

SPRING 2020

# USGBC+

BETTER BUILDINGS, BETTER LIVES



**WOMEN LEADERS CREATE HEALTHY SPACES, COMMUNITIES AND ECONOMIES**  
The green building world has changed dramatically over the past two and a half decades.  
Today, USGBC celebrates the voice that women bring to society and to the green building movement.





# LEED v4.1 is here.

LEED v4.1 emphasizes outcomes by tracking performance in energy, water, waste, transportation, indoor air quality, the indoor environment and occupant satisfaction. Track, measure, perform, excel.



Boston Public Market Association (Owner), Architerra (Architect), Chuck Choi (Photographer)

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ON THE COVER

Featured Women in Green

Clockwise from left: Deepa Sathiaran, Marija Golubović, Theresa Lehman, Alicia Silva and Grace Kwok.  
Illustrated by Tristan Chace



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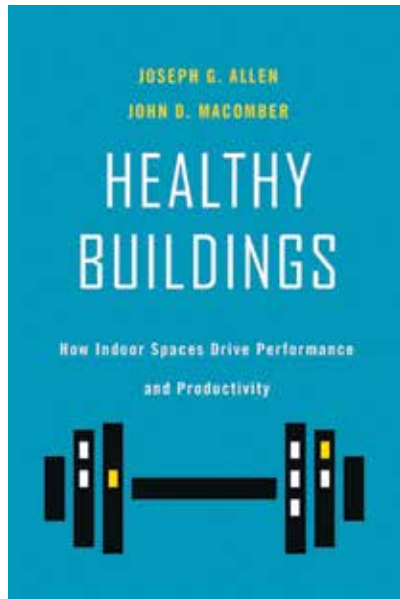
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## HEALTHY BUILDINGS

How Indoor Spaces Drive  
Performance and Productivity

“This book should be essential reading for all  
who commission, design, manage, and use  
buildings—indeed anyone who is interested in  
a healthy environment.”

—Norman Foster

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knowledge gap around healthy buildings, reveal  
their important role in global sustainability, and  
provide practical guidance on the main factors  
we should all be on the lookout for in our homes,  
offices, and schools.”

—Cristina Gamboa,

CEO of the World Green Building Council

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## CURRENT LEED STATISTICS\*

AS OF APRIL 2020

Total commercial LEED-certified projects globally ▶ **49,300**

Gross square footage of commercial  
LEED-certified projects ▶ **8.7 Billion**

Total LEED Residential certified units ▶ **540,000**

LEED for Cities and Communities certifications ▶ **105**

\*Does not reflect projects certified through the Arc performance platform.





# LEED v4.1 is here.

LEED v4.1 is improved for interiors, enabling productive spaces that influence the carbon footprint of the whole building. Every action counts and everyone deserves a space where they can be productive, healthy and happy.



Photo credit: Timothy Hursley | Architect: Croxton Collaborative Architects, PC

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LEED ON

# The Health of Our Buildings



**KIM ROY**  
CEO, HITT Contracting

2020 has always seemed like the future to me. As our executive team was working on our vision planning for the first quarter, we felt energized by the prospects of a new decade. The world seemed poised for transformation, enabled by technology like never before, and ready to make true progress in addressing global challenges such as inequality and climate change. The year felt full of promise, and then in the course of a few days, our lives became full of uncertainty.

I won't attempt to summarize the impact of the global COVID-19 pandemic. There is still so much unknown about how our industry, economy and work will change. Yet with adversity comes a unique opportunity to examine how we can evolve as a company and as an industry at an accelerated pace.

The pandemic has reaffirmed that, above all else, health is priceless. A critical part of our mission now is to come together as developers, designers and builders to ensure there are spaces for people to live and work confidently in this new reality. This shared purpose will guide our work for the foreseeable future and help ensure our society is better prepared for the next global health crisis.

While most Americans have shifted to the relative safety of their homes for work, family life and learning, we've been working tirelessly to prepare offices and gathering places for the return to life outside of home. We know for certain that people cannot come back to the office as it was when they left earlier this year.

We've long discussed healthy buildings as a critical part of sustainability. But now, the very definition of a healthy building will change. Along with daylighting, standing desks and low-emitting materials, we'll be focused on touchless systems and antimicrobial surfaces to reduce the spread of and exposure to disease.

Fundamentally, our office environments must now offer flexibility to achieve social distancing and new health standards. We're already seeing requests for immediate redesign away from bench seating, social spaces and shared offices. Will we see a surge in the demand for square footage and private offices? How will shifting toward more isolated professional spaces impact our ability to collaborate? Or on the other hand, will companies move toward fully embracing remote work, reducing their footprints even further than they had through the evolution of open office design? Only time will truly tell.

Like most leaders, I'm anxious and making day-to-day decisions based on limited information that may impact the course of my company, which weighs heavily on my mind. But I'm also feeling inspired as I see architects, engineers and builders coming together to make advances that may have otherwise taken years to achieve.

In an unexpected way, my hope that we would come together to rapidly advance the building industry may come to fruition, thanks to the virus, rather than despite the virus.

I say again, with adversity comes opportunity. And there is always hope.

LEED ON,



## CONTRIBUTORS

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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.



### KILEY JACQUES

is the design editor for Taunton Press's *Fine Homebuilding* magazine, a publication steeped in green building science and construction methods. She has written on sustainability topics for *Energy of the City*, *Proud Green Home*, and *Green Building and Design*, among others.



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# LEED v4.1 is here.

LEED v4.1 features additional pathways, updated credit achievement thresholds and a greater emphasis on carbon reductions, making every step towards transforming the market count.

Photo credit: Jasper Sanidad Photography

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### FEDERAL ADVOCACY NEWS

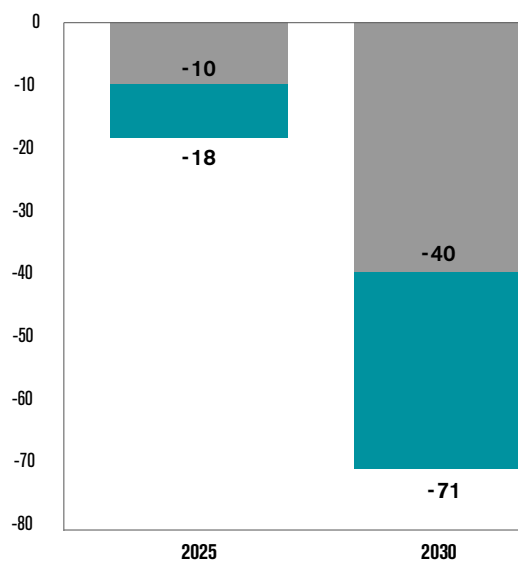
Energy efficiency, clean energy and climate legislation were on the slate early in 2020 for both the U.S. House and Senate, as well as the start of the fiscal year 2021 appropriations process.

- **Key bills and provisions USGBC is tracking:**

- **The CLEAN Futures Act:** a comprehensive climate policy proposal to reach net zero greenhouse gas levels nationwide by 2050.
  - **The GREEN Act:** which would extend current renewable energy tax incentives and create new incentives.
  - **The American Energy Innovation Act:** a compilation of dozens of energy bills that have previously passed the Senate Committee on Energy and Natural Resources, which would authorize funding for federal programs on renewable energy development, energy storage, grid modernization, and carbon removal and sequestration.
- **Emergency and stimulus packages:** When the COVID-19 pandemic led to significant disruption for much of the U.S. economy, Congress turned to emergency aid legislation, with two laws quickly enacted and then a third package passed to provide immediate, temporary financial relief for households and businesses affected by the economic downturn. At press time, a fourth addition was also under consideration.

#### Electric power sector emissions reductions under the GREEN Act

Million metric tons of CO<sub>2</sub>, annual change from current policy



Source: Rhodium Group analysis



USGBC staff and local volunteers take part in Indiana Advocacy Day.





## STATE ADVOCACY NEWS

Early adjournment marked many state sessions in the first quarter of 2020, as most state legislatures concluded their sessions by the end of March—either as planned or in response to the pandemic.

However, many bills were introduced that would incentivize green building or that were related to broad climate and clean energy goals. For bills stranded by early adjournments, we are hopeful that the momentum behind them will carry into the next state session.



### **HAWAII: HB 2635—Relating to the State Plan:**

This bill would establish green infrastructure policies for state facility systems. Working with our Hawaii community, USGBC submitted a letter of support, spoke with Rep. Chris Lee's office and provided testimony in support of the bill at a February hearing. The bill crossed over before the legislature suspended the session indefinitely.



### **MARYLAND: SB 655 and HB 790:**

Working with members, we were making good progress on SB 655, to reestablish certification for green schools, with the bill passing the Senate prior to the session adjournment. We also worked with a delegate on HB 790, a LEED incentive bill. We will work with the sponsors in the fall to build support for these bills in 2021.



### **INDIANA: HB 1060—Regulation of**

**Building Materials:** This bill would disallow local governments from setting local design requirements on new homes, which would negatively impact high-performance building standards. USGBC opposed the bill and discussed it during our Indiana Advocacy Day in February 2020. The bill failed to pass.



### **MICHIGAN: SB 598, 597 and 596—"Powering**

**Michigan Forward":** This package of bills supports the expansion of solar energy in Michigan by repealing the current distributed energy tariff and removing the cap on the number of solar energy systems installed in the state. USGBC submitted a letter of support in February. All three bills failed to pass.



### **MAINE: LD 2055—An Act to Require State Agencies to Use Renewable and Sustainable Energy and Reduce Greenhouse Gas**

**Emissions:** This bill set targets and timelines to reduce greenhouse gas emissions, increase renewable and sustainable energy use in all state operations, and provide accountability by designating a sustainability coordinator in each state agency. USGBC submitted a letter of support in February 2020. The Maine legislature adjourned their session early, and this bill is carried over to any special session.



### **VERMONT: H 688—An act relating to**

**addressing climate change:** This bill would set greenhouse gas emission reduction requirements, create the Vermont Climate Council and require all state agencies to consider greenhouse gas emissions in their decision-making procedures with respect to the siting, construction and maintenance of buildings. USGBC supports this bill, which has passed the State House and been referred to the Senate.

## QUALIFIED ALLOCATION PLANS (QAPs)

Advocacy continues to provide recommendations on state affordable housing plans in 2020, including making the case for LEED certification and other supportive policies, such as energy efficiency and performance tracking.

By requiring or incentivizing LEED certification, states can help more low-income housing residents benefit from sustainable, efficient and resilient housing—housing that also supports efforts to improve equity.

- Advocacy provided input to state housing finance agencies in **KENTUCKY, NORTH CAROLINA and TEXAS** on their draft or proposed QAPs so far in 2020, with more anticipated throughout this year.



# Rachelle Schoessler Lynn

Interior designer Rachelle Schoessler Lynn credits early influences on her sustainability-centric career.

WRITTEN BY **KILEY JACQUES**

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**Left: Rachelle Schoessler Lynn is the director of workplace with Gensler Minneapolis.**

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**R**achelle Schoessler Lynn recalls being at the leading edge of resilient design back in the early 1990s while working at LHB in Minneapolis, Minnesota. Each employee in the eight-person architecture, interior design and engineering firm was tasked with researching a specific aspect of sustainability and figuring out how to weave it into their business practices. As the director of workplace, Schoessler Lynn made human health her focus; it was the basis for her foray into product ingredients and how they affect people.

While with LHB, Schoessler Lynn contributed to the design of a number of “health houses” on behalf of the American Lung Association, which was researching asthma in children at the time. The demonstration houses were used to educate the public about air quality and mechanical systems. At the same time, the team was working with a woman who had multiple chemical sensitivities.

“We wrote a contract, which nobody else would have considered doing back then, that acknowledged we didn’t know whether or not she would get better,” Schoessler Lynn explains. “In the end, she lived in the house we designed for 13 years, and she did get better. From

those projects, we learned that by paying attention to chemicals, we can make a difference.”

In a similar vein, the firm designed the first commercial building in Minneapolis to have a geothermal heating system; it was located in a neighborhood with high levels of industrial pollution. “It was an attempt to put a building there that would be better for the environment and the residents,” Schoessler Lynn notes. “We did a lot of cutting-edge projects like that. The momentum was really good at that point to be experimental.”

After 15 years at LHB, the designer co-founded Studio 2030, which she operated for the next five years until taking on the role of workplace leader at MSR Design, where she stayed for another seven years before landing her current position in July 2019 as director of workplace with Gensler Minneapolis. Her purview includes leading the Minneapolis workplace team, designing commercial interiors, identifying resilient opportunities on projects and working with the firm’s materials librarians to highlight materials that contribute to human and planet health. She also leads her region in support of the firm’s new climate commitment, the “Gensler Cities Climate Change Challenge”

(GC3). “Our plan is to eliminate all carbon emissions associated with our work by 2030,” she explains.

Toward that end, she is working to make Gensler Minneapolis’s library of materials as clean as possible—from embodied carbon to forest stewardship to toxins and transparency. “I feel confident that designers can walk into our library and pull any product off the shelf—and they will have made a good choice.”

Among Schoessler Lynn’s endeavors is her involvement with the AIA Materials Knowledge Working Group, which is currently writing a “2050 Materials Pledge” to support human health, climate health, social health, ecological health and the circular economy. The goal is for all of Gensler’s materials to meet the criteria outlined in the pledge by 2050. “We are trying to figure out ways of bringing a lot of different components of sustainability into one place,” says Schoessler Lynn, adding that she hopes that by making it easy to make good choices, they will reach designers who have not yet embraced “sustainability all day, every day.”

She also wants climate action initiatives in the commercial building sector to reach beyond structural materials, which, she believes, is often the focus. “I want people to think

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**“Not everybody needs to be the expert on everything, but if you can build a team around people who are experts in different fields, then I think we can make really great progress.”**

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more about the interior buildouts of all the floors in a given building,” she says. “Those interiors are relatively short-lived, and often the materials are thrown away during renovations.”

Her ultimate objective is to be able to account for the embodied carbon in all specified interior materials. She advocates for using fewer materials and maximizing the opportunities of those being used. “We want to account for the life span of a building, rather than just when it is first built,” she explains. “We are just starting to collect data on embodied carbon on the products we specify, because interiors manufacturers are just starting to provide that data.”

Asked about the changes to Building Design and Construction (BD+C) and Interior Design and Construction (ID+C) that have come with the launching of LEED v4.1, Schoessler Lynn replies, “We have made a lot of progress. Back in the 1990s, we were looking at MSDSs [materials safety data sheets] and trying to be chemists.”

The question reminds her of Kirsten Childs, whom BuildingGreen founder Alex Wilson describes as “a pioneer in the development of indoor air quality as a core sustainability metric.” Well known for her work on the National Audubon Society headquarters—one of the first high-profile green buildings—Childs partnered with a chemist to determine if materials they were selecting for that project were toxic. “She was the interior designer we all aspired to be,” says Schoessler Lynn. “To have gone from learning inside Childs’s inner circle to today, when we have [transparent] manufacturers







and nonprofit organizations like the Health Product Declaration Collaborative and Cradle to Cradle—we have so many more resources at our fingertips. It should be easy for us to make better choices.”

She does, however, wonder if the information has become too complex and overwhelming, and whether or not that contributes to fewer designers paying attention to the chemical makeup of products. She’s hopeful about the next generation of designers, though. “I think because climate change and climate action have been all over [the media] . . . we have some great people coming up in the industry who will help us continue to make good choices, and who will take the initiative to learn more about the things we are working on.”

As she reflects on what stands out to her about her work, Schoessler Lynn circles back to the way she and the others at LHB each took

responsibility for some aspect of their shared work around sustainability—a model that has stayed with her and continues to influence her own holistic approach to resilient design. “Not everybody needs to be the expert on everything,” she says, “but if you can build a team around people who are experts in different fields, then I think we can make really great progress.” ●

**Above: Schoessler is working on making Gensler Minneapolis’s library as “clean” as possible—from embodied carbon to forest stewardship to eliminating toxins.**

**Left page, top: A sustainable materials palette from Gensler’s North Central materials library.**

**Left page, bottom: (from left) Chris Gade, chair, Division of External Affairs, Mayo Clinic; Lorenz Esguerra, executive vice president, Weber Shandwick; Brianna Gallett, senior vice president, Weber Shandwick; Leah Guimond, director of corporate communications, Sleep Number; and Rachelle Schoessler Lynn.**

## Roles and Recognition



**Adjunct faculty at University of Minnesota**

**USGBC Minnesota chapter co-founder**

**Minnesota B3 Guidelines, “Buildings, Benchmarks and Beyond,” co-author**

**CIDA Board of Directors**

**2016 ASID National Designer of Distinction**

**2014–2015 National Chair of the ASID Board of Directors**

**2013 LEED Fellow**

**2009 ASID Fellow**

# Teaching Sustainability in Prisons

**Guilford College's Wiser Justice Program brings education to the incarcerated—and LEED Green Associates to the field.**

BY KILEY JACQUES

**B**arbara Lawrence speaks with emotion in her voice when describing the work she does on restorative justice. As Guilford College's vice president for diversity, equity and inclusion, as well as the founding faculty director of the Wiser Justice Program, Lawrence knows firsthand the difference this five-semester, 30 college-credit coursework can make in the lives of incarcerated individuals.

Twice a week, Lawrence and other area college professors travel to correctional facilities in North Carolina to bring higher education to nontraditional students, in an effort to help them earn Leadership in Energy and Environmental Design (LEED) Green Associate credentials.

As Lawrence explains it, the evolution of the program began as collaboration in 2014, when she, along with multiple Guilford College offices and departments, and the North Carolina Department of Public Safety, began the Higher Education in Prison Program (HEIPP), a two-year pilot plan. Following many successes and additional partnerships, HEIPP ultimately became the Wiser Justice Program, which serves both men and women.

Just prior to the program's inception, Lawrence had been teaching a class on race and criminal justice in which the students studied mass incarceration. "We were looking at how we have so many regressive policies that send college-age people to prison with such frequency," she recalls. "We realized that we may need to bring college to them."

In another class, an instructor was examining schools, power and politics—she, too, was talking about a school-to-prison pipeline. "We had a mutual student who said, 'I want us to bring Guilford to prisons.' So, she and I began researching how we might do that."

They turned an eye toward a few signature programs—including Bard College's Prison Initiative—that provide college-level courses "of substance" in prison. "We found a piece of North Carolina legislation that says public dollars cannot go toward college degrees for incarcerated individuals," Lawrence notes. "So we had to figure out what we could offer."

Since a degree was off the table, they partnered with the Department of Public Safety and the U.S. Green Building Council (USGBC) to offer 30 college credits and an employment credential. Enter the LEED Green Associate credential. "It gives them a head start for school and makes them eligible for employment in the green building industry—where our research indicated a large demand," says Lawrence.

Among the professors teaching the Wiser Justice courses is Ja'Maul Redmond of Forsyth Technical Community College. Since 2016, the architecture technology instructor has been helping incarcerated people to make connections between their lives and the subjects they are studying.

**Right: Barbara Lawrence is Guilford College's vice president for diversity, equity and inclusion, as well as the founding faculty director of the Wiser Justice Program.**







**Lawrence pictured with her recent graduates. The program helps inmates earn LEED Green Associate credentials that can help them in the job market after incarceration. Lawrence also focuses on communication and writing skills.**

"Our prison and government holding facilities are way behind, in terms of sustainability as a building type," Redmond says. "When we go through the coursework and cover what's wrong with current building types in general, and we talk about strategies to make them better, they fully understand it because they experience some of the things we talk about. That makes them eager to understand strategies for change—both now and once they are released."

Redmond's professional expertise is in architecture, specifically in the health care sector. He has witnessed changes made to hospitals and medical office buildings dating from the early 1990s, and he views the Wiser Justice Program as an opportunity to advocate for changes to be made to prison buildings. "I've seen what can happen in terms of sustainability, if you educate the people who are using the buildings. I saw this as a way to do that," he says.

For most of the people Lawrence and Redmond teach, this is the first time they are making connections between social and environmental injustices. The educators are giving them the vocabulary with which to think and talk about those connections.

"The transportation content is something I almost need to push them to move beyond," Redmond notes. "They want to stay on that topic. We look at factors associated with getting to and from work in urban and rural locations—they are very interactive with that portion."

Of course, transportation is one of the biggest obstacles to education and employment; many of these students have faced that hurdle. Lawrence and Redmond help them

to understand how it is tied to social equity. "I explain how being [marginalized] ... can affect your education [level] and knowledge base," says Redmond, who also teaches how living on the outer edges of society impacts the environment.

Among his reasons for participating in the Wiser Justice Program, Redmond cites education's role in social betterment, saying: "For me, a big part of sustainability is social equity. This program is part of that. The more we can provide for people who make mistakes, the better. We can't change those mistakes or what led to them, but we can affect what happens after. Education can help."

For her part, Lawrence relays the story of the end of the first semester ever taught: "I asked them how it felt to be making history with this college, in this correctional facility. One student said, 'Miss Lawrence, my family told me I would never see a college, and you brought college to me. And now, thanks to you, my favorite word is "empirical." Another said, 'Miss Lawrence, the fact that you and the other professors drive here every week makes me feel like I am somebody—and that's not what my life is in here.' Another woman told me she was a career criminal, but after being in the program, she is committed to never going back. She said, 'I'm going to go out and do some good in the world.' I drove home crying. In fact, for the last five years, since I started teaching the program, there have been many nights I've driven home crying."

The program works on the outside, too. Two cases in point: Upon earning the LEED Green Associate credential, an inmate who had been in a medium-security facility was



moved to a minimum-security facility that allows for work release. She was able to find a job with a building developer earning \$25 an hour while still on work release. Another graduate left prison and went on to a community college to undertake an environmental studies program; he landed an internship as a result of having the LEED Green Associate credential.

Not only are the inmates receiving a valuable education, they are also coming away with so-called soft skills. Lawrence notes that Guilford College is a writing-intensive school that stresses oral and written communication, as well as critical analysis. “The courses we offer are about making the world a better place,” she says. “Not only do we focus on social justice, but we also [highlight] ethical leadership. We have them looking at systems within institutions ... and identifying community-based, problem-solving approaches to business, the criminal justice system and the green building industry. We want to enhance their critical thinking skills.”

Looking forward, Lawrence envisions expanding the coursework for a Wiser Justice Program associate's degree. (Currently, the school's mainstream students don't have the opportunity to take the LEED Green Associate exam unless they do so on their own. It's only available to the incarcerated.) Right now, Guilford is the only college in the country offering the exam to imprisoned men and women. Lawrence hopes to partner with other schools and correctional facilities to work the LEED exam into their programming. “I want this to happen all over the country,” she concludes.

It's interesting to note the irony at play. People who are most vulnerable to incarceration are typically from marginalized communities, which are the ones most impacted by social and environmental injustice. As fate would have it, Wiser Justice Program graduates are now uniquely qualified to address those very issues. ●

## Roots of Success

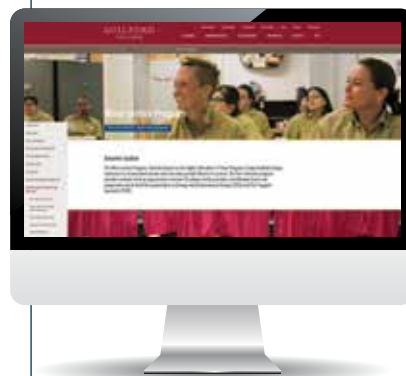
The Ohio Department of Rehabilitation and Correction (ODRC) is making similar efforts. According to Jacqueline Langhals, energy conservation and sustainability administrator, they are in the process of growing the program they have had in place since 2012, namely Roots of Success.

Founded by Raquel Pinderhughes, the 10-module environmental literacy program has been a building block for the development of more recent curricula. It includes modules in buildings, agriculture, financial literacy and entrepreneurship, among other sustainability-related topics; and the incarcerated population is trained to facilitate the course. “There's a lot of ownership in that,” says Langhals. “I'm always looking for new ways to provide continuing education to them, and Roots is a really great introduction to what sustainability means.”

Currently, ODRC is working to launch a LEED Green Associate test course—fall 2020 is the target date for the pilot. They also started a building operator certification course that had been running for a week before the COVID-19 shutdown in March. Both are an outgrowth of the Roots of Success program.

“My long-term hope for the LEED Green Associate course is that it becomes part of our construction trades program,” Langhals notes. Asked about the impetus for bringing LEED Green Associate test preparation into the mix, she responds: “I'm a LEED Green Associate, and it helped me get my first job ... I am always looking for trainings and certificate programs that will help build a résumé to help them get hired when they are released—because our mission is that they don't come back.”

In addition to their educational programs, ODRC helms a number of statewide endeavors. Among them is the commitment to all new construction achieving LEED certification. Their first LEED building—a women's correctional facility—was completed last year. “They have a very solid Green Team there,” says Langhals, “and they are trying to pursue zero-waste certification too.” That facility will be used as a teaching tool. “It's an opportunity for the women to show off their building and to talk about what they have learned.”



Langhals says there is room for program development on multiple fronts. At one institution, for example, there was interest in renewable energy, out of which came a solar photovoltaics program, whereby incarcerated individuals receive training to become level II installers. It is this promise of employment and the pride participants demonstrate that moves Langhals. “It's one thing to do sustainability and make something more efficient, but it's a whole other thing when you can give people tools to help themselves at the same time.”



**For more information about programming, visit [www.guilford.edu/office-diversity-equity-and-inclusion/wiser-justice-program](http://www.guilford.edu/office-diversity-equity-and-inclusion/wiser-justice-program).**

# Heritage Assets: Portland Center Stage at The Armory

**The restoration and adaptive reuse of the Armory makes it the first LEED Platinum performing arts theatre on record.**

BY JEFF HARDER

**D**ecade after decade, it was impossible not to notice The Armory, a behemoth of a building adorned with castle-like turrets and parapets lying just north of downtown Portland, Oregon.

First built as a 19th century training facility for the Oregon National Guard, the building devolved into whitewashed disrepair over decades, becoming one among many abandoned buildings and warehouses in a place that few had reason to visit. Even fewer had ever been inside the Armory, yet its Gothic Revival architecture made it an enduring local landmark.

"We used to call it the white castle," says Cynthia Fuhrman, who first moved to Portland in the late 1980s. "Everyone knew this big, white castle was here, but most people in town didn't even know what it was used for."

Nearly a decade and a half after a \$36.1 million transformation, however, The Armory is an essential part of Portland's revitalized Pearl District neighborhood. As the 55,000-square-foot home to Portland Center Stage (PCS), the city's largest professional theater company, where Fuhrman now serves as managing director, an ordinary year might see 150,000 attendees walk through brick arches facing 10th and 11th Avenues to take in a range of productions like "Cabaret," "West Side Story" and "In the Heights," the Lin-Manuel Miranda musical that kicked off the most recent Portland Center Stage season to record crowds.

**Right: The Armory in Portland underwent a \$36 million renovation over 15 years. It is the first LEED Platinum building on the National Register of Historic Places.**











Beyond hosting 420 performances by Portland Center Stage, The Armory is also a popular community gathering space, presenting as many as 350 events a year, from art exhibitions to concerts to the occasional wedding. Meanwhile, in the green building realm, The Armory is adorned with superlatives: It's the first LEED Platinum building on the National Register of Historic Places, the first LEED Platinum facility in Portland, and the first LEED Platinum performing arts facility on record.

More importantly, The Armory is a 129-year-old testament to an overlooked truth: Preserving historic buildings and pursuing sustainability can be perfect companions.

In fact, rather than being liabilities or obstacles to green development, historic buildings and other heritage assets can have major, inherent advantages when it comes to sustainability.

"You have to start with the embodied carbon footprint," says Sharon Park, associate director of The Office Architectural History and Historic Preservation for the Smithsonian Institution. Park previously administered the National Park Service's Historic Tax Credit program. "If you have a building that's already built—whether it's simply an existing building or a historic building—and you're reusing the existing structure, that's a huge offset for the carbon footprint compared to new construction. That's a real

incentive to renovate buildings, salvage materials, and repurpose and reuse them."

Granted, not every old building is suitable for a sustainability-focused renovation. "It's a very special team that will do [historic] preservation and LEED certification," Park adds. "An owner has to decide that they're going to balance preservation while upgrading for sustainability, and for the people who do it—well, my hat is off to them."

However, old buildings—particularly preindustrial buildings—are frequently durable and timeless. Take Mexico City's Antigua Palacio del Ayuntamiento, a roughly 100,000-square-foot Baroque government building that was first constructed in 1527 and, almost 500 years later, became the first building in Latin America to achieve certification under LEED for Building Operations and Maintenance. Its bioclimatic character—with thick walls and two courtyards providing ventilation and natural lighting—was complemented by a roof renovation to reduce heat island effect, improvements in water and energy efficiency, and other upgrades.

Revitalizing historic buildings can also become points of community pride, contributing to a sense of place and telling a bigger story. "If we bought a lot of the same size and built a 55,000-square-foot building and put our theater in it, would we have the same success as being in The Armory? I don't know," Fuhrman says. "It just feels like being in The Armory



**Opposite page, left: Sharon Park is the associate director of The Office of Architectural History and Historic Preservation for the Smithsonian Institution.**

**Left: Interior balconies of Mexico City's historic town hall, Antiguo Palacio del Ayuntamiento. Photo: Tania Victoria/Secretaría de Cultura de la Ciudad de México**

**Right: Antiguo Palacio del Ayuntamiento. Photo: Tania Victoria/Secretaría de Cultura de la Ciudad de México**



and the sustainability aspects of the project have been so much a part of our brand, and have been a big part of the success of the theater company."

In 1891, The Armory was first built as an annex for the Oregon National Guard, where guardsmen practiced maneuvers—and, at the underground firing range, marksmanship. (Each year, the National Guard still dispatches members to The Armory for a color guard ceremony.) The original layout comprised two wide-open stories under a roof held up by elegant arched trusses made of Douglas fir, all shielded behind an imposing red brick exterior.

Within a few years, however, it was reimagined as a community gathering space, hosting boxing matches, marching band rehearsals, and even speeches from presidents Theodore Roosevelt, William Howard Taft and Woodrow Wilson, where crowds as large as 6,000 filled wooden bleachers. "We like to think that, in terms of performance and community conversation, back then there was a little bit of the DNA of what we do now," Fuhrman says.

By the time the city's fire marshal warned the building was unsafe in 1928, though, audiences had already begun flocking to the city's new municipal auditorium, and The Armory began a decades-long decline. After the Blitz-Weinhard Brewery purchased the city block on which The Armory was sited in 1968, The Armory was mothballed.

By the turn of the 21st century, artists and young professionals began flocking to the surrounding area, generating new interest in the neighborhood and spurring the creation of The Brewery Blocks, a five-acre shopping, residential and business district. Redevelopment throughout the Pearl and River districts continued, but The Armory remained dormant and with an uncertain future.

Eventually, however, its local significance transformed into popular support. "The Armory was considered by all to be a treasure that had to be saved and repurposed," says Phil Beyl, LEED AP and director at GBD Architects, the firm behind The Armory's design. A key challenge, Beyl adds, was finding a suitable tenant. In 2002, after false starts with a series of retailers, the late Bob Gerding—co-founder of Gerding Edlen, the Portland-based real estate development firm behind The Brewery Blocks—had an epiphany: "Why not a theater?"

As it happened, Gerding sat on the board of Portland Center Stage, an independent theater company founded in 1988 as an offshoot of the Oregon Shakespeare Festival. By the early 2000s, after years of putting on plays and musicals at outside venues like the Portland Center for the Performing Arts, Portland Center Stage sought its own venue to foster further growth. Bob Gerding became a driving force behind the theater's embrace of sustainability. "Gerding Edlen saw



the greater good that a community resource like a theater could bring to their Brewery Blocks development,” says Beyl.

Gerding Edlen and GBD—which was also lead architect on each building in The Brewery Blocks—insisted on high building performance throughout the new development in Pearl District: three buildings in The Brewery Blocks are certified LEED Gold, and one is certified LEED Silver.

When it came to The Armory, the project team decided to aim even higher. “Early LEED analysis and brainstorming amongst the designers, builders and developers showed that we had a better than fighting chance to earn enough points for LEED Platinum,” says Beyl, who sits on the Portland Center Stage board of directors. “That was enough to establish Platinum as a primary goal for the project.” With Portland as a city at the vanguard of green building in the 2000s, those ambitions only spurred further excitement around the rehabilitation of such a recognizable property.

Since it was GBD’s first performing arts venue design commission, the firm teamed up with a leading theater designer for the restoration. The project’s \$36.1 million cost was financed through what Fuhrman describes as a “complicated package,” including cash fundraising from donors, public investment, New Markets Tax Credits, and Federal Historic Tax Credits. In 2006, construction began in earnest.

Renovating a long-abandoned building from the 1890s brought a host of challenges. Since the design-build team couldn’t alter the building’s exterior walls, heavy equipment used for excavating inside had to be taken apart and reassembled before and after. “They called this the ship-in-the-bottle project,” Fuhrman says.

The Armory, because of its old indoor firing range, demanded extra effort with lead mitigation. Replacing the decayed roof was an even thornier obstacle. “We had to replace the original wood roof structure with a noncombustible assembly to enable the development of the Henry condominium building next door,” Beyl says. This became a point of contention while trying to secure critical tax credits. “It was a battle that raged for a long time before winning approval.”

During construction, crews diverted 95% of waste away from landfills and locally sourced significant portions of building materials. While the roof had to go, the project was able to salvage the original 1891 Douglas fir beams.

The building’s conversion took place during a five-year period when Fuhrman lived in Seattle. When she returned to Portland for the venue’s opening in 2006, she was astounded at its transformation. “To see the outside restored to its original red brick was beautiful, but also very historic.





**Far left: Associate director Marissa Wolf (seated) and managing director Cynthia Fuhrman of the Portland Stage Company at the Armory.**

**Left: The Armory today performs 30% more efficiently than the building code specifies. The theatre company recycles and reuses as many materials as they can between the 420 performances it hosts throughout the year.**

**Above: The Armory is a testament to the idea that preserving historic buildings and pursuing sustainability are a perfect pairing.**

Then you walk through the front doors, and you're struck by this super-modern environment of concrete, light and steel."

Beyond combining postindustrial aesthetics on the exterior and a decidedly modern ambiance within, the theater facilities include the U.S. Bank Main Stage, a showpiece with 515 orchestra seats and 75 balcony seats, all with extra leg room. Two floors down, there's the Ellen Bye Studio, a 199-seat space with a stage that can be reconfigured for a variety of layouts, including in-the-round seating. Other features of the facility include a two-floor public lobby, surrounding mezzanine, a costume shop and gallery spaces.

Throughout the building, the design incorporates a variety of sustainability features: a rainwater-collecting cistern that redirects graywater to flush the facility's toilets, a chilled beam HVAC system, LEDs and automated skylights to maximize natural lighting, and ventilation outlets for the passive heating-cooling system on the floor of theater seats.

Integrating electrical, mechanical and information systems has led to The Armory performing 30% more efficiently than the building code specifies, along with changes in day-to-day operations. "[Usually] you build a set, put a show on stage, and when the show is over, you take the set apart, tear it up and throw it away," Fuhrman says. "As a rule, we try to make sure we strip everything and recycle and reuse as much as we can."

Fuhrman, who handled communications for the city's Office of Sustainable Development before migrating to Portland Center Stage in 2008, saw visitors from as far as Russia, Hungary and Belgium visit the space specifically for its reputation in sustainability circles. "Internationally, people were coming to Portland to learn about green building, and The Armory was always on their tour route." Beyond LEED certification, the theater earned accolades from The Urban Land Institute, the American Council of Engineering Companies Oregon and Forbes magazine.

Individual historic assets have individual burdens, but when a structure has spent generations as a feature of the physical landscape, it finds a home in the community's consciousness. "The Armory has been in Portland's awareness for so long and had kind of an aura of mystery—nobody knew what it was, they hadn't been inside it, or maybe their dad had gone inside a long time ago—and the excitement of seeing it come back to life has been huge for us," Fuhrman says. "We do amazing theatrical productions, and we hope that's the main reason people come in the building. But we actually know this from our audience surveys: There's something exciting about walking into this giant, historic structure and being able to spend the evening here, having a different kind of experience." ●

# 10 Green Jobs with High Growth Potential

**According to the Bureau of Labor Statistics, these occupations are on the rise in the U.S.**

BY ARNOLD KEE

**T**he employment landscape is always changing. For green jobs, though, opportunities have been steadily rising, and prospects are good for the market overall. For example, according to the 2020 U.S. Energy and Employment Report released by the National Association of State Energy Officials and the Energy Future Initiative, energy efficiency jobs alone total 2.38 million, up 2.1% from two years ago.

The U.S. Department of Labor (DOL) defines “green jobs” based on what certain roles produce, or the processes those occupying such jobs use to complete their functions. More specifically, these jobs, over time: (a) existed in “businesses that produced goods or services that benefit the environment or conserve natural resources” or (b) incorporated “duties that involved making their establishment’s production processes more environmentally friendly or use fewer natural resources.”

These particular jobs were then linked with data from the Bureau of Labor Statistics (BLS) to build a dataset that includes employment totals, salary, required education, work experience and growth predictions.

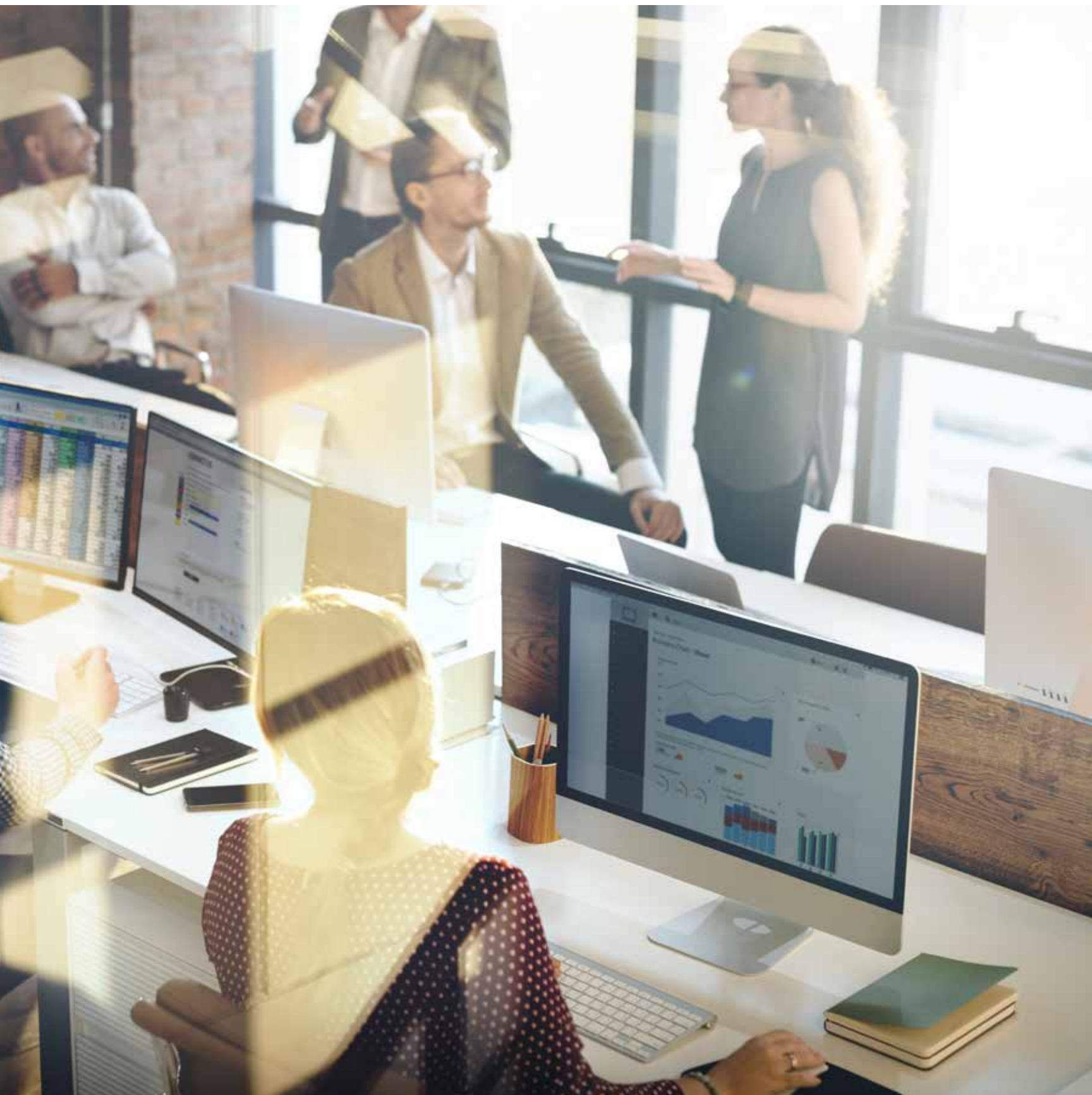
From the task level, DOL identified about 130 occupations that fit the green job definition. That list includes occupations that seem obvious, such as “climate change analyst,” as well as less obvious ones, like “nanosystems engineer.”

USGBC has narrowed the list to 10 by comparing DOL’s green jobs data with a range of roles connected directly or indirectly to LEED projects. Not all of the tasks required by these selected occupations are used in LEED. However, by using DOL’s method of breaking green jobs down to the task level and comparing them with many of the strategies employed by LEED, we are able to see stronger connections.

This subset is our own subjective “Top 10” list, since it was selected to represent diversity among available employment factors. These 10 occupations have strong growth trajectories, according to the BLS, have tasks that align or overlap with LEED strategies, and







represent a range of skills and knowledge within the larger green jobs landscape.

Median wages for these jobs range from about \$24 per hour for an environmental science technician to almost \$50 for a construction manager. Those wages work out to salaries between \$50,000 and \$100,000.






All of the selected occupations are expected to experience job growth between 2018 and 2028. The projected growth ranges from 4.1% (fuel cell engineer) to 13.6% (plumber). The levels of education required also vary. Three of the occupations—climate change analyst, architect and industrial ecologist—can be expected to require master's degrees in their fields.

In contrast, plumbers and solar energy installation managers can enter those fields with a high school diploma, associate's degree or postsecondary certificate. Construction managers, energy auditors, environmental science technicians, fuel cell engineers and sustainability specialists will find the bachelor's degree to be the most likely match in education requirements.

We believe that jobs that use green strategies have an evolutionary advantage, one that will become even more pronounced as the labor market responds to a more carbon-conscious economy.






Take a look at our breakdown of these green jobs with high growth potential. One of them may be right for you:

## Top 10 growing green jobs

JOB TITLE	DESCRIPTION	MEDIAN SALARY	GROWTH PROJECTION (between 2018 and 2028)	LIKELY HIGHEST LEVEL OF EDUCATION REQUIRED
 <b>Architects, Except Landscape and Naval</b>	Plan and design structures, such as private residences, office buildings, theaters, factories, and other structural property.	\$88,857.60	8.4%	Bachelor's Degree
 <b>Climate Change Analysts</b>	Research and analyze policy developments related to climate change. Make climate-related recommendations for actions such as legislation, awareness campaigns, or fundraising approaches.	\$77,584.00	8.2%	Master's Degree
 <b>Construction Manager</b>	Construction managers plan, coordinate, budget, and supervise construction projects from start to finish.	\$103,105.60	9.8%	Bachelor's Degree
 <b>Energy Auditors</b>	Conduct energy audits of buildings, building systems, or process systems. May also conduct investment grade audits of buildings or systems.	\$76,960.00	6.3%	Bachelor's Degree
 <b>Environmental Science and Protection Technicians, Including Health</b>	Perform laboratory and field tests to monitor the environment and investigate sources of pollution, including those that affect health, under the direction of an environmental scientist, engineer, or other specialist.	\$50,356.80	9.2%	Bachelor's Degree





JOB TITLE	DESCRIPTION	MEDIAN SALARY	GROWTH PROJECTION (between 2018 and 2028)	LIKELY HIGHEST LEVEL OF EDUCATION REQUIRED
 <b>Fuel Cell Engineers</b>	Design, evaluate, modify, or construct fuel cell components or systems for transportation, stationary, or portable applications.	\$92,809.60	4.1%	Bachelor's Degree
 <b>Industrial Ecologists</b>	Apply principles and processes of natural ecosystems to develop models for efficient industrial systems.	\$77,584.00	8.2%	Master's Degree
 <b>Plumbers</b>	Assemble, install, or repair pipes, fittings, or fixtures of heating, water, or drainage systems, according to specifications or plumbing codes.	\$58,156.80	13.6%	Post-Secondary Certificate—awarded for training completed after high school (for example, agriculture or natural resources, computer services, personal or culinary services, engineering technologies, health care, construction trades, mechanic and repair technologies, precision production)
 <b>Solar Energy Installation Managers</b>	Direct work crews installing residential or commercial solar photovoltaic or thermal systems.	\$70,532.80	10.4%	Post-Secondary Certificate—awarded for training completed after high school (for example, agriculture or natural resources, computer services, personal or culinary services, engineering technologies, health care, construction trades, mechanic and repair technologies, precision production)
 <b>Sustainability Specialists</b>	Address organizational sustainability issues, such as waste stream management, green building practices, and green procurement plans.	\$76,960.00	6.3%	Bachelor's Degree



USGBC's education team is always building resources for emerging professionals, college students and those considering a career transition. Explore our offerings on [usgbc.org/credentials/green-careers](https://usgbc.org/credentials/green-careers).

# Colgate-Palmolive Manufacturing Facility in New Jersey Achieves LEED Zero Waste

Global sustainability goals are achieved in the Garden State.

BY HEATHER BENJAMIN



One of the most recognizable names in consumer health and personal care products, the Colgate-Palmolive Company, is also one of the most committed to reducing its global environmental footprint.

As part of its global corporate sustainability goals, Colgate strives to design and construct environmentally friendly manufacturing sites, technology centers, warehouses and offices. In fact, the company received a Leadership Award from USGBC at the 2019 Greenbuild International Conference and Expo, recognizing its exemplary work in the green building industry.

Large-scale manufacturing operations have a great deal of potential for waste; however, when a company prioritizes saving resources, the achievement of one plant can be replicated across a portfolio.

As the world's first project to achieve LEED Zero certification in all four categories—carbon, energy, water and waste—the Colgate-Palmolive flavor manufacturing facility in Burlington, New Jersey, shows just how green industry can be.

## Partnering to reduce environmental impact

Since 2007, Colgate-Palmolive has been an active USGBC member and is committed to its LEED green building rating system, as well as its TRUE Zero Waste program, to demonstrate its green building goals. Currently a Platinum-level member, the company has achieved LEED certification for 19 of its sites around the world.

The release of USGBC's LEED Zero certifications aligned with Colgate's search for

ways to demonstrate its net zero sustainability goals and encompass "all four of the major environmental impact pillars," explains D.J. D'Agostino, LEED AP O+M and TRUE advisor, and Colgate's environment, health and safety coordinator for the Burlington facility for the past two years.

"The team struggled to find one entity that had a credible process to both validate and certify our internal net zero aspirations in each category," says D'Agostino. "The search came to an end once we heard of the LEED Zero program being announced at the 2018 Greenbuild in Chicago. LEED Zero certification was a no-brainer for the team, in that we found a trusted, well-established third party with a net zero certification."

## Achieving employee buy-in to meet zero waste standards

A major part of this achievement was related to the facility's work to minimize waste. LEED Zero Waste is earned by meeting the requirements of Platinum-level TRUE Zero Waste certification. TRUE is GBCI's certification program for projects with the goal to divert all solid waste from landfills, incineration (waste-to-energy) and the environment. Currently, 30% of Colgate-Palmolive's manufacturing facilities are certified with TRUE Zero Waste: 16 sites across eight countries.

"Achieving net zero waste at the Burlington site meant implementing many new practices that required employees to change their current mindset about waste," says D'Agostino.

**Opposite page, left to right: Daniel Fitzpatrick, engineering leader for Colgate; D.J. D'Agostino, LEED AP O+M and TRUE advisor, and Colgate's environment, health and safety coordinator; Megan Cox, Burlington plant manager.**







**Left: Recycling bins.**

**Right page: Colgate-Palmolive's Burlington, New Jersey team boasts the first site in the world to achieve LEED Zero certification in these four categories: carbon, energy, water and waste.**

to go for special waste processing. Additionally, the team relaunched the best practice of reusing certain empty raw material drums for use with compatible finished flavor products. Combined, both initiatives diverted an additional 100,000 pounds of material and generated close to the same amount in savings for the facility in just the fourth quarter of 2019 alone.

During this period, the facility continued to improve its waste-to-landfill diversion rate. Engaging the whole team, the plant focused efforts on a trash-to-treasure dumpster dive and converted Earth Day 2019 into a weeklong series of events centered around TRUE Zero Waste. Other strategies included on-site food waste composting, e-waste recycling drives, and reusable water bottles and coffee mugs.

The TRUE Platinum certification, along with other waste data, was submitted to USGBC, allowing the facility to then achieve LEED Zero Waste certification.

With more than 34,000 employees and over 40 manufacturing locations worldwide, implementing companywide goals is always a challenge. However, D'Agostino finds that the company's will to achieve these goals consistently helps each individual location learn from the strategies and successes of the last.

"By committing as a corporation to reducing our overall waste and adopting those same guidelines, we have created a global community to share best practices and ideas that work for our unique waste challenges," he says.

### **Starting from anywhere to get to zero**

D'Agostino encourages manufacturers looking to explore LEED Zero Waste to just jump into the process.

"The best time to start is today," he says. "Get the ball rolling by starting a 'green team,' and be prepared to get employees engaged. It may surprise you how much excitement you can generate and how many employees you get to volunteer, even if your site's zero waste journey is just beginning."

Far from being a pie-in-the-sky goal, he says, "LEED Zero for waste, as well as water, energy and carbon, is truly doable and can really help to accelerate your team to achieve sustainability goals you may have once thought impossible."

### **Continually raising the standard for sustainability**

LEED Zero certification is one manifestation of Colgate's 2020 Sustainability Strategy, which mandates cutting in half the amount of manufacturing waste sent to landfill per ton

Over a two-year period, starting in 2017, he says, the facility ramped up processes for the "Five Rs" (redesign, reduce, reuse, re-earth, and recycle), and they found that some staff were quicker to adopt new practices than others. To improve engagement, a committee was formed, including team members from all levels of the organization.

"Within weeks of forming, the impact of the committee became obvious," recalls D'Agostino. "Through small 'wins' such as new recycling bin locations and reduced collection points, the team was able to implement novel ideas, like use of reusable industrial rubber bands for shipping instead of conventional (disposable) plastic straps." This helped take the program further.

More and more examples of these small wins helped the site team to envision bigger process changes with bigger impact. Thanks to this momentum, a vendor was identified who was able to reuse and recycle scrap or otherwise unusable mint oils, which would otherwise need





of product, compared to 2010. As of the end of 2019, the company has already surpassed this goal, reducing waste-to-landfill by an estimated 53%.

In other commitments, the company will convert to 100% recyclable packaging by 2025, to fulfill a pledge made in support of the Ellen MacArthur Foundation's New Plastics Economy Global Commitment.

Also, the first recyclable toothpaste tube recently debuted in the marketplace under the Colgate Smile for Good brand in Europe and the Tom's of Maine brand in the U.S. To further its efforts, Colgate is sharing its technology with the industry, including competitors, to encourage the widespread adoption of recyclable tubes.

In 2019, Colgate appeared on several publications' lists of the most sustainable U.S. companies, and it was honored as a 2020 ENERGY STAR Partner of the Year—Sustained Excellence.

By reducing waste at every level and gaining employee buy-in, the Burlington facility is just one representation of Colgate's companywide commitment to a future of zero waste—one in which the items we all need for our daily lives can be made without widening our environmental footprint.

"I am very proud to achieve the certification," says Megan Cox, the Burlington Plant Manager, "but I was even more impressed by the team's commitment to continuous improvement, a key Colgate value."

The site reached the 90% diversion mark, meeting the certification's minimum requirements, and didn't stop there. "By the end of 2019, we nearly hit our aggressive goal of 98% waste to landfill diversion, a 3% improvement from the year prior," says Cox. "Certification has not stopped our efforts either—now that we have built this culture of sustainability, we continue to do what we can as a site to limit our impact on the environment." ●





# Women Leading in Green Around the World

The green building world has changed dramatically over the past two and a half decades. These five women have been there since the beginning.

BY CALVIN HENNICK

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**T**he numbers are stark. Women make up around 10% of the U.S. construction workforce. At job sites, that figure is even lower, with only one woman for every 100 male construction workers in the field. Only about 14% of construction executives are women, who also make up just 13% of construction firm owners. And only around one in three construction firms promoted women to senior roles in 2018.

However, there are bright spots everywhere, especially in green building. There was 64% growth in female construction firm owners between 2014 and 2019. Nearly half (44%) of the top 100 contracting companies have women in executive roles, and the number of women working in construction trades jumped by nearly 18% between 2017 and 2018—the sharpest increase in two decades.

Beyond the numbers, there are countless stories of women in leadership roles at their

companies, in their communities and in the sustainable development world as a whole. Many of these women have been on the front lines of the green building movement since its beginning, or very nearly so.

They have not only seen the movement unfold over time, but have pushed it forward with their projects, helping to shape each new iteration of the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system with their innovative ideas and willingness to push the envelope.

While these leaders say that women continue to face unique challenges, they also see enormous opportunity in the green building sector. And those opportunities continue to grow as these trailblazers clear the path for the women who are following in their footsteps.

Here are five of their stories.



**THERESA LEHMAN**  
 Director of Sustainable Services  
 Miron Construction Co., Inc.  
 Neenah, Wisconsin

**O**n the farm where Theresa Lehman grew up in northeastern Wisconsin, waste wasn't allowed. Lights were turned off when they weren't in use. Plates were cleaned. But when Lehman went to the Milwaukee School of Engineering, many of her classmates were wealthy, and Lehman found that they often weren't as concerned as she was about conserving their financial resources. Some of the wealthiest, she says, received a spending allowance of up to \$30,000 a month from their parents.

"I just saw an immense amount of waste," Lehman recalls. "When I graduated from college, I hoped to make that much in a year, not waste that much in a month."

Lehman decided to research waste in the construction industry while she was in college. During a summer internship, a design/build firm asked her to build a library of sustainable materials—a nearly impossible task in the mid-1990s, just a couple of years after USGBC was founded. At her first full-time job as a construction manager, the company owner wanted to build a new office, and he asked Lehman for her opinion on what green building rating system the company should follow. "I said 'LEED,'" Lehman remembers. "He asked if anyone in Wisconsin had done it before. No one had."

Lehman found herself becoming an early expert in the emerging rating system. ("I happened to be in the right place at the right time," she says.) After a couple more green building projects, she sat for the LEED AP exam, and her high score led USGBC to reach out to her for help in writing the new LEED AP Operations and Maintenance Exam.

Lehman then became a LEED Faculty member and started her own consulting business. She began working with Miron Construction Co., Inc. on its rebranding effort, which included sustainability as one of the company's six key drivers, and joined the company as a full-time staffer in early 2008. Since then, the company's LEED portfolio has included 64 projects valued at \$904 million.



Theresa Lehman helped to pilot LEED v4 while working on the LEED Platinum Lake Mills Elementary School in Wisconsin. The team's design work helped the school to reduce illness and absenteeism.

Left, right and bottom: Green features of Lake Mills include a vegetated green roof, photovoltaic system, solar hot water system, operable windows, GreenGuard furnishings and a web-based eco-screen that all serve as educational tools, providing hands-on learning opportunities for the teachers, students and the community.



Lehman says that construction is still very much a "man's world," and acknowledges that it can be frustrating to see entire firms that, even today, have zero women on their executive teams. However, she says, being a woman in a sustainability role can actually be an advantage, as men tend to see her as a partner rather than as a competitor or antagonist. "Because I don't intimidate them, and they know I'm a resource for them, they're open to collaborating," she says.

Although Lehman certainly could have found opportunities in larger markets during more than two decades in the field, she preferred to stay close to both her family and the open space of the Midwest. "When I go to big cities, it's cool to see, but it causes me stress and anxiety," she says. "I can't imagine sitting in traffic. I can't imagine living in a condo or an apartment, and not having a yard to enjoy going outside."

Staying in Wisconsin hasn't prevented Lehman from making a large impact. She helped to pilot LEED v4 while working on the LEED Platinum Lake Mills Elementary School, and her team's ideas for that project led to a number of pilot credits that were incorporated into the new standard. The team's design work helped the school to reduce illness and absenteeism, with a corresponding spike in standardized test scores, and soon families from neighboring towns were clamoring to transfer their kids to the district.

"There's just so much to do here where I was born and raised that I feel compelled to stay here," she says. ●





## GRACE KWOK

Chairman and Executive Director

Allied Sustainability and Environmental  
Consultants Group  
Hong Kong

When Grace Kwok was in high school in the early 1990s, she took a trip from her native Hong Kong to mainland China and marveled at the natural wonders that unfolded over such a large canvas. "It was amazing to me, the sky and the mountains," she says. "I knew China was developing quickly. I knew that kind of scenery and natural environment would be damaged in 10 years' time. I saw the urgency and the need for doing environmental work."

Before that trip, Kwok had planned to go into computer science. But afterward, she decided to study environmental engineering at university. "I really wanted to be a pioneer," she says.

When Kwok was finishing up her degree, she says, it was still quite unusual for engineers to have a sustainability focus. Most of her classmates in her environmental engineering program ended up becoming civil or structural engineers. "In Hong Kong, at that time, there were just a few private consultancies focused on environmental work," she recalls.

Kwok joined Allied Sustainability and Environmental Consultants Group in 1999, and became executive director in 2015, taking on responsibility for the overall planning, management and strategic development of the company, as well as overseeing business operations. She has been involved in numerous green building projects in Hong Kong, Macau and China, including some of the earliest LEED-certified building projects in Hong Kong. Seventeen of these projects have obtained a certification level of LEED Gold or Platinum, and many have received additional green building awards.

Kwok worked on the first LEED-registered building in Hong Kong, the Kowloon Commerce Centre, completed in 2008. She also led the sustainability work for the University of Hong Kong's Centennial Campus, a large expansion at the western end of the main campus that was completed in 2012.



**Left: Grace Kwok worked on the first LEED-registered building in Hong Kong, the Kowloon Commerce Centre, also known as the International Commerce Centre.**

**Right: The Centennial Campus of the University of Hong Kong received LEED Platinum certification in 2013 and was the first higher education project to be awarded such distinction in the city. Innovative features include the positioning of the building to capture natural light, breezes and stormwater.**

Initially, the university only planned to meet the standards of a local green building system, but Kwok and her team convinced officials to shoot for LEED certification. Kwok saw an opportunity to dramatically improve energy performance by adopting a highly efficient air-conditioning system. "They only aimed for Gold at first," Kwok recalls. "I told them they could get LEED Platinum. At first, they didn't believe us. They thought I was joking."

Her involvement from the beginnings of the green building movement has given Kwok a front-row seat from which to watch the evolution of the movement over time. As an example, Kwok points to the way that LEED standards have become more people-centered, focused not only on hard metrics around emissions and water consumption, but also on the experience of the people who live and work in green buildings.

"It's becoming more people-focused," Kwok says. "Initially, it was very focused on how we could protect the environment and be more energy-efficient. But now, it's looking more at how the people, the users, can benefit from the indoor environmental quality."

"I've always tried to work on something new, to not just work in my comfort zone," Kwok adds. "That's one thing I really like about the green building field—that it keeps developing. With LEED, there are always new versions, and when they update it, there will be something new that they include based on the feedback or the experience of people using the previous version. That's what has kept me interested."

Kwok has served on a number of committees for the Hong Kong Green Building Council, and is an advisor to the LEED Data Centers Advisory (China) Committee, a Certified Carbon Auditor Professional accredited by Association of Energy Engineers, a member of the Hong Kong Institute of Environmental Impact Assessment, and a founding fellow of the Hong Kong Institute of Qualified Environmental Professionals Limited. She also acts as a co-chair of the Hong Kong Women Professionals & Entrepreneurs Association Environmental Sustainability Working Committee.

Today, Kwok enjoys passing down her expertise to emerging professionals and students. "Because I started early in this field, I always like to share my experience with all—not only with other professionals in the field, but also with students," she says. "Advocacy is something that is very important to me, and something that needs to be important to all of us if we want to continue to push the green building movement forward." ●



**Above: The International Commerce Centre in Kowloon, Hong Kong, is a multi-use building. With offices, lodging and retail, it spans more than 3 million square feet. The building achieved LEED certification through energy efficiency, reduced water use, sustainable site selection, and use of responsible materials.**



## DEEPA SATHIARAM

Executive Director

En3 Sustainability Solutions  
Chennai, India

One of the first green building projects that Deepa Sathiaran led was a World Bank building in Chennai in 2006—one of the first buildings in India to attain LEED certification. Her firm came on board late in the process, when the design was nearly finalized. It was the first World Bank building to pursue LEED certification, and Sathiaran—then heavily pregnant—had to move quickly to incorporate sustainable elements before the design was finalized to ensure that these measures could be achieved during the construction process.

“At every stage, we had to keep working with the client to make sure things were on track,” Sathiaran recalls. “It was a fast-track project that was going to be inaugurated by the chief minister of the state, and the date for the inauguration was fixed. We had to make sure LEED certification was issued before then. This was before LEED was online, and I remember calling the project manager saying, ‘You need to print out these final documents to be shipped, because I don’t know when I will go into labor.’ He came in at night to pick up CDs so he could print out the documents. That was just a couple of days before I went into labor.”

Sathiaran’s story illustrates some of the challenges that come along with being a woman at the head of a movement. Not only did she have to essentially help invent how to implement LEED in an emerging market, after all, but she also had to work around a deadline imposed by her own pregnancy. However, Sathiaran says, she views being a woman in a male-dominated industry as something of an advantage, rather than a detriment.

“I don’t think of it as a challenge,” she says. “Actually, it was definitely a big plus. It’s helped me open up a lot of doors. I would say it was a huge strength, rather than a limitation.”





**Left: GBCI India headquarters in Noida provides on-the-ground customer support for regional green building and business project teams in the Middle East and Asia-Pacific regions. Above: Oberoi International School Phase 2 has achieved LEED Gold under Building Design and Construction. Deepa Sathiam of En3 worked closely with the Oberoi team to achieve the school's sustainability efforts.**

An electrical engineer trained at the Anna University's College of Engineering (India's oldest engineering school), Sathiam says she remains one of the "very few" women HVAC design engineers in all of India. She was also the first woman to become a chapter president of ASHRAE on the subcontinent. She explains that being a woman has seemed to be an advantage in her work, because she stood out when she tried to appeal to men's sense of right and wrong, and to shift the conversation ever so slightly away from the bottom line.

"Even today, I feel that the decision to go green or not is not just about the cost or the money," Sathiam says. "It's about the fact that the client has to want to do it. It's never been about the cost. It's to make the client say, 'Yes, I want to do it, because it's the right thing to do—not just for the environment, but also as a good asset management practice.' Being the odd one out as a woman in the industry, when you talk to senior people, it strikes a chord. Women are passionate and push for what they believe in. Sustainability, air quality and wellness in buildings are all things that I'm passionate about. When you talk with so much passion and commitment, people on the other side of the table realize that it's the right thing to do. It really helped open doors."

Sathiam notes her own staff is 60% female.

Although she worked in the U.S. early in her career, Sathiam moved back to her native India shortly after

starting her firm. En3 Sustainability Solutions now has four offices in India, with around 40 employees, and the firm has worked on close to 300 million square feet of green building projects in the country, with more than 500 LEED-certified projects and 3 LEED Earth Awards for implementing the first LEED project in various countries, including South Sudan, Kenya and Afghanistan. Sathiam has been recognized as one of India's "Top 15 Nature's Keepers" and has been honored with several awards, including the 2020 IWBI WELL Community Award, the Greenbuild India Leadership Award by USGBC in 2018, the IWBI Leadership Award in 2019, and the Outstanding LEED Professional Award by Rotary. She is a LEED Fellow, IGBC Fellow, and a Faculty member for both USGBC and WELL.

Sathiam says she was lured home by the opportunity to embed sustainability principles into the rapidly developing Indian market.

"It made sense to be part of the green movement right from day one here in India," Sathiam says. "We are the second largest country in the world in terms of population, but compared to China, we have one-tenth the resources and one-third the land mass that China does. So, resources are going to be scarce. It's imperative that we do things right the first time. We can't afford to make a mistake and then come back and fix it." ●



**ALICIA SILVA**  
 Director and Founder  
 Revitaliza Consultores  
 Mexico City

**Above:** Revitaliza Consultores has guided several sustainability projects in Mexico.

**Right:** Revitaliza Consultores also led the sustainability work to pursue LEED for Existing Buildings certification on the 55-story skyscraper Torre Mayor in Mexico City.

In Mexico, design and construction professionals are routinely referred to by titles like “architect,” “engineer” or “master.” But when Alicia Silva, director and founder of Revitaliza Consultores in Mexico City, shows up to project meetings with her female employees, they are sometimes greeted with the less formal “miss,” or even “darling.”

“At my company, we have trained everybody to say, ‘I’m not “miss,” I’m “architect.”’ Or: ‘I’m not “darling,” you can call me “master.”’ We have to train women to not allow people to put them down.”

Other times, Silva and the firm’s executives will be told that Revitaliza Consultores never brings its “experts” to important meetings—“experts,” in these instances, being code for “men.” “Because we were women, we were not recognized as the experts,” Silva says. “We had to explain to everybody, and even read our CVs to them.”

Silva is accustomed to breaking new ground, both in leading the charge for sustainable development in Latin America and in working to create more opportunities for women in the field. She started her career in green building in 2002 while living in Seattle, working on interiors and lighting projects.

She moved with her family back to her native Mexico in 2009, partly because she wanted her children to be more connected to their roots, but also because she saw tremendous opportunity to make an impact in Mexico City, which serves as a cultural and corporate hub for all of Latin America.

“Mexico City is the epicenter for a lot of things,” Silva says. “Here, I have many more ways to connect to people, and a lot more opportunities. If I go and talk to the people at Nike, they’re the people who work with the whole country, and sometimes Latin America. I would go and talk to the president of Toyota [for Mexico], and he ended up being my high school classmate.”

“This was a huge opportunity for me,” Silva adds. “We were at the beginning of the wave. When I came here, there were, like, five people in green building. Because of my Seattle background, coming from this ecotopia, I was already at the top of the wave.”



Silva's firm, which started with five people, now employs 25. The firm has led the sustainability efforts on 42 projects that have achieved LEED Gold or Platinum certification, and is currently working on 35 more. Revitaliza Consultores guided one of the earliest LEED Platinum projects in Mexico, a facility for Nestlé. The firm also led the sustainability work for a LEED Gold terminal at Cancun International Airport, and it convinced the operators of the 55-story skyscraper Torre Mayor in Mexico City to pursue LEED for Existing Buildings certification.

Silva is a founding member of SUMe (Sustentabilidad para Mexico, the green building council) and served as vice president of the group from 2011 to 2015. She also serves on the USGBC LEED Steering Committee, and has participated in the Materials and Resources Technical Advisory Group, the Supply Chain Manufacturing Group and the USGBC Education Committee. Silva also speaks at national and international forums in the United States, Central America and South America.

Despite her ambitious leadership in the field, Silva takes an unconventional approach to leading her firm, emphasizing work-life balance, along with excellent design. "One thing that is very important, when we talk about women in leadership roles, is that we bring another perspective to the table," Silva says. "I have two kids, and even as a business owner, there's no amount of money that can buy time away from my kids."

Silva researched which countries around the world are the best to raise a family while also pursuing a professional career, and she decided to model her firm's approach after that of Scandinavia—setting a 33-hour, full-time weekly schedule for her employees and providing healthy meals at the office.

"I'm very demanding in terms of quality," Silva explains. "It's 33 hours, but with super high standards. Then you can go and have a family, and not feel guilty that you're losing time with your children. I think that's a female perspective. I don't want more money or more power. I want to have a family. You have to do your 40 hours of work in 33 hours, but it's worth it for people. Then you have a life." ●





## MARIJA GOLUBOVIĆ

Chief Executive Officer

Energo  
Italy and Serbia

At the beginning of her career, Marija Golubović, a mechanical engineer by training, worked mostly on projects like ships and hospitals—projects for which commissioning, or a verification process ensuring that systems perform as designed, was routine. So, for Golubović, it seemed faintly ridiculous that this sort of quality control wasn't being conducted for most other buildings until recently. "You would think, yeah, this happens all the time in buildings," Golubović says. "But no, they often just design and construct, and systems are working God knows how. Before LEED, most normal commercial buildings weren't doing that."

Her commissioning-rich background made Golubović a natural fit in the world of sustainable building, where performance tracking and verification is a must. In 2007, she co-founded the European design, engineering and technical consulting firm Energo, and in 2008, she became one of Europe's first LEED APs. In 2012, the company became one of USGBC's first European education partners.

"When I learned about LEED, for me the most interesting thing was that finally, finally, somebody in the design and construction world was asking for commissioning, for energy modeling—somebody was rating that," she recalls.

Golubović's firm provides green design services, as well as consulting. Her team worked on the first LEED Gold manufacturing facility in Serbia, Europe's first multifamily LEED Residential project, and commercial facilities ranging from shopping malls to corporate headquarters. For her first LEED project in 2010, Golubović obtained a LEED innovation point by placing plants on shelves throughout a warehouse—both



**Left: Vodafone Village in Milan, Italy, achieved LEED Silver certification in 2012. Energo was hired to oversee a number of aspects of the project, including energy modeling, and to develop documentation to record increased ventilation, thermal comfort design and HVAC in general.**

**Right: The entrance to Milan's Malpensa Airport Terminal 1 is transformed into "Soglia Magica," a weightless curtain of light and artificial fog. Energo worked with the architects to create this art installation to capture the imaginations of travelers coming through the bustling passageway.**



sprucing up a sometimes drab building type and providing a natural source of oxygen for the facility.

Her career has given her a front-row seat to the rapid pace of change in the European market. While she was a rarity as a LEED AP only a bit more than a decade ago, Golubović says, green building is now the norm on the continent. "The market in Italy and Serbia, there's almost no new project that isn't going to be certified or at least willing to consider being certified," she says. "I'm hardly finding any projects that aren't implementing some green strategies. This is a big change."

Golubović notes that there are more women in green building than in construction and engineering as a whole. However, she says that women are often overlooked when credit is doled out for project outcomes. "It's architects who are signing the projects, and those are mostly men," she says. "Women are seen as the developers of others' ideas, but not as the creators of those ideas."

Even when she is evaluating talent herself, Golubović says, she sometimes has to stop herself from lending unearned credibility to professionals who are men. Instead, she says, she must check herself to make sure she is assessing prospective partners or employees on the basis of their credentials. "I catch myself sometimes in evaluating personnel," Golubović says. "Even if I haven't spoken with the person, I might lean toward a man, and then I say 'Stop, stop, stop, it has to be a man or a woman who is competent.' I think there's still work in front of us to change this." 🌱

## Recognizing "Sheroes"

Each month in 2020, USGBC's **Women in Green program** is recognizing eight women across the country who embody the program's eight pillars: leadership, health, economic equality, mentorship, speaking up, democracy, purpose and courage.

The campaign, meant to highlight the impact that woman are having on sustainability in their local communities, will culminate this November when a "Shero of the Year" is named at the Greenbuild International Conference and Expo.

"We want to not wait until the end of someone's career, but to identify heroic leaders doing paradigm-shifting actions [today] to create equity and access for women in sustainability," says Kimberly Lewis, USGBC's senior vice president of market transformation and development in North America, who founded Women in Green in 2012. "We want to really give a national lens into who's getting things done locally."

For nearly a decade, Women in Green has emphasized local involvement, organizing breakfasts, workshops and other events for women leaders to connect and support one another. The program also has a partnership with Million Women Mentors, which connects female professionals with girls and young women interested in pursuing careers in science, technology, engineering and math.

Through this year's "Shero" campaign—and through the program as a whole—Lewis hopes to communicate to women in the industry that they have the opportunity to be leaders, no matter where they're based.

"It's local, local, local," Lewis says. "I want to make sure we provide the platform and opportunity so people don't have to go to the coasts, but know that they have the power to organize right in their communities. At Greenbuild, we bring everyone together. But then you need to go back and make things happen where your feet are planted."









# Orlando: A Model for Urban Sustainability

Orlando, Florida, sets a cardinal example for how to move a city toward resilient systems, operations and development.

WRITTEN BY **KILEY JACQUES**

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*"Our vision is to transform Orlando into one of the most environmentally friendly, socially inclusive and equitable, and economically vibrant communities in the nation."*

— Orlando Mayor Buddy Dyer

Left: Mayor Carl T. Langford Park provides a natural refuge in Downtown Orlando. The park is located in a shady oasis of mature oaks, wide sidewalks, green lawns, birds, butterflies and plenty of room for the kids to play.

Following spread: Orlando's Lake Eola is actually a sinkhole approximately 23 feet deep, located 100 feet east of the fountain.



“We strive to achieve the triple bottom line of people, planet and prosperity,” says Chris Castro, Green Works Orlando director of sustainability, in reference to the city’s comprehensive sustainability plan. He attributes its success, in large part, to Mayor Buddy Dyer, who launched the Green Works Orlando initiative back in 2007. It outlines goals to enhance quality of life, generate diverse economic growth, and create equitable access to resources and services, and it has since become the driving force behind the city’s every move.

According to Castro, Orlando is one of the fastest-growing cities in the country, with 1,000 to 1,500 people moving to central Florida every week. He notes the city’s cross-generational appeal, saying it is Millennials’ number one choice, while Gen Xers rank it among their top five picks and Baby Boomers put it among their top 10.

“Orlando is known for its progressive ideals, openness around diversity and stance on sustainability and climate change—these things appeal to generations now looking for somewhere to grow their families,” he says. “They want a place that embraces equity and inclusion, and that has a good job market and growing economic development.”

The city’s allure has much to do with the wide-reaching measures it has taken since the inception of Green Works Orlando. Castro points to seven focus areas and corresponding goals: transition the electric grid to 100% clean energy; create a market for high-performance, green building development in commercial and residential sectors; build a local food economy that embraces urban agriculture; transform to a zero-waste future; enhance livability with natural systems and ecology; develop programs around water quality; and reduce the number of single-occupancy vehicles and implement multimodal transportation solutions.

Of course, tourism is a major factor influencing Orlando’s sustainability plan. Castro claims the city is the most visited tourist destination in the Americas; it hosted 75 million visitors last year. As a result, agencies are pushed to scrutinize their capacity to function at that scale. “We have to start thinking about ways to sustain that type of economy,” Castro notes. “The energy usage and number of toilet flushes that come from those 75 million visitors is impossible to quantify, but they have a huge impact on our resources. There are unintended consequences of a tourism economy.”





The volume of people, in combination with the city's myriad moves to keep pace, is something that positions Orlando to be a prototype city. "We want to understand how to leverage those 75 million visitors to learn about sustainability, resilience and inclusiveness—so they can take that knowledge back to their own communities and make it a part of their culture," Castro explains. "Our ability to influence the rest of the world is probably greater than any other because of the amount of tourism happening here. It's a unique opportunity."

Solutions that have set Orlando apart include achieving Gold-level certification under LEED v4.1 for Cities. Key to earning that certification was the energy performance of the city's buildings, which, in 2007, were contributing to roughly 75% of Orlando's carbon footprint; an estimated 25% was coming from the transportation sector.

"We realized that buildings, and our ability to squeeze out inefficiencies and ramp up high-performance development, is one of the most cost-effective and impactful strategies for us to address the climate crisis," Castro says. Today, every new city facility must achieve LEED certification—whether a fire station, community center, administration building or public

arena. They have been following this course of action since 2010. Currently, LEED Silver is the base model for all new municipal buildings.

In 2016, the city took out a \$17.5 million green bond to retrofit 56 of its most energy-intensive facilities—upgrades were made to the automation and HVAC systems, real-time data monitoring capabilities, and interior and exterior lighting. That investment has resulted in \$2.5 million per year in energy cost savings; those savings are helping to repay the bond debt.

"We did a performance contract that cities normally enter into with the private sector," Castro explains. "Because of our expertise and ability to buy tax-exempt equipment, we were able to make the numbers work so the ROI is seven years or less." They are actually saving more than the repayment schedule required.

This type of financing is known as a Revolving Energy Fund (REF), which revolves the cost savings back to the REF for future projects—there are no outside funding sources. In this case, the REF helped finance deep energy retrofits in 27 facilities, resulting in an average 31% efficiency improvement. "It's a very compelling strategy that the U.S. Department of Energy has recognized as part of their Better Buildings Challenge," Castro notes.





Top: Chris Castro, Orlando's director of sustainability and resilience, poses in a residential front lawn growing okra and other organic vegetables.

Bottom: Orlando Mayor Buddy Dyer holds local tomatoes grown at the South Street Urban Farm in downtown Orlando. The city's "Grow-A-Lot" program has helped turn vacant city lots into urban farms and community gardens to address food insecurity and spur a local food economy.





Similarly, with backing from PACE Funding—a leading energy efficiency, water conservation and renewable energy finance company—the city has made over \$18 million worth of clean energy investments. “That has resulted in roughly 1,000 improvements throughout the community in a two-year period,” says Castro, adding that there are a handful of PACE providers, as well as banks and lenders, that are doing energy efficiency lending. “That’s tens of millions of dollars to lower the energy use and emissions output in the city.”

Like New York City and Washington, D.C., Orlando has implemented building benchmarking, energy audits and a transparency policy that requires buildings over 50,000 square feet to be monitored for energy and water use. It is the first city in Florida to have passed the ordinance, and it is now helping others to replicate the work. Castro says this has created a market driver for improving buildings. “Now more than 1,000 buildings are required to report their energy use to the marketplace; it becomes another information data point for making informed real estate decisions.”

On the energy supply side, Orlando Utilities Commission (OUC), the municipal electric and water utility, is adding renewables to the fuel mix. They are currently on track to transition 10% of the electric grid to solar energy by 2025. Of special note is OUC’s community solar program, which allows residents to digitally subscribe to solar farms to offset energy use at an individual building or apartment.

Over the past six months, they have also launched a residential rooftop solar co-op to help residents bundle their demand and lower the cost per co-op member through economies of scale. More than 50 homeowners have signed contracts, and approximately 720 kilowatts in new rooftop solar energy has been added. “The beauty is that it is helping to build capacity through a distributed energy resource,” Castro notes. “It’s not just decentralized solar farms, but also home solar panel installations.”

Among the city’s more innovative methods for harnessing solar power is its growing number of floating PV arrays, which take advantage of the many water bodies—primarily stormwater retention ponds—surrounding Orlando. Working with the National Renewable Energy Lab (NREL), the city is testing the efficiency of floating solar and how it can be expanded to serve the country. They are also looking at the effects on wildlife. “If we find that it is not damaging, then it opens up all of the natural lakes and waterways too,” says Linda Ferrone, chief customer and marketing officer of OUC.

The city has also secured \$3.2 million in capital improvement funds to invest in rooftop solar at critical facilities meant to assist during grid outages or during emergencies. It is in the process of installing PV arrays



**Top:** Chief customer officer Linda Ferrone leads the sustainability and emerging technologies for the Orlando Utilities Commission.

**Above:** The Orlando Utilities Commission (OUC) staff installs the first floating solar array in the southeast. The 31-kW floating solar array is located at the OUC Gardenia Operations Center. OUC was the first utility in Central Florida to build a large solar farm and was one of the first in the nation to offer “community solar” in their portfolio.

on the rooftops of 10 city buildings. “Some of the things we are doing are meant to benefit us over the next couple of years; others will be of benefit in 10 years and beyond,” says Ferrone. “You have to rush at the short-term projects—those things are important to get us as much solar as possible, and quickly.”

Though OUC is a separately governed city-owned utility, it works closely with the city to help achieve the mayor’s proclamation of having 110% renewable energy citywide by 2050. Their utilities-scale solar program includes plans to add two more solar PV arrays, which will produce 108.5 additional megawatts for the grid. They are also experimenting with storage solutions; lithium ion batteries are the convention, but Ferrone notes they are short-lived and full of toxic materials that make proper disposal difficult. “We are looking at hydrogen—it is the perfect energy storage [solution] because there is no byproduct and it never wears out.”

OUC is working with a U.S. Department of Energy grant to install hydrogen storage units in conjunction with a new floating PV array; the project includes setting up a microgrid to study how hydrogen storage can work. They are also studying solar flow batteries, as well as combinations of storage options to marry the differences—although lithium is short-lived, it ramps up quickly; the other options are longer-lasting.

Electric vehicle (EV) infrastructure is another of OUC’s contributions to the city’s energy-related efforts. It is working with the Transportation Department to determine ways of cleaning up the system. “Orlando is one of the top 10 EV cities in the country, and the only one in the Southeast—all of the others are on the West Coast,” says Ferrone. “We got excited about EVs about eight years ago, when the Electrify America grant came out. We stretched ourselves to get a lot of charging stations around the city, and we never really stopped that effort.” Currently, they are focused on adding EV infrastructure along hurricane evacuation routes and major highways.

Ferrone says OUC has made a commitment of \$45 million toward EV market transformation by 2030. That includes the addition of EV hubs, grid preparation, public education and incentives for companies with large fleets. The agency also partners with Lynx, a transit authority EV bus program; it has funded eight buses to date and anticipates a total of 150 will serve the city within six years.

Orlando also has the first EV rental car initiative, Drive Electric Orlando, available at its airport. Castro says it doubles as a VIP pass—theme parks like Disney and Universal honor it with an offset fee and free charging. Charging is also free at the hotels, and some offer free valet parking to EV drivers.

“At the end of the day, we want to make Orlando the EV test-ride city of America,” he says. “Imagine getting all of our tourists to try an EV for the first time, and then

they return home and maybe change their purchasing habits. That is our goal.” There are currently 358 charging stations around the city, and plans are to add another 150 this year throughout city parks, recreation centers, parking garages and more.

Alternative modes of transportation include the soon-to-be-expanded SunRail commuter train that runs up and down the I4 corridor, and the Virgin high-speed rail, which operates from Miami to West Palm Beach and is set to reach Orlando in the next two years. Bike and multimodal trails are proliferating throughout the city—there are over 350 miles of bike lanes and urban trails, as well as enhanced micromobility solutions, such as bike- and scooter-share programs and car sharing.

Waste—particularly organics—is yet another significant target area. Two programs address food waste in landfills. First is the backyard composter initiative, whereby residents sign up for a free compost bin that is assembled and delivered to their door. “The more waste we can take out of the landfill waste stream, the more money we save for taxpayers, which is what pays for the free composters,” says Castro. “It’s an innovative model of avoided cost to cover the cost of composting units. We now have over 8,000 households composting.”

Second, they’ve designed a collection program for commercial food waste. Businesses are given a 65-gallon cart on wheels; when full, it is taken to a waste-to-energy biogas facility that turns the organics into renewable natural gas, which is then turned into electricity that is sold on to the grid. This process creates both electricity and a fertilizer additive—the biocake, or leftover material, is turned into field fertilizer.

The city also has a program for recycling cooking grease, which is a storm- and wastewater pollutant. Orlando provides free containers to residents; 3,000 gallons of grease were collected last year alone. All of it is turned into biodiesel, which the city buys back and uses in its fleet of public transportation vehicles. It is a closed-loop system and part of Orlando’s increasingly circular economy.

The traditional recycling market is struggling with contamination, as people clog the system with nonrecyclables. Orlando is working with Recycle Across America to standardize its recycling labeling. Its airport and public schools are the first in the country to deploy the new labels. To encourage businesses to adopt the strategy, the city is granting them free access to the labels. Additionally, an app called ORL Collects allows users to search any given product to see if it can go into a home recycling bin, and if it can’t, shows where it can be properly disposed of. “One tool is not going to solve this,” Castro notes. “It’s myriad strategies that we need to address the waste issue.”



Among Orlando's multipronged tools for building resiliency are its collaborations and the actions they set into motion. For example, in October 2019, over 30 governments in East Central Florida joined forces to develop a collaborative—the East Central Florida Regional Resilience Collaborative (ECFR2C)—to improve the region's resilience and collectively address climate change.

"I think it's important to showcase the priority that this has become for our entire region," Castro says, noting that Orlando is leading the charge. He also points to the Citywide Performance Tool (CyPT) report, an engineering study by Siemens to determine the technologies needed to achieve 90% GHG emissions reductions by 2040 and net zero emissions by 2050, as well as the technical feasibility of achieving this goal. The city also recently completed a Solar Ready Design Guide, a resource to help the Capital Improvements team navigate the road to solar-ready buildings throughout the city.

The ways in which the city of Orlando is transforming itself, in the words of Mayor Buddy Dyer, "into one of the most environmentally friendly, socially inclusive and equitable, and economically vibrant communities in the nation" are innumerable. By all measures, they are having the desired effects.

Perhaps what is most remarkable about the model is the way it edifies residents and visitors alike. From EV charging stations at the resorts, to solar trees and sculptures in the public parks, to the soon-to-be floating PV at the airport that every tram passenger will hear about through an audio recording, Orlando's leadership on urban sustainability is underscored by the visibility of its efforts. As Ferrone says, "There are so many things we can put in front of people's faces that will leave an impression." 🍌



**Top:** The city of Orlando enabled front-yard farming in 2014 by amending its landscape code. Today, nonprofits like Fleet Farming are providing year-round services to convert homeowner lawns into edible landscapes.

**Middle:** The city's "Grease Fighter" stands next to one of its grease traps to raise awareness about eliminating household cooking grease from entering stormwater and wastewater pipes and preventing overflow issues. The city provides free grease containers for all residents and has 17 neighborhood center locations for residents to pick up and drop off their used cooking grease. The cooking grease is later turned into biofuels for the city's fleet vehicles.

**Bottom:** A view of Walt Disney World's iconic 5-MW solar farm in the shape of Mickey Mouse. Disney is a major investor in renewable energy, with the recent installation of a 50-MW system that now helps power half of Walt Disney World parks and resorts in Orlando.



# Construction Contracts

ConsensusDocs creates fair and detailed agreements—especially in the time of COVID-19.

By Alexandra Pecci

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In green building projects, every detail matters, and specifying those details in construction contracts provides a clear road map for reaching green building goals, whether it's calling for certain sustainable materials, adhering to a project timeline or earning U.S. Green Building Council's LEED certification.

But unforeseen events can disrupt even the most well-considered construction plans. That's why flexible, easy-to-read, standard contracts that robustly protect all stakeholders are more important than ever.

For the past 12 years, ConsensusDocs have become an invaluable industry resource for such contracts. ConsensusDocs are standardized contract documents written by and for the design and construction industry and developed by the ConsensusDocs Coalition, a group of 40 design and construction industry associations.

The COVID-19 pandemic has illuminated the need for fair and detailed contracts in a way that few other events have ever done. The crisis has been fast-moving and confusing as it rips through the construction world, shutting down projects, sickening workers, requiring physical distancing and disrupting global supply chains. But ConsensusDocs is well positioned to help its stakeholders navigate those uncharted waters.

"Our standard document specifically mentions epidemics," says Brian Perlberg, executive director and

senior counsel for the design and construction contract organization ConsensusDocs.

A strong force majeure clause (which frees contracted parties from liability during an event beyond their control), along with language that specifically mentions epidemics, have helped excuse stakeholders from delays and supply chain disruptions, allowing for penalty-free project timeline extensions.

"If you don't specifically mention [epidemics], you may not get extra time from your force majeure clause," Perlberg says. "By providing a more comprehensive, detailed force majeure clause, we've gotten a lot of plaudits for how we've handled this unforeseen event."

Clear language and attention to detail in the face of a pandemic isn't the only reason ConsensusDocs is a go-to for construction contracts. As its name says, it aims to create consensus between all parties involved, fairly allocate risk, and protect the best interests of the project itself.

## Improving on an industry standard

Although standard contracts for the construction industry have existed for a long time, they've traditionally been produced and offered by just one party, often leaving the other parties involved concerned that the contract is unfair.







That's not the case with ConsensusDocs, says Howie S. Ferguson, executive director of the Construction Owners Association of America (COAA).

"They're fairer and more balanced when it comes to assignment of risk and responsibilities between the parties," Ferguson says, noting that he doesn't believe that the same is true for other standard contracts from organizations like the American Institute of Architects.

"Their documents, not surprisingly, tend to favor architects," he says. "Same for other industry standard contracts."

Historically, the remedy has been to amend those unbalanced contracts so much that "the modifications exceed the length of the standard document," Perlberg says.

Instead of having a clear, concise, and fair contract from the beginning, stakeholders are left with what Perlberg calls a "Frankenstein project."

"They're sewn together with the dead body parts of every failed project that they've ever experienced," he says.

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**A strong force majeure clause, along with language that specifically mentions epidemics, have helped excuse stakeholders from delays and supply chain disruptions, allowing for penalty-free project timeline extensions.**

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ConsensusDocs aims to remove that cycle of repetitive renegotiation, creating contracts that are in the best interest of all parties, right from the beginning.

“The mission of ConsensusDocs is to identify best-practice standard construction contracts that help create better project results, primarily from lowering transactional costs from repetitively negotiating,” Perlberg says.

ConsensusDocs was founded in 2007 by 20 organizations in the architecture, engineering and construction industry. That founding principle of collaboration is key to success, creating a meritocracy in contracts, rather than a top-down approach that doesn’t adequately consider the expertise and input from other parties involved.

For instance, traditionally, “The architect of the project has been thought of as the decider and the one with authority and a certain level or prestige in that role,” Perlberg says. But, he adds, “many other project participants and stakeholders have roles to play and sometimes have superior knowledge.”

The key to fairness and success is creating “a structure to share that information earlier in the process,” he says. “Getting all that information; measuring twice and cutting once.”

Today, the ConsensusDocs Coalition consists of 40 organizations that collectively represent more than 300,000 individuals and companies. ConsensusDocs uses a tiered

## 3 Main Advantages to ConsensusDocs

According to Perlberg, ConsensusDocs offers three main advantages over alternatives:



### 1 They’re easy to understand.

“You should be able to read and understand your contracts. Good legal writing is simply good writing,” Perlberg says. “That’s really important when you deal with the people who are actually using the contracts, not just the lawyers speaking legalese.”



### 2 They offer clear communication pathways.

While some contracts create contractual silos that actually restrict parties from communicating directly, ConsensusDocs creates a system to encourage helpful and direct communication throughout the construction process. They also encourage the contractor to be involved and add value throughout the process. “I think that’s one of the reasons you’ve seen less claims and litigation over our documents,” Perlberg says.



### 3 They’re flexible enough to embrace emerging trends.

It’s hard to believe that in the year 2020, many contracts don’t allow parties to rely on information conveyed in an email, but that’s the reality. “Construction is notoriously slow, legal is notoriously slow,” Perlberg says. In contrast, ConsensusDocs has always striven to be at the forefront of new technologies so it can properly address those technologies in contracts, whether it’s email or facilitating the use of innovative tools like building information modeling. “We have a track record of being first in addressing emerging trends as well as memorializing best practices, like using email,” Perlberg says. “We try to be flexible, innovative, and encourage emerging trends, so projects can be more innovative and be more efficient.”



subscription model to offer more than a hundred different contract documents to its subscribers.

Ferguson says COAA's decision to be part of ConsensusDocs was a wise one, because they're "more inclusive of partner input and perspectives and [require] far less maintenance for our tiny staff."

Flexibility is also key, Ferguson says.

"I believe most members who've purchased ConsensusDocs contracts aren't necessarily using them as is," he says. For instance, they might modify sections or articles that speak to how work is to be done on the owner's premises, he says.



## The Green Building Connection

**The ConsensusDocs green building addendum does two important things for stakeholders, says Perlberg.**



First, it organizes a system to allow for "someone who charges ahead to help provide organization and direction for a project's green building objectives."



Second, it provides flexibility within the document for stakeholders to determine their own green building objectives. For instance, one project might specify a LEED certification goal, whereas another project might identify other objectives, such as using certain building materials or sourcing supplies locally.

Perlberg also notes that crises like COVID-19 should encourage green builders to consider building additional flexibility into their contracts regarding things like material specifications, since supply chain disruptions can make those materials impossible to access or too expensive to buy.

"There might be a need for flexibility in the substitutions process," he says.

### Measuring success

Since construction can be very litigious, creating an effective foundation is important right from the beginning of a project.

"Success depends on collaborating and working well together," Perlberg says. "Contracts play a large part in creating a better foundation to communicate and collaborate."

He says that over the past five years there have been more than 160,000 finalizations of contracts within the ConsensusDocs system. But one of the most impressive numbers for measuring the success of ConsensusDocs is "zero."

"To date, there has not been one litigated case that has been a court-reported decision that is arguing over the interpretation of a ConsensusDocs contract," Perlberg says. "Not being in court decisions ... is a leading indicator that we're not in as many claims, we're not having as much litigation, and so that, to me, is a source of success. This is a situation where the absence of data is supportive of the premise that we provide a better foundation."

Perlberg points to the Iowa Department of Administrative Services, which he says experienced formal claims—and sometimes multiple claims—on almost every project it did. But after making several changes and moving to ConsensusDocs in 2011, "They have experienced zero formal claims and have put over \$400 million of construction in place," Perlberg says.

Whether it's encouraging a cooperative work environment or navigating an unprecedented global pandemic, the word "consensus" is the key to success for ConsensusDocs users.

"I think all of this leads in the same direction," Perlberg says. "Getting people involved earlier, encouraging better communication and collaboration." ●





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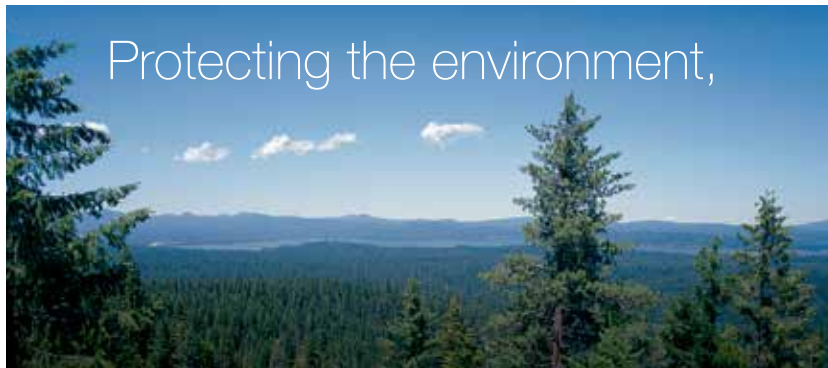
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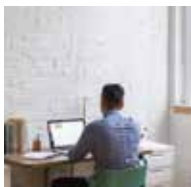


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August 13: Tennessee Town Hall  
August 13: Arc Performance Pro Workshop

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