integrated so they get efficient use of their dollars spent," explains Morris.

Filmore Canal Networks. Neutral ground canals can circulate water through the district at all times to help maintain high groundwater levels and limit further subsidence. The design employs a two-tier system to balance groundwater levels and infiltrate stormwater into the ground.

Left page: City planners could transform waterways in New Orleans (shown left) into canals in the Netherlands (shown right) using Living with Water's principles.

Photos: Greater New Orleans Urban Water Plan. Waggonner & Ball Architects

The Dutch Dialogues gave New Orleans stakeholders a framework for constructive discussion, and brought disparate parties to the table to create synergies that otherwise wouldn't occur, says Waggonner. In addition, Waggonner set an intergenerational element to the discussions so younger professionals and university students could participate in the process and integrate that philosophy into their work ethic as they advance in their careers.

"We have an effective network now," says Waggonner. "The work transcends the competitive. No one is making money doing this, including the Dutch participants. We're constantly learning from each other."

A new radical plan for water management in New Orleans

Since the Dutch Dialogues, Waggonner and others have been working hard at coming up with funding for designing new plans for water management, and even larger pots of money that will be necessary to implement any of the design ideas that are approved.

In 2010, state and federal funds were allocated to Waggonner and Ball to lead a team of local and international water management experts to develop a Greater New Orleans Urban Water Plan. The in-depth plan, "Living with Water," calls for a radically different game plan for how water should be incorporated into the city's infrastructure.

Taking a completely different tack, the Living with Water plan recommends designing a new system within the levees that doesn't automatically eject the water when it rains. Instead, the new ideas focus on rethinking the use of water and integrating it more into the fabric of the city.

"We want to make New Orleans consciously a water city by using surface water in the landscape," says Waggonner. "In Louisiana, water has not been something we valued and we want to change that. Our new paradigm regarding water is to drain it, store it, and use it when we need it."

These designs are intended to first promote safety for residents, but also establish amenities that improve the quality of life by living close to water. For example, one component of the plan reworks the canals, which currently are walled in, aesthetically unpleasing, and mostly hidden from residents, explains Waggonner. They're used primarily as a place to push water away from residents. The new plan calls for a flattening of the canal walls, cleaning up the water, and making the edges of the canals more like a promenade for residents and visitors to have a place for walking and communing with the natural

environment, he says. "What we're trying to do is get people not to turn their backs to the water's edge but to embrace it."

To illustrate those ideas, Ball created a wonderful series of drawings that are intended to foster buy-in from the community because they'll be able to visualize how these canals can transform their surroundings and draw tourists to the region, much like the High Line transformation did in New York City, he says.

"We were hired to do this study, but it took longer and cost more than any of us thought because it was very exhaustive and grounded in science," notes Ball. "We're hoping funding will come soon so this project can start."

As of late summer, city officials and others were working on tapping potential funding sources, including the federal Rebuild by Design program, which was created as an initiative of the President's Hurricane Sandy Rebuilding Task Force and the U.S. Department of Housing and Urban Development in 2013.

Waggonner, a natural leader, great networker, and sincere cheerleader for the city, was the best choice to head up the New Orleans team that collaborated with the Dutch

View of Greater New Orleans as a delta city, made more resilient with blueways, greenways, parklands, and integrated wetlands.

Rendering: LSU Coastal Sustainability Studio

in the workshops, concludes Morris. Aside from his fierce determination to rethink the fundamentals of water's role within New Orleans, Waggonner knew how to tap the right experts for the local team.

"He told me there were people in New Orleans who were skeptical or were too busy to participate," recalls Morris. "But David has a strong commitment to the city, he doesn't give up easily, and adversity won't stop him. The Dutch participants couldn't succeed without the true local knowledge and participation that David brought together."

Dutch Dialogues Beyond New Orleans

Since its inception in New Orleans, the Dutch Dialogues process has taken on a life of its own in the U.S. and elsewhere. Both Waggonner and Morris participated in a Miami workshop in August that assembled many local players to discuss how to build a team for addressing water issues. The first formal Dutch Dialogues are expected to begin there next year.

Indeed, many believe the principles and framework adopted by the federal government's Rebuild by Design program after Hurricane Sandy was modeled after the Dutch Dialogues format.

Integrated Living Water Systems

The integrated living water system is the basis of the Greater New Orleans Urban Water Plan. It is a new model for managing stormwater, surface water, and groundwater collectively, rather than as isolated phenomena. It works to slow, store, and use stormwater in order to reduce the region's dependence on pumping, and it provides for the circulation and recharge of surface water and groundwater. The Urban Water Plan describes seven characteristic elements that join together the capacity of existing systems with those of the region's open spaces, soils, plants, and wetlands.

1. **Small Scale Retrofits.** Interceptor streets on high ground (backslope neighborhoods) are a critical subset of small scale retrofits. Running perpendicular to the flow of water, interceptor streets function as speed bumps, absorbing and slowing water as it moves downslope, in order to alleviate localized flooding and lessen the load on drainage systems downstream.

2. **Circulating Canal.** In the region's bowls and lowlands, circulating canals sustain local habitats and recharge groundwater. During wet weather, they continue to serve as drainage conduits. Circulating canals with flowing water and improved banks can be beautiful public spaces, as seen in this example from the Netherlands.

3. **Strategic Parklands.** Strategic Parklands are multi-acre areas located at key junctures of the integrated living water system that are designed to contain vast quantities of stormwater during heavy rains and provide invaluable open space and recreational amenities. Wally Pontiff Park in Jefferson Parish is an example of an existing parkland.

4. **Waterfront Development Zones.** Waterfront Development Zones around key waterways and parklands anchor the development of higher-density, multi-use districts defined by urban water assets. Shown is a multi-use development along the Industrial Canal.

5. **Integrated Waterworks.** Integrated waterworks are the water treatment plants, drainage pumps, siphons, sluices, and gates that draw, redirect, and filter stormwater, surface water, groundwater, drinking water, sewage, and industrial wastewater. They are the engines that establish the flows of the living water system. Shown here is a weir in City Park.

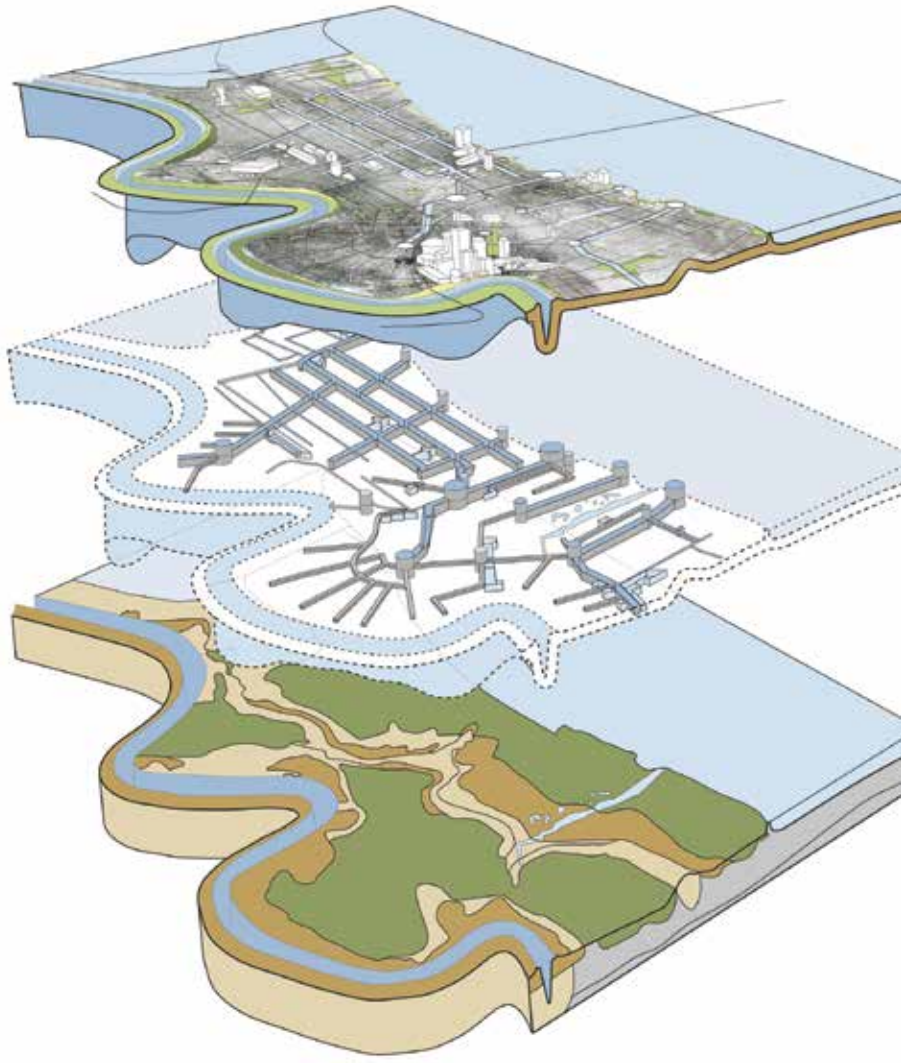
6. **Integrated Wetlands.** Wetlands located within strategic parklands and distributed throughout the region store and filter both stormwater and dry weather flows. Existing wetlands are restored with treated wastewater and filtered stormwater.

7. **Regional Monitoring Networks.** Surface water and groundwater provide system managers with real-time data that are necessary to address immediate drainage needs and long-term trends in water levels and water quality, and to maintain higher water levels without compromising safety. ●

Photos: Greater New Orleans Urban Water Plan. Waggonner & Ball Architects

Right: Layered Planning Process. Working from the ground up to determine how to integrate the natural flows of the landscape into infrastructure networks and the physical shape of our communities.

Rendering: Greater New Orleans Urban Water Plan. Waggonner & Ball Architects



After Hurricane Sandy, city leaders in Bridgeport, Connecticut, a coastal city hit hard by the storm, invited Waggonner as a consultant to facilitate a Rebuild by Design workshop for key stakeholders to figure out how to begin repairing its devastated infrastructure and nearby waterways. They're moving along in the process, but will face funding challenges once they've devised a rebuilding plan, observes Waggonner.

"There can't be any resiliency in Bridgeport without economic revitalization because there's so few revenue sources there," he notes. "You have to approach resiliency with an economic approach in mind."

One of the segments at the National Building Museum's "Designing for Disaster" exhibit includes a video of the Dutch Dialogues format in action as it was employed in Bridgeport during the workshop led by Waggonner. That inclusion in the exhibit is expected to give even wider exposure of the Dutch Dialogues methodology to a broader audience and spread the word further.

More city leaders around the U.S. have contacted the Dutch Embassy and are eager to engage in their own flavor of Dutch Dialogues, says Morris. Some potential cities and regions in line for future collaborations include Norfolk, Virginia, San Francisco, Los Angeles, and the Sacramento–San Joaquin River Delta in California. However, none of those will move forward until the right people are selected to lead the charge locally, notes Morris.

"We have to make sure there are good local partners," says Morris. "We have to find the right David Waggonners in those places and we don't have them just yet."

Despite Waggonner's considerable contribution to facilitating the Dutch Dialogues in New Orleans and elsewhere, he's humble about his place in the important conversation bubbling up around resiliency in our cities and communities. "The scale of this ship is bigger than me; I'm just trying to be a voice in the chorus," he insists.

"We don't have the luxury of a 20-year feedback cycle," he continues, with a tone of urgency in his voice. "If you want to combat climate change and be more resilient, we need to experiment at a much faster rate and the Dutch Dialogues can help us do things the right way the first time. I've learned that it's always better to spend more time planning upfront—measure twice and cut once."

Take the Challenge

The Benjamin Franklin High School in New Orleans goes green with a little help from the local USGBC chapter.

By Calvin Hennick

Plaques outside the auditorium at Benjamin Franklin High School—a selective charter school adjacent to the University of New Orleans—proudly display past issues of *Newsweek* that declare the school one of the best in the country.

But inside the auditorium, the ceiling is water damaged, some of the lighting doesn't work properly, and the wooden seats are beginning to show signs of wear.

"If you're playing on a national stage—pardon the metaphor," says school principal and chief executive Timothy Rusnak, gesturing to the platform at the front of the theatre, "I think you should have a facility that puts your best foot forward. You don't go to a wedding in your underwear."

Many schools in New Orleans were already in rough shape a decade ago, and with many needing to be rebuilt after sustaining damage during Hurricane Katrina, Rusnak has little hope that Franklin will get any sort of major capital from the city for repairs. Although, through a partnership with United States Green Building Council Louisiana chapter, the school is upgrading and greening large parts of its infrastructure—for free.

The partnership sprouted from the chapter's Green Schools Challenge program, when mentors working with area schools began making offers of donations. "You get someone, and they see the shape our schools are in, and they say, 'What can we do to help?'"

Left: Principal Timothy Rusnak with students from Benjamin Franklin High School.
Photo: Marc Pagani

Right: Shannon Stage, executive director for USGBC Louisiana.

says Shannon Stage, executive director for USGBC Louisiana.

"The light bulb sort of went off," says Erin Ryerson, a designer with a local architecture firm, who helped organize the effort. Ryerson is also the GreenBuild 2014 Host Chapter Committee chairperson. "We've got schools with needs. We've got businesses that ask all the time, 'Where can we put our products to show them off?' It was putting A and B together."

Instead of spreading the donations to schools across the city, Stage says, the local chapter decided to focus its efforts by partnering with one school each year, for a program they're calling the USGBC Louisiana Green School Showcase. Franklin High, whose students won the most recent Green Schools Challenge, is the first "Showcase School," and has received donations from more than a dozen vendors.

Allison Bowler, chief financial officer at the school, estimates that Franklin has received about $100,000 worth of donated equipment, materials, and labor—quite a windfall for a school that hasn't received a coat of paint in 25 years. "It is wonderful," she says.

"It's heaven-sent, really," says Rusnak. Because the school's students are high achieving, many people assume that Franklin doesn't need money, and they direct their donations elsewhere. In fact, Rusnak says, if the school wants to continue to "set the pace," it needs resources. "We have a limited budget. Any kind of donation is very much appreciated."

In addition to being charitable, Ryerson says, the vendors are getting something out of the arrangement, too. For many of them schools are major customers, and it helps them sell to other schools if they can show that their products are working for Franklin.

One of the first donations was a water fountain from the manufacturer Elkay. The company has now donated three fountains, which also have a spout to fill up water bottles. In the first three months of use, Bowler says, students filled up their reusable bottles 10,000 times. "So that was 10,000 [plastic] water bottles that didn't go into landfills."

The school is also receiving new ceiling tiles and wall panels that create a better acoustic environment in classrooms, low-VOC paint, low-volume sinks and toilets, and windows that can be tinted on demand, among other items.

In addition to saving the school money on its energy bills, Bowler says, the new fixtures will also boost Franklin's educational mission. "You don't only learn in the classroom," she says. "We're also teaching the next generation about how to be socially responsible. The sooner they see it as a young adult, the longer they'll carry it with them."

These vendors have all donated time or materials to Franklin High as part of the Green School Showcase program:

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Bradley Corporation
Bretford
CertainTeed Ceilings
Cosentino
C.T.W. Engineered Glazing Systems
Elkay
Fritztile
Green Coast Enterprises
IdeaPaint
Kalwall
Landis Construction Co., LLC
Mohawk Flooring
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Tandus Centiva

Sustainable Housing Breakthrough

A sustainable rating system for multifamily dwellings is a win-win for residents and real estate investors alike.

By Eric Butterman

The opportunities abound—if you know the score. That's the thought behind the ENERGY STAR rating system 1 to 100 scale finally being applied to multifamily buildings as it's been for so many other structures. Available through Portfolio Manager this September, owners can assess their building for this official rating. Previously, multifamily buildings were not able to show their green value in this way.

Team Effort

With the EPA's ENERGY STAR recognized by 80 percent of the public as high-brand recognition, that label can change the conversation, says Chrissa Pagitsas, director of Green Initiative Multifamily for Fannie Mae. The problem was multifamily was left silent without a rating system. "It hurt multifamily's ability to assess their property's performance," she says. "It wasn't viable to do it before because the EPA didn't have anyone to collect data to do the analysis."

Fannie Mae agreed to fill that role. With over 39,000 properties in their arsenal across the U.S., they volunteered to gather data to change the multifamily landscape. The survey, which took place in 2012 and 2013, also resulted in garnering valuable statistics to further bolster that green could equal savings.

But there are certain qualifications. According to the Portfolio Manager website, this rating will only be available to properties with 20 units or more. To receive an accurate score and ENERGY STAR certification (given to buildings scoring 75 and above), more than half of the units on a property will need to be located in structures that have five or more separate living units per structure.

A Boon to Investment

Beyond its positive effect on improving the green status of buildings, Fannie Mae believes this will be a financial boon to affordable housing. "With an ENERGY STAR score affordable housing owners can prioritize where they invest capital," Pagitsas says. "If you have 100 properties in a portfolio and limited capital to invest for improvement, how do you begin that assessment? This score gives owners a tool to assess where to best make those capital investments to reduce water and operating costs and increase net operating income."

Roger Platt, senior vice president of Global Policy and Law for the United States Green Building Council (USGBC), also sees the advantage for real estate investment trusts. "They're increasingly trying to position their particular companies as being committed to broader sustainability goals," he says. "Investors are often asking what the sustainability aspects of these projects are. To be able to say this portfolio has an average ENERGY STAR score of 'xyz' is vital. They can tell their shareholders about their commitment and it goes with the whole premise of [Real Estate Investment Trust] REIT, the idea that it's the most transparent form for real estate."

Mike Zatz, chief, ENERGY STAR, Market Sectors Group, offers that we can't say for sure what will happen with real estate investment trusts from the rating system, but notes studies on the effect to the office sector say we can anticipate the same might hold true.

However, it also benefits Leadership in Energy and Environmental Design for Existing Buildings (LEED EB). There has been a credit linked to the ENERGY STAR score but multifamily buildings couldn't previously access it since there wasn't a score for that category, says Pagitsas. Platt also sees a more focused and committed market for the LEED EB rating system after September. "If you are a company that has already done what is necessary to make your building an ENERGY STAR building, it will be much easier to make an additional investment when you're talking about a LEED for existing buildings," he says. "It can bring in the apartment building industry in a similar way to other industry."

An Affirmation to Affordable

Shauna Sorrells, director of the Office of Public Housing Programs for HUD, believes the establishment of a score can push housing authorities to redevelop at a higher level. "It also encourages housing authorities to do their own internal assessment, identifying energy consumption hogs within their own portfolio, and prioritizing their limited resources to make improvements in that space," she says. "Anything that increases the resonance of this conversation to our owners and gives them specific tools to help prioritize their resources to make these types of improvements we see as a strong benefit."

Platt says the improvements also will likely be passed on in much-needed savings to tenants in affordable housing. "If this could create a reduction in someone's energy bill of $1,000 a year, that's a big difference," he says. "The opportunities are there and now the data helps back it up."

The LEED Gold University of South Florida Apartments student-housing project in Tampa, Florida, by The Dinerstein Companies, consists of two 4-story mid-rise buildings with 182 apartment units and 24 townhomes.

Photo: Laurence Taylor

Moving Forward Together

The USGBC, a strong supporter of the initiative from early on, is excited to push its collaboration further now that the rating system is going online. "With our huge audience of 13,000 member companies and 30,000 individual members of our chapters, this is a benefit everyone needs to know about," Platt says. "Our role will be to build on this score and encourage as many building owners as possible to go beyond energy and water performance and go into environmental details and lifecycle of buildings."

The easiest message to spread is one that's simplest. That, more than anything, is the beauty of this one. "The value is that you bring together the energy auditors, the energy efficiency and sustainability community with a common language that can speak to the finance people," Platt says.

And, in the end, that value's score just might be immeasurable. ●

Statistics Uncovered

In addition to the rating system, beneficial statistics have also come out of the survey. Notable ones include:

- **A sample 100,000-square-foot multifamily property operating the least efficiently may end up paying $165,000 more in energy cost per year than one operating most efficiently.**
- **High-rise properties use almost 10 percent more energy per square foot but 20 percent less water per square foot than low-rise properties.**
- **Properties in the West use almost 50 percent more water per square foot than properties in the Northeast.**

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"We've Got to Do It Smarter"

Illustration by Melissa McGill

Q&A with Charles Allen

Charles Allen is the director of the Office of Coastal and Environmental Affairs for the City of New Orleans. He formerly served as president of the Holy Cross Neighborhood Association and as acting director of the Lower Ninth Ward Center for Sustainable Engagement & Development. Here, he shares his thoughts about the role of sustainability in the city's rebuilding process, the pace of the city's recovery, and how New Orleans will fare when the next big storm hits.

Interview by Calvin Hennick

Q. What are some examples of sustainable practices implemented during the city's post-Katrina recovery?

Our public works department has installed energy-efficient street lighting. We also helped to establish a program where residents and businesses can get loans to do energy-efficient retrofits in their homes and buildings. In the Mid-City area, there's the Lafitte Greenway project, focused on providing pedestrian walkways and bike paths, but there's also going to be rain gardens, bioswales—all those sorts of water retention features.

Q. With all there was to do to rebuild the city after Katrina, why focus on sustainability at all?

There's been this realization that, as we come back, we've got to do it better, we've got to do it smarter—we have to learn from the lessons of Katrina and Rita. As we deal with heavy rain events, as we do more and build more things that recharge the soil, and not rely so heavily on the pumping system, things like that help us to manage Mother Nature better than we might have been able to do otherwise. The proliferation around the city of solar panels, and people trying to do various things to make their homes and buildings more energy efficient, that reduces their utility costs. People then have more resources to make investments in their quality of life. That speaks to resilience.

Q. Has the city's focus on sustainability increased during the recovery period, as compared to before the storm?

I think so. It's like any other situation in life: You tend to learn better the hard way. You tend to really learn, and really become mindful of what you should have done, when something shocks you into a hard reality. We just have to be mindful that the ways and practices before Katrina, are not the ways and practices that we need to continue to follow going forward.

Q. Is the city prepared for another storm of Katrina's magnitude?

I think we are. Since the storm, the Army Corps of Engineers—the federal government—has invested in a $14.5 billion storm risk-reduction system that surrounds the greater New Orleans metropolitan area. Nothing is foolproof, but we feel very confident in the system that is protecting us on a daily basis. We've had some tests. A couple of years ago, we had a major hurricane, Hurricane Isaac. And the system performed as designed, with no issues. We did not evacuate the city. There were points where the storm surge was just a little bit below Katrina, and if we had had the levee system that we had during Katrina for Hurricane Isaac, the city could have flooded.

Q. It's been almost 10 years since Katrina. Is the city all the way back?

Not to the degree that a lot of us might like, but we've covered a lot of good ground. We're still a city where, in terms of systems and so forth, we're designed to support a larger population than we have right now, but you hear that all of these indicators are showing that there's more and more people and activity coming back. The people are the critical thing. As we get more people back, as we get a more expanded tax base to help support municipal services, then that cost burden reduces over time. We're maybe not there yet, but one thing is for certain: We're stronger, we feel we're better, and we feel that the trajectory is in a good, positive direction. ●

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