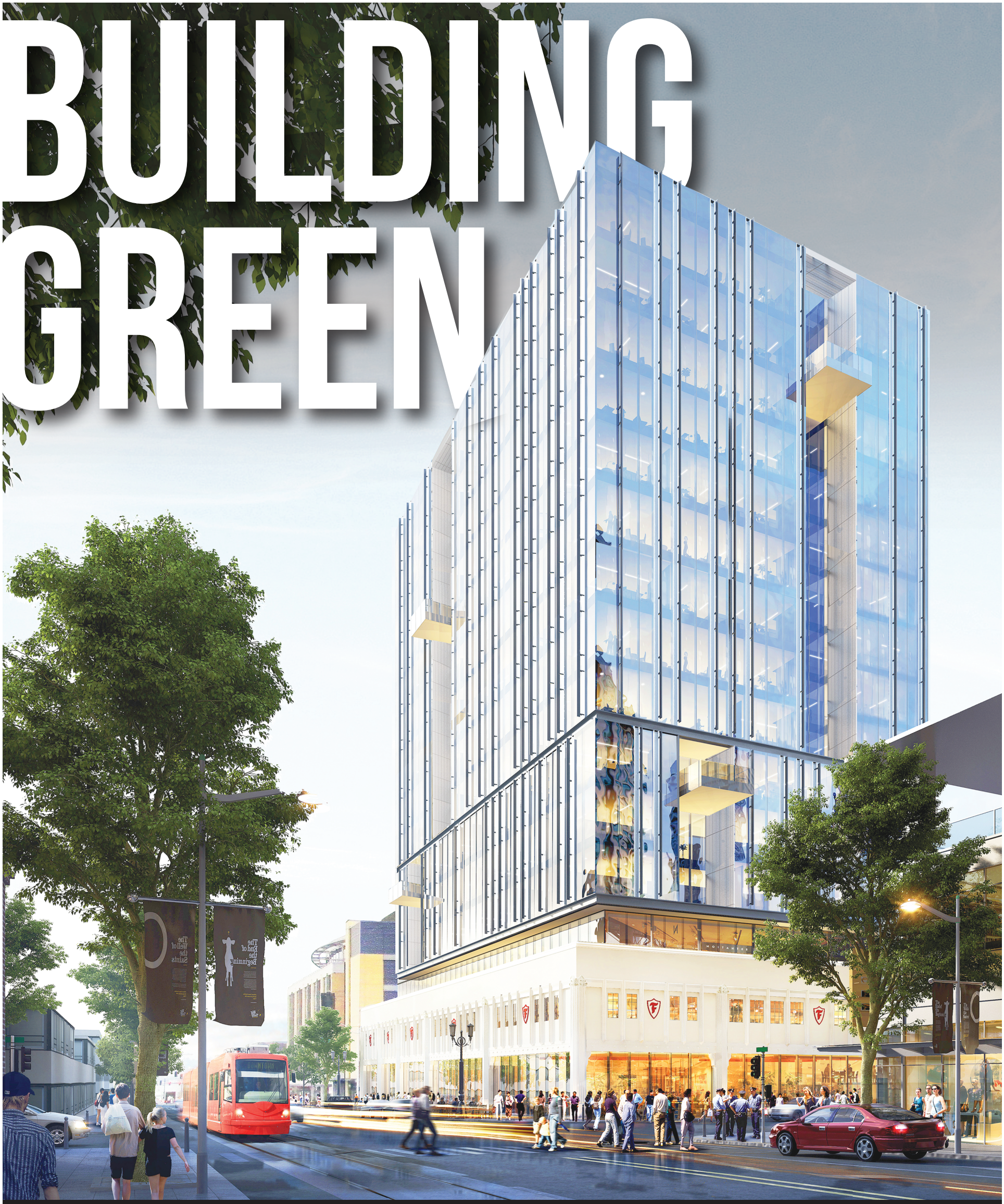
BUILDING GREEN



LET'S MAKE BUILDINGS PEOPLE CAN STILL USE AFTER A DISASTER

More designers are taking recovery time into account as the climate changes and major disruptions become more frequent.

We are trained and required to design and build buildings and infrastructure to a life safety or public health standard.

That means that anyone in a code-compliant building will survive the next big earthquake, windstorm or flooding event. However, that also means that our buildings or infrastructure may or may not be usable after the event.

BY STEVE MODDEMEYER
COLLINSWOERMAN

When buildings and infrastructure are designed to be expendable that means they have to be repaired before we can use them. We'll have major disruption for months or longer as we struggle to get back to work, back to school, and back home in safe housing.

It made sense in the past to select a threshold for design because if we tried to resist the truly huge and rare events we'd stand a good chance of overbuilding, overstrengthening, and overspending for an event that may not even happen during the usable life of the building.

But the realities of climate change and earthquake risk are pushing back on our presumptions. With climate change we are learning we can no longer predict the probability of an extreme event because background conditions in the climate are already shifting around us.

For example, many of the major rivers around Puget Sound are already being reshaped as huge sediment loads are mobilized as snow fields retreat and rain events gain in ferocity. This adds additional and potentially significant uncertainty in predicting the likelihood of a flood. Storm surge on top of rising seas means more floods in shoreline areas.

Floods closed roads in Chehalis in 2009. Resilient design helps buildings and bridges return to use more quickly after such events.

PHOTO BY WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Recovery time

Structural engineers and planners in the earthquake community are recognizing that the metric for earthquakes should be more than just the size of the event. They are beginning to also include the length of time it takes to recover once an extreme event does take place.

This focus on recovery time is already included in the state

DISASTERS — PAGE 14

NEW GREEN RATING SYSTEMS GO WAY BEYOND LEED

Owners who want to stand out from the crowd can choose among rating systems that focus on health, wellness, resilience, energy-efficiency and more.

The City of Seattle's Fire Station 32 recently achieved LEED platinum certification — the highest level rating in the world's most widely recognized green building rating system.

It's an ambitious target for any project, let alone a small, publicly owned facility designed back in 2013. This 17,000-square-foot fire station is now a showcase project that makes smart use of public dollars by using solar panels, solar hot water, rainwater capture and a green roof — just about every signature sustainability feature you could want in 2013 — and shows that a more environmentally friendly building can be comfortable, user-friendly and a great investment.

BY CHRIS FORNEY
BRIGHTWORKS SUSTAINABILITY

But in 2018, the bar for building green is continually being raised because we are still far from sustainable in the building industry overall. According to the 2017 National Green Building Adoption Index, LEED-certified buildings only account for 4.7 percent of the commercial office buildings across the 30 largest U.S. office markets. The green building segment of the building industry needs to keep growing, but there are also new and higher bars to reach for if you want.

Evolving and new rating systems alike are challenging developers to not just meet higher standards, but to address new issues. And building owners and tenants now find they have a genuinely exciting opportunity: to make their real estate programs and properties reflect their unique values to clients, staff, renters and customers.

Fire Station 32 in West Seattle was awarded a LEED platinum rating in January.

PHOTO BY NIC LEHOUX

New rating systems

The LEED rating system was founded in 2001 — the same year that Brightworks Sustainability began managing sustainability programs in the real estate industry. We have seen firsthand how LEED has become a tremendously important standard for the U.S. and the world, helping define the baseline of green building, and using its power in the market to evolve its standards over time.

But none of these evolutions has been more significant than the recent LEED Version 4. LEED v4 officially took effect for all new projects in 2016, but is still challenging project teams around the world who thought they had green building all buttoned up.

Much of this challenge stems from an increased emphasis on materials-related credits that push the material manufacturing market toward increased transparency and toward a greater understanding of how building materials impact human health. With LEED v4, design and construction teams face new struggles trying to achieve the same certification levels they used to hit with relative ease.

These changes can ruffle feathers, but also serve a vital purpose: to drive the market toward greener, healthier and more efficient buildings. And continued commitment to the evolving rigor of LEED is an opportunity for businesses to communicate leadership and show that they know they can and need to do better.

While LEED has raised the bar for green building in general, there are also a growing suite of topic-specific sustainability rating systems for health, wellness, resilience, energy-efficiency and others. Each system offers the challenge of additional targets to hit, with discrete benefits for those willing to tackle them.

Many corporate real estate programs incorporate green building as a tool to guide more efficient and responsible use of resources, to save money on operating costs, and to put their brand values on display for customers, clients and staff. These topic-specific rating systems offer new ways for private companies and public entities to differentiate themselves from their peers and show leadership in areas that align with their missions.

A focus on health

Alexandria Real Estate Equities is a REIT uniquely focused on collaborative life science and technology campuses. It manages nearly 1 million square feet of Class A office and laboratory space in the Seattle area.

Alexandria was an early adopter of the Fitwel rating system, which was developed by the Centers for Disease Control and Prevention to promote public health outcomes. Fitwel's low-cost approach promotes human health by encouraging buildings to apply lessons from existing scientific research on strategies and techniques that improve public health and wellness.

Alexandria has several Fitwel-certified properties and was the first REIT to become a Fitwel Champion. Brightworks is managing both the LEED and Fitwel certification programs for their new offices at 400 Dexter Ave. N., a great combination to reflect Alexandria's values of sustainability in general, but also of human health in particular.

The Well Building Standard is a more hands-on approach to creating a healthy indoor experience for the occupants of a building. Using in-depth testing of air and water quality, the Well Building Standard certifies buildings that can prove their spaces provide an optimum environment for health, wellness, comfort and cognition.

We've helped numerous clients assess their buildings for opportunities in the Well standard. These clients are interested frequently because their business has a particular stake in promoting human health through its core business, mission or values. Well and Fitwel both offer organizations a genuine real estate differentiator, whether they're saving lives in the life sciences industry, competing to impress top talent in the technology industry, or investing in a genuine change after receiving staff complaints about particularly "unwell" offices of the past.

Resilient design

There are also new tools and frameworks available to offer owners a way to improve how their buildings perform during natural disasters like earthquakes and increasingly extreme weather events caused by climate change. The RELi resilience action list and credit catalog, the REDi Resilience-based Earthquake Design Initiative, and the American Red Cross Ready Rating program offer rating systems specifically for building resilience

RATING SYSTEMS — PAGE 15

INSIDE

ON THE COVER

Martin Selig Real Estate's 400 Westlake tower in South Lake Union will produce more energy than it needs to operate. Perkins+Will is the architect.

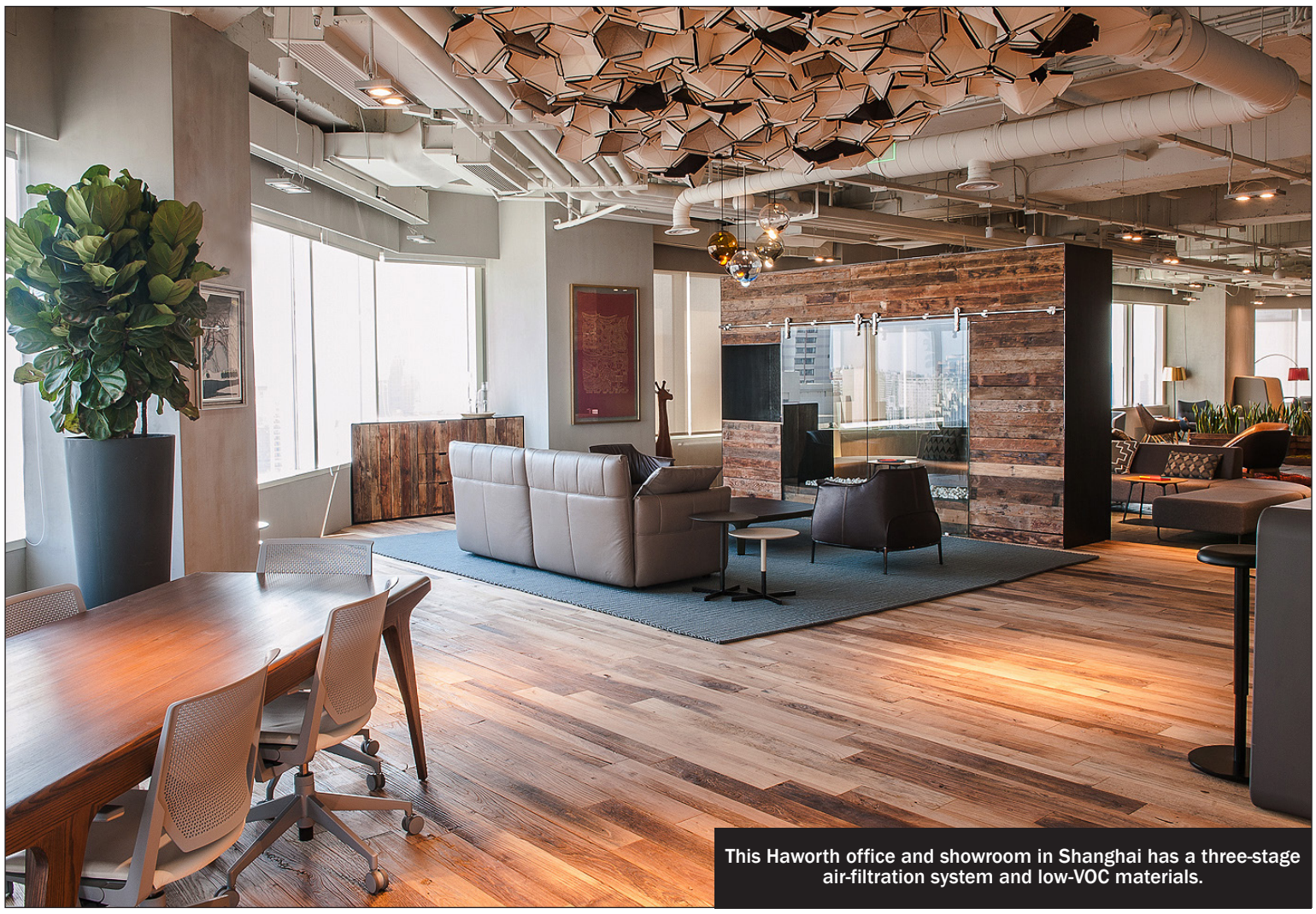
IMAGE BY PERKINS+WILL

BUILDING GREEN TEAM

SECTION EDITOR: JON SILVER • SECTION DESIGN: JEFFREY MILLER
WEB DESIGN: LISA LANNIGAN • ADVERTISING: MATT BROWN

HOW CLEANER INDOOR AIR MAKES FOR HEALTHY WORKERS AND A HEALTHIER BOTTOM LINE

Studies show we perform better in "enhanced" green buildings where the airflow resembles an outdoor breeze.



This Haworth office and showroom in Shanghai has a three-stage air-filtration system and low-VOC materials.

PHOTO PROVIDED BY HAWORTH

Walk into the 12,000-square-foot Haworth office and showroom in Shanghai and there is a lot to catch a visitor's eye — panoramic city views, a mixture of open and wood-constructed drop ceilings, and of course the play area with a foosball table and Xbox. What may not draw immediate attention, though, is the three-stage air-filtration system, low-VOC materials and the rigorous attention given to air-quality monitoring.

BY ELENA VELKOV
GLUMAC

"In China, people check the air quality the same way we check the weather in the U.S. — on a daily basis," says Nicole Isle, Glumac's chief sustainability strategist.

"This is not a way to live. As we continue to urbanize, we need to remember to create humane spaces."

Improving wellness

Glumac designed Haworth's mechanical, electrical and plumbing systems under the Well Building Standard's stringent air guidelines. Well focuses entirely on human health in seven categories: air, water, light, comfort, food, fitness and mind.

Haworth was the first Well-certified project in China, a country with some of the worst air quality in the world. However, Glumac is also supporting Well projects on the U.S. West Coast, and the trend of healthy buildings and good indoor air quality is spreading in the commercial sector.

Studies have shown that high-caliber indoor air — like that of the Haworth space and the Well standard — will effectively increase profits through increased productivity.

Take the 2016 Harvard University study on indoor air quality and cognitive function. Harvard took 24 office professionals and studied their typical work behavior for six days throughout a two-week timespan.

Unbeknownst to participants, researchers varied the air quality with outside air, recirculated air, off-gassing qualities and carbon dioxide concentrations. The levels of indoor air quality were placed into three categories: a typical building, a green building, and an enhanced green building. Participants then took a survey to assess their cognitive function.

On average, cognitive function scores were 61 percent higher in the green building and 101 percent higher in the enhanced green building over the baseline condition. The biggest leg up in the green buildings came in the domains that required higher levels of cognitive processing: crisis response, information usage and information strategy.

This tells us that investments in good indoor air provide an ongoing return that makes the upfront investment in human-centric design well worth it.

"We've done all this work to create uber-energy-efficient, high-performance buildings," Isle says.

"We've already figured that portion out. Now we're talking about high-performance people. People are what make a business profitable or not. Spaces need to promote wellness and comfort to enliven people."

Wellness in an office environment also comes with mechanical, electrical and plumbing systems that work in conjunction with biophilia. Biophilia is the practice of integrating nature into the built environment — literally the love of life.

This includes coupling indoor air quality with lighting that mimics human circadian rhythms, airflow that resembles an outdoor breeze, natural light and plants. The goal is to provide a healthy, humane environment that can actually speed up an owner's return on investment.

"Whether you enjoy nature of not, the research is telling us that daily connections to nature boosts our health," Isle says.

"Humans evolved outdoors, and our bodies remain very much in tune to outdoor conditions. When you rob someone of those conditions indoors, you rob them of their ability to sleep well at night, manage stress and feel energized."

Glumac has supported many LEED platinum and gold projects in Seattle where productivity is key, including several Amazon offices, the Allen Institute for Brain Science, the Meridian Center for Health, and the University of Washington's Mercer Court apartments. All included high levels of air quality considerations and, of course, high-efficiency systems.

Clean indoor air

Healthy indoor air can take many shapes. When mechanical engineers design systems for a Well or LEED platinum project, they increase the volume of fresh, outside air that enters a building, by typically about 30 percent above required standards.

Engineers can also increase air filtration, filtering air once when it comes into the building and again before it is recirculated. This helps to clean the air from any indoor particulate matter.

Finally, if owners want to go above and beyond in their efforts for good air quality, engineers can also design mechanical systems that incorporate an ultraviolet light. The process rids the air supply of bacteria, mold and viruses.

UV light is often used in the health care market. Now, it is becoming a topic of discussion for commercial buildings, as owners are increasingly interested in building-health conditions.

"If you can maintain the indoor air quality at a high level, minimize sick time, and make employees want to be in the space because it smells good and feels fresh, people will tend be more productive," says Scott Vollmoeller, an executive vice president at Glumac.

"When an owner values human performance based on the built environment, and we can create the systems that support that, then we've done our job and we've done it well."

Elena Velkov is a marketing specialist at Glumac's Seattle office.

CHEAP SOLAR ENERGY WON'T END THE NEED FOR DEEP-GREEN BUILDINGS

California energy markets show how surging demand after dark can force carbon-emitting power plants to step in to meet household needs.

The clean energy revolution is gathering steam with tech breakthroughs, record-breaking deployment rates, free-falling prices and a new, cautious optimism about the prospects for meaningful climate solutions.

As this revolution unfolds, what are the implications for energy efficiency in our buildings? If it becomes cheaper to slap on solar panels than to insulate and air seal, do deep-efficiency approaches like Passive House make sense?

Should we just ditch energy efficiency for clean energy?

In fact, building energy efficiency has never been more relevant to climate action than today.

BY ZACK SEMKE
NK ARCHITECTS

Pittsburgh's Morningside Crossing is a 46-unit senior housing project that includes a Passive House retrofit of a former school.

IMAGE PROVIDED BY NK ARCHITECTS

The need for efficiency

While the climate crisis is wickedly complex, climate math is pretty simple. Carbon emissions are a product of four factors: population, gross domestic product (GDP) per capita, energy intensity of the economy (per unit of GDP), and carbon intensity of that energy.

We know that to limit global warming to well below 2 degrees Celsius, global carbon emissions need to peak by 2020 and then go down by 50 percent per decade every decade after.

Global population will rise to around 9 billion people in coming decades. GDP per capita will also increase as hundreds of millions of people rise out of poverty. We should celebrate that.

But the first two factors in our emissions math — population and GDP per capita — will increase, not decrease. That puts pressure on the latter two factors — energy intensity and carbon intensity. We need to see both decrease rapidly, with deep energy efficiency and renewable energy deployed all over the place. We need Passive House buildings everywhere, with solar panels on their rooftops.

Experts at the Carbon Tracker Initiative, DNV GL, Grantham Institute at Imperial College London, and the Energy Transitions Commission all concur: clean energy can propel us toward our Paris climate goals, but we need deep energy efficiency in our buildings to make the mark.

When it comes to clean energy and Passive House, it's not either/or, it's both.

Positive cash flow

But is deep energy efficiency just too expensive? Not anymore.

According to Pembina Institute, the average construction cost premium of Passive House projects is just 6 percent. Data from Pennsylvania Housing Finance Agency suggest that this premium could be as low as 2 percent for multifamily buildings. With upfront costs as low as 2-6 percent, ongoing utility bill savings can offset the bigger mortgage or construction loan payments required to fund Passive House construction. Passive House can be cash-flow positive from day one of occupancy.

Policy mechanisms like "property assessed clean energy" financing can eliminate the split incentive problem, allowing project owners to invest in energy efficiency and assigning the debt service for that investment to the property itself. Future buyers enjoy the benefits of Passive House and take on the loan payments that fund those benefits, all cash-flow positive.

When it comes to positive cash flow and Passive House, it's not

CHEAP SOLAR — PAGE 15

TO MEET GREEN GOALS, CITIES MUST GROW MORE STRATEGICALLY

Planning should focus on people's needs, and de-emphasize prescriptive zoning and car-dependent uses.

BY DOUG DEMERS & JILL JAGO
B+H ARCHITECTS

This vertical campus concept has flexible community spaces that encourage people to socialize.

IMAGES BY B+H ARCHITECTURE

A master plan for a sustainable mixed-use development in Chengdu, China. The aviation-themed community mixes housing, offices, retail, green space and public transit.

Earlier this month, the United Nations Intergovernmental Panel on Climate Change released a disconcerting analysis at its Cities and Climate Change Science Conference: Cities actually emit 60 percent more carbon than city planners are accounting for.

Our current focus on renewable energy and mobility solutions cannot stem the tide because the escalating emissions are generated by per capita consumption of goods and services beyond building use and transportation. In other words, we are in trouble and our current approach won't fix things.

The report finds that wealthy "consumer cities" like London, Paris, New York, Toronto and Sydney, despite substantial progress on today's spreadsheets, in fact rank alongside pollution-generating "producer cities" in India, Pakistan and Bangladesh when their total per capita footprints are calculated.

This should not suggest that our steady progress in green building technology and energy efficiency or our investments in mass transit are a mere drop in the ocean. Rather, the time has come to amplify our impact by taking a much more strategic approach to green — one that optimizes planning around people, nature and essential needs, not around prescriptive zoning and programming, function and its demands.

Meeting basic needs

The first primitive village was a response to meeting the most basic needs of people. It was founded by water, then grew to provide food and offer shelter.

These basic needs have not changed in millennia. Yet once the basic needs are met, the village provided the means not just to survive but to thrive. At the heart of the community, relationships were founded; information exchanged; goods made, bartered and sold; food shared; advice given and ideas born.

Data-driven design

Most major U.S. cities have evolved to optimize use of the automobile. As we now contemplate a future where the automobile is losing its primacy we are stuck with stranded assets, natural pathways bisected by giant highways and open spaces hostile to human activity.

Our current approaches tend to work within the confines of these arbitrary constraints without considering the bigger picture — continued economic and social growth over time, supported by a healthy environment and sustainable resource management. If this is the goal, and it's the only goal that promises any kind of a future worth striving for, we have to shift the focus to

GREEN GOALS — PAGE 15

ASPHALT: THE GO-TO MATERIAL FOR GREEN PAVING PROJECTS

The asphalt industry reuses and recycles nearly 75 million tons of its own product annually, lowering carbon emissions and taking a burden off landfills.

BY KAREN DEAL & TAMARA HUDDLESTON
LAKESIDE INDUSTRIES

Asphalt might not sound like a green word, but it is a green product that packs the potential to reduce carbon dioxide emissions, improve air quality and keep our water clean.

Over the years, asphalt has become the go-to material for constructing green pavements and is used for everything from fish hatcheries to lining our drinking water reservoirs. From the production of the paving material to the placement of the pavement on the road, to rehabilitation through recycling, asphalt pavement minimizes the impact on the environment.

The low consumption of energy for production and construction, low emissions of greenhouse gases, and conservation of natural resources help to make asphalt the environmental pavement of choice. As both private companies and public agencies look for ways to be more sustainable and reduce their environmental impact, they can start by looking from the ground up.

Lakeside Industries has been recognized by various organizations and received awards and accolades for our environmental contributions. We work hard to find solutions for our clients to increase sustainability within their own organization.

We received a King County Green Globe award in 2013 for our production of sustainable pavements by using recycled asphalt shingles in our paving mix. We were also recognized for our work with the Washington State Department of Transportation on a new pavement specification for evaluating pavements containing recycled asphalt shingles on state roads.

Recycling roads

In order to be green, we have committed to producing a product that incorporates recycled materials into our asphalt mixes. Reclaimed asphalt pavement (RAP) is the term given to removed and reprocessed pavement materials containing asphalt and aggregates.

These materials are generated when asphalt pavements are removed for reconstruction, resurfacing or to obtain access to buried utilities. RAP has multiple applications and can be crushed and incorporated into hot- or warm-mix asphalt that is used for new paving projects and utilized as an aggregate for various construction uses.

According to the Environmental Protection Agency and Federal Highway Administration, RAP is recognized as America's number-one recycled product, and the asphalt industry reuses and recycles nearly 75 million tons of its own product every year. This takes a significant burden off landfills and helps to ensure that untapped mineral resources will be available to future generations.

Use of RAP also helps to lower greenhouse gas emissions. According to an EPA study, adding 20 percent RAP to new asphalt pavements reduces greenhouse gas emissions by 14 percent.

Porous pavement

Use of recycled materials and construction of porous asphalt pavements in major projects helps organizations reach their sustainability goals and can be a significant factor when being considered for various awards and designations. Lakeside helps these businesses by producing high-quality paving materials that help them meet these awards requirements.

Greenroads, for example, is a foundation that advances sustainability education and incentives for transportation infrastructure.

They have developed a rating system for projects designed and constructed to a level of sustainability higher than standard industry practices. This is a distinguished designation for a project to achieve, as it must pass a rigorous review using the Greenroads Rating System. Recycled and recovered content, use of local materials, materials preservation and reuse, and water runoff flow control are some of the metrics used in determining whether a project is eligible for the designation.

When contractors use asphalt containing significant levels of RAP or select porous pavements for their paving projects, they can more effectively meet their sustainability goals, helping them meet the requirements of this designation.

Lakeside is a major producer and supplier of porous asphalt mix. Porous asphalt is produced using the same process as other asphalt design mixes, but with a lower concentration of finer materials. Typically, a porous asphalt pavement is constructed with three layers: a surface layer, a filter layer and a reservoir layer.

The result is a pavement that allows water to drain through the surface into a recharge bed, where it slowly filters to the soils below. This is beneficial when considering stormwater runoff management design, as it can significantly reduce the amount of untreated runoff reaching open waterways and prevent flooding on roads and in parking lots.

Porous asphalt pavements are being used successfully throughout the U.S. in every type of climate and geography. They are recognized by the EPA as a best practice for stormwater management.

A Lakeside Industries asphalt plant in Monroe.

PHOTO PROVIDED BY LAKESIDE INDUSTRIES

LEED friendly

In addition to paving projects, developers are increasingly looking to find ways to build using recycled products and materials in their projects. Use of asphalt containing RAP in driveways, parking lots and other structures can be a major factor in achieving green building certification credits.

The LEED green building rating system serves as a benchmark or scorecard for the design, construction and operation of green buildings. It was designed to encourage the adoption of sustainable building and development practices.

Incorporating porous asphalt pavements, open-graded surfacing or light-colored asphalt into a building project are some of the areas that are eligible for credits under the LEED sustainable sites criteria.

The recyclable nature of asphalt pavement, the use of asphalt with high percentages of RAP, and the requirement that asphalt must be produced locally can also make a project eligible for credits under LEED criteria. Additionally, innovation and design credits can be awarded for use of warm-mix and high-RAP-mix asphalt pavements.

When all these factors are considered, asphalt pavements can contribute more LEED credits than any other pavement type.

Supporting society

The world needs asphalt, and we're proud of the product we're able to deliver to our customers to build schools, airports, highways, city streets, private developments and fish hatcheries, to name a few.

Through investments in technology and leading in industry trends, we work to continually improve our practices to exceed the requirements established by state and local environmental agencies. When your product is integral to the infrastructure that supports our society, you should work even harder to protect the world our society lives in.

Karen Deal is the environmental and land use director at Lakeside Industries. Tamara Huddleston is a technical administrative assistant at Lakeside.

CLIMATE CHANGE IS MAKING RESILIENCE A MORE URGENT DESIGN PRIORITY

A new rating system called RELi will offer credits for projects that adapt to natural threats such as extreme rain, sea level rise and storm surges.

Over the past few decades, there has been steady progress in the building industry toward producing projects that are environmentally sensitive and energy efficient.

This movement is spearheaded by the global efforts of the United Nations Intergovernmental Panel on Climate Change, regulatory agencies like the Environmental Protection Agency and the Department of Energy, and cities, states and companies.

BY CHRIS TYNER
PERKINS+WILL

Standards such as the U.S. Green Building Council's LEED rating system and the Living Building Challenge have become synonymous with sustainability. Their fundamental goals are to sustain natural resources, promote occupant health and reduce life-cycle waste and pollution to safeguard prosperity and opportunity for future generations.

Despite the positive influence of the sustainability movement, it is imperative to look more broadly at how the work we create connects to the systems we are part of. Resilient design, with its emphasis on withstanding and recovering from the impact of shocks and stressors, is the natural evolution of sustainability. Sustainability relies on resilience.

Tree snags were installed along the Thea Foss Waterway in Tacoma to restore lost bird habitat.

PHOTO BY BENJAMIN BENSCHNEIDER

Designing for resilience

Resilience is often confused with sustainability because there are numerous overlapping components: flexibility, adaptability, energy efficiency, health, material reuse and conservation, to name a few. Designing for resilience involves assessing social, economic and environmental vulnerabilities, then implementing design responses to enhance system stability.

For example, what if a hospital could be designed to remain operational — and energy- and water-self-sufficient — in the event of a disaster? What if an office tower provided safe shelter, food, water and emergency supplies for days after an earthquake?

Could distributed clean power sources reduce greenhouse gas emissions, lower consumer cost and ensure critical operations when grid services are disrupted? Can rooftop gardens provide employment opportunities and fresh food sources?

Dangers ahead

There are numerous issues creating an urgent need for a holistic design approach. Pollution continues to accelerate biodiversity loss through atmospheric degradation and contamination of land and water.

The frequency and severity of natural disasters is on the rise due to climate change. Exponential population growth means more people are impacted by climate-related displacement, economic disparity and competition for finite resources.

In the Pacific Northwest, it is essential to prepare for shocks such as earthquakes and flooding in design planning. We are experiencing warmer and drier summers that affect thermal comfort, agriculture and ecology. Recent Canadian and eastern Washington forest fires resulted in weeks of poor air quality. Projections forecast more severe storms and rising waters.

A recent University of Washington study highlights the disparity in life expectancy between higher- and lower-income neighborhoods. Resilience planning should include policy and strategies that bolster all demographics. Designs must respond not only to the threat of acute shocks but also to issues posed by chronic stressors such as income inequity, aging infrastructure, and access to transportation, food and water.

Taking action

In the U.S., there are cities, states, communities, corporations, universities and institutions that are making resilience planning a priority.

Examples of these efforts include the Department of Housing and Urban Development's National Disaster Resilience Competition, World Bank's Urban Risk Assessment and the Rockefeller Foundation's 100 Resilient Cities program. Seattle is currently formulating its strategic plan based on a resilience workshop held in 2016.

In 2014, Perkins+Will, along with the Institute for Market Transformation to Sustainability, began development of RELi. This comprehensive action list was created to assist architects, city planners, developers, governments and businesses to design buildings, communities and neighborhoods to better withstand and recover from shocks and stressors. In a report prepared for the Energy, Kresge and Barr foundations, the Meister Consultants Group identified RELi as the only standard holistically addressing facilities and communities, including social vulnerability.

At Greenbuild 2017, USGBC formally announced its adoption of RELi. This means the standard will become a global rating system, similar to but independent from LEED.

Credits unique to the standard include adaptive design for extreme rain, sea level rise and storm surge. RELi also supports robust systems with credits that require projects to participate in or establish organizations that build community cohesion, and social and economic vitality. RELi is currently being used by pilot projects across the country.

Local examples

Designs that are regenerative and replenish essential systems contribute to resilience. For the Center for Urban Waters in Tacoma, Perkins+Will looked for ways to reintroduce biodiversity and restore the area's original habitat, which served as an osprey migratory path before becoming heavily industrialized.

Tree snags for bird perching were installed along the Thea Foss Waterway and large trees

were anchored in the water along the bank to create shaded areas for fish and wildlife. Several weeks after the building was complete, users saw an osprey perched on one of the snags, signifying that ecological restoration had begun.

Reducing reliance on grid source energy and incorporating distributed power systems promotes resilience. Perkins+Will's design for 400 Westlake in Seattle's South Lake Union neighborhood is participating in the city's Living Building Pilot Program.

The project incorporates self-sufficiency through on-site energy production and storage, providing emergency lighting for 10 percent of the building and refrigeration needs for one week. In addition, the project is committed to net-positive energy, which means it will generate more electricity than it needs to operate.

Since the roof area available for solar panels is not sufficient to produce all of the building's power, additional panels will be installed at an off-site location. This strategy, called scale jumping, enables others to benefit from distributed power.

The 400 Westlake tower in South Lake Union will produce and store enough energy to provide emergency lighting and a week's worth of refrigeration.

IMAGE BY PERKINS+WILL

Inspiring change

Rating systems are successful when they focus our aspirations and influence related industries to value environmental stewardship. Green design minimizes our impact on the Earth, however even the most sustainable projects are susceptible to shocks and stressors.

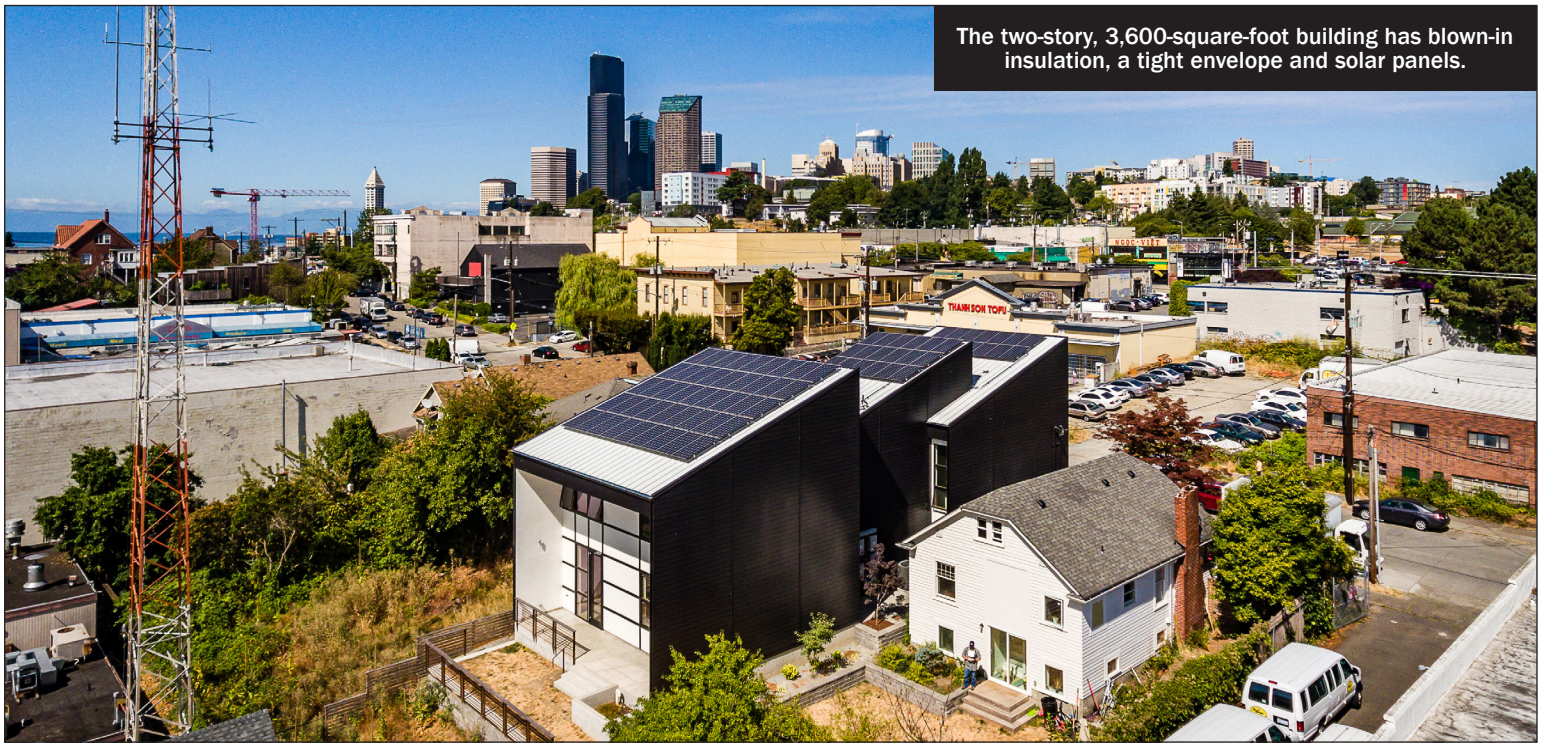
Resilient design, including innovative actions developed in RELi, challenges us to be proactive and inclusive as we address social, economic and environmental vulnerabilities. By embracing our diversity and interconnectivity, we can inspire an industry transformation that fortifies sustainability.

Chris Tyner is an associate with the Seattle office of global architecture and design firm Perkins+Will. Tyner is one of 28 RELi-accredited professionals worldwide; three are with the Perkins+Will Seattle office.

WE DESIGNED OUR OWN NET-ZERO OFFICE — AND YOU CAN, TOO

The building is only the second commercial structure in Seattle to achieve that distinction, but our goal turned out to be surprisingly within reach.

BY JULIAN WEBER & EMILY WALKER
JW ARCHITECTS



The two-story, 3,600-square-foot building has blown-in insulation, a tight envelope and solar panels.

PHOTO BY FLY DRONE BASE

Why does your building still use energy? Ours doesn't. Yours doesn't have to, either.

Seattle is recognized as a leader in sustainability, with groundbreaking architecture such as the Bullitt Center. The business success in Seattle has led to thousands of people moving to the city each year.

Our day-to-day work focuses on creating urban infill housing for the people living here. We work to provide higher-density living, which results in a lower carbon footprint.

JW Architects was founded in a garage in 2009 and then moved into two offices in a historic building in Columbia City. In 2014, we had the opportunity to design our new office building. We translated our experience with high-performance-energy homes into a high-performance-energy office space.

Today, we work in a zero-energy building certified by International Living Future Institute. Three years ago, we never would have thought this was possible. It surprised us at how achievable it was with hard work, collaboration, a little bit of scrappiness and a lot of passion.

Zero-energy certified

It is not hard to find someone in Seattle who wants to make an impact on climate change. We harnessed that energy in our young office, set the ambitious goal of achieving zero energy, and came together to make it happen.

We began designing the building in 2014, broke ground in August 2015 and moved in the following June.

In the midst of the design process, some staff members attended 16 hours of continuing education classes offered by the American Institute of Architects about "getting to zero." The case studies presented were inspiring and intriguing, but with the Bullitt Center as the only certified zero-energy office space at the time, achieving zero energy seemed like a lofty goal. However, we researched and thought about which certification best represented the direction the firm was headed.

The distinction of zero energy ended up being the best choice. Zero energy has a succinct definition: "In one year, our building produces more energy than it uses."

We enjoy telling this to friends and colleagues because it's clear and people can easily identify with the measurement and values.

Zero-energy certification by International Living Future Institute requires one year of proven performance. We achieved that in September 2017 after occupying the building for 15 months. Our office on King Street is the second commercial building in Seattle to be certified, following the Bullitt Center.

Since occupying the building, we have spent time reflecting on the strategies used and some key lessons learned.

Even on gray days, the office is mainly illuminated by natural light.

PHOTO BY TANNER HOUSELOG

Design strategies

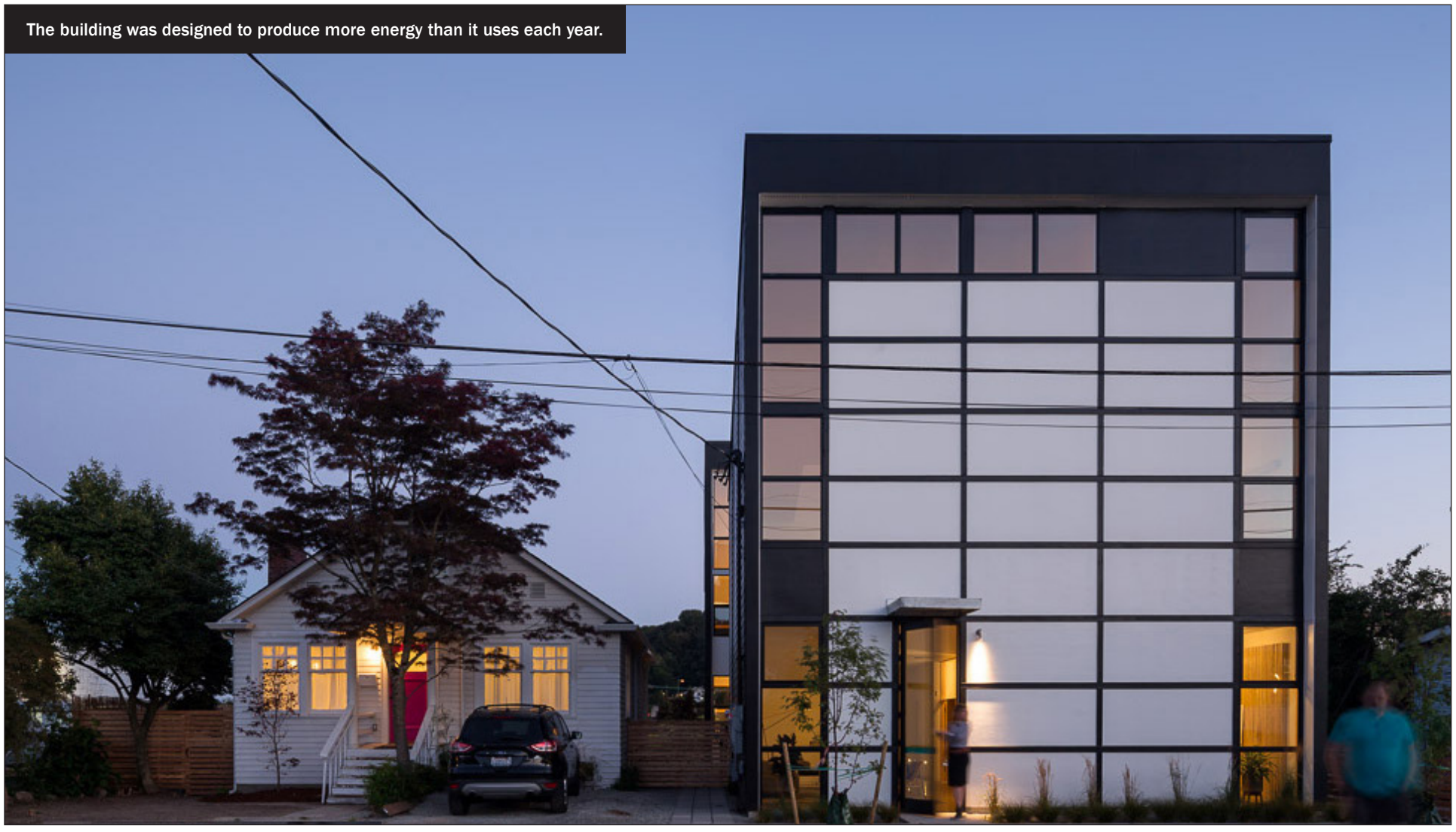
● **Upgrading the building envelope.** We drew on our knowledge base and created an energy model in-house. We calculated the most strategic insulation strategies and placed R-20 rigid insulation below the slab, and 2 inches of spray foam on the walls for both insulation and air infiltration.

The remainder of the 2-by-8-inch exterior wall is filled out with blown-in fiberglass insulation. The roof is underlain by CertainTeed MemBrain and insulated with two rolls of R-38 insulation and covered with a white metal roof to minimize heat gain.

● **High-efficiency mechanical.** Two air-to-air heat pumps provide both heating and cooling with distribution by two high air-handling units dedicated to each zone.

Indoor air is exchanged with outdoor air by a heat-recovery ventilation system. Hot water for bike and run commuters is provided by a heat pump hot water heater. We use an all-LED lighting system.

● **Daylighting.** At King Street, the outdoors can be experienced inside with great views of Mount Rainier on clear days. We implemented a time-tested sawtooth



The building was designed to produce more energy than it uses each year.

PHOTO BY LARA SWIMMER

roof form with north-facing windows to create a balanced quality of daylighting, reducing our energy load over the year.

- **Measuring plug loads.** Plug loads were measured by using two $90 electricity consumption meters and creating a spreadsheet. We plugged the meter into each electrical device in the Columbia City office and measured the usage for two weeks.

Many offices that pursue zero-energy usage convert all their computing to laptops. We experimented with that, but found the reduced screen size challenging. We upgraded our desktop spec to include the most efficient CPUs and graphics cards.

Lessons learned

- **Rate of heating and cooling.** The building cools down efficiently from the passive ventilation strategy of night flushing. When the heat pump is producing cool air, the building gets comfortable very quickly because of the natural stratification of the air. The large volume of the interior keeps the building from getting comfortable as fast when heating.
- **Daylighting.** We used much less artificial lighting than expected. The energy model was based on operating our all-LED system for a building-wide average of 11 hours per day for 250 days per year.

At our office, people have individual LED task lamps they typically use for a couple hours in the early morning and later afternoon. Daylighting is the primary source of lighting even on the grayest of days.

Though our projected EUI was 20.4, our actual EUI was 17.4 after 12 months of occupancy. We attribute that to the amount of useful daylighting and limited use of artificial lighting.

- **Visibility of the solar panels.** Clients typically push us to make sure the solar panels are visible to the homeowner. After touring friends and family through the building, we wish the panels were more visible from inside the building.
- **Night flushing.** Our team was engaged with the building while experimenting with night flushing strategies. Through trial and error, we eventually achieved a strategy that is successful.
- **Learning to be an intentional occupant.** We are diligent about opening windows and turning on and off the heat. In the winter, we run the heat from 7:30-8:15 a.m. and then supplement throughout the day when needed. We do not have to sacrifice comfort to achieve zero energy.

A heat-recovery ventilation system heats fresh air as it enters the building.

PHOTO BY LARA SWIMMER

New projects

Our whole team has a stake in this one statement: "In one year, our building produces more energy than it uses."

Energy conservation is embedded in our office culture and everyone contributes. Currently, we are applying many of the lessons learned from the King Street office to two residential projects targeting zero-energy certification. In the works are a compact seven-unit rowhouse project in Ballard and a single-family home in Georgetown.

We will continue pushing forward on designing for lasting sustainability through zero-energy strategies.

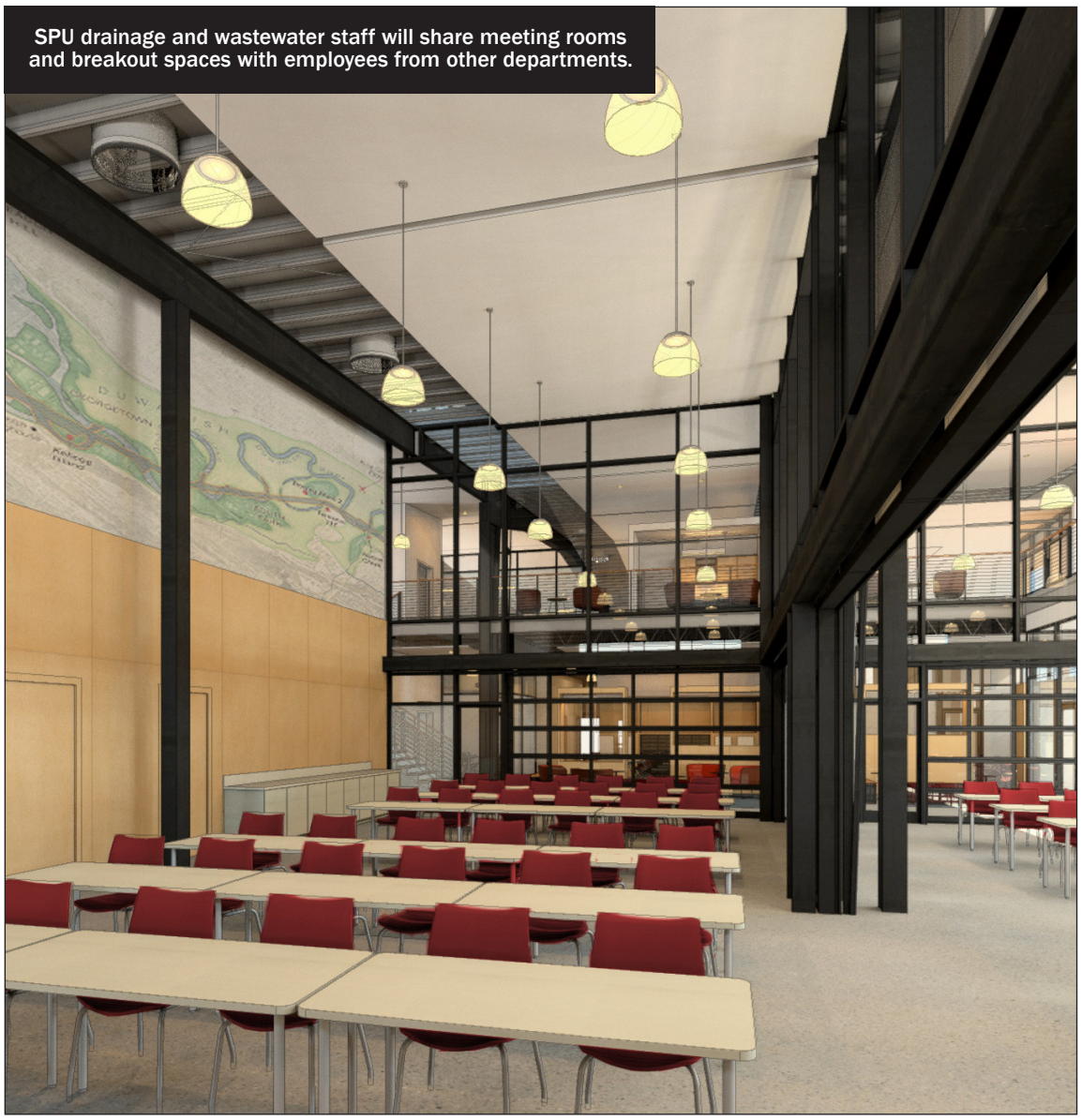
Julian Weber is the founding principal of JW Architects. Emily Walker is the client relations manager.

The operations center will be housed in a remodeled pre-engineered metal building in West Seattle. SPU plans to seek a general contractor in September.

IMAGE BY SHKS ARCHITECTS

SPU REMODEL SHOWS EVEN INDUSTRIAL BUILDINGS CAN BE GREEN

The South Operations Center will consolidate space, reduce drive time for field crews, and collect rainwater for washing fleet vehicles.



SPU drainage and wastewater staff will share meeting rooms and breakout spaces with employees from other departments.

Utilitarian buildings on brownfield sites can perform at high levels and improve cities at their industrial margins. The Seattle Public Utilities drainage and wastewater South Operations Center is designed to demonstrate this.

A 38,000-square-foot pre-engineered metal building on the operation center's 6-acre site will be substantially altered to create its new home.

BY PIA WESTEN
SHKS ARCHITECTS

The property, located on the western bank of the Duwamish River in West Seattle, has seen a variety of industrial uses over the years — including a shipbuilding yard, steel mill, lumber mill and, most recently, a Greyhound bus base — that have left their mark on the landscape.

This project will optimize operations, taking advantage of location, program efficiency and the transformation of operational processes. Site and program sensitivity demand a high level of environmental resilience. Additionally, the project will seek LEED gold certification.

Green site impacts

While the facility's industrial location accommodates operational and program needs, achieving many of LEED's sustainable sites credits is a challenge.

SOUTH OPERATIONS CENTER

Owner:
Seattle Public Utilities

Architect:
SHKS Architects

Landscape architect:
Site Workshop

Civil engineer:
LPD Engineering

Mechanical engineer:
The Greenbusch Group

Structural engineer:
Swenson Say Faget

Electrical engineer:
Case Engineering

LEED consultant:
O'Brien & Co.


The site as it looks now.

These credits commonly depend on compact development, alternative transportation and connection with amenities like restaurants and schools — elements not typically available in industrial zones. While LEED's rating system would not encourage the selection of this site, there is inherent value in renovating buildings and brownfield sites like this one.

For SPU, proximity to the Duwamish River alone improves service. The utility manages wastewater and stormwater services for residences and businesses. Field employees clean and repair sewer and drainage systems, investigate waterway pollution, and provide emergency response to natural events and disasters throughout the city.

The center's location on West Marginal Way will complement SPU's other operational facilities and provide greater proximity to service areas. Additionally, it will provide critical access to West Seattle, a part of the city largely cut off from the utility's emergency operations at times when the West Seattle Bridge is impassible.

This location will also significantly reduce drive time for field crews, which now operate out of SPU's Charles Street complex in Sodo. The reduced drive time will decrease the fleet's environmental impact.

Considering all aspects of a site and its environmental and operational benefits allows for critical efficiencies not always measured or rewarded by today's green building rating systems.

Shared space

The center will accommodate field and office employees and co-locate SPU's source control, planners and warehouse staff and city fleet maintenance. Shared operational spaces like decontamination, locker rooms and dispatch will decrease the overall space needs for the facility.

Co-locating multiple SPU divisions will encourage collaboration between groups and further decrease space needs by providing shared meeting, breakout and ancillary spaces. The inclusion of warehouse and city fleet maintenance staff on the site will decrease drive time for field crews and reduce breakdown time of fleet vehicles by having repair and maintenance staff on site.

Co-locating SPU departments and eliminating duplicate spaces will reduce the required floor area by approximately 8,000 square feet. These program efficiencies will result in a reduction of nearly 720,000 kilo-British thermal units of energy use annually. The projected energy use intensity is 90, much better than one would expect to see at an average facility of this type.

Managing runoff

The existing site is largely paved and located on non-native fill; rainwater cannot infiltrate to the subsurface. Consequently, the site produces stormwater runoff that, along with its pollutants, flows into the Duwamish River.

SPU will use multiple on-site cisterns to collect rainwater runoff from the roof. The stored rainwater will be used by crews to reduce potable water use both in the field and in on-site operations.

Field crews will be able to fill the 1,100-gallon vacuum extractor trucks with the collected rainwater and use it for tasks that don't require potable water, such as cleaning and maintaining sewer and drainage systems. On site, the collected rainwater will be filtered and treated to be used to wash fleet vehicles.

This innovative use of rainwater — it was first proposed by an SPU staff member — improves the environmental impact of an industrial site not well suited for typical stormwater management strategies. To complement the reduction of stormwater runoff that the cisterns achieve, the site design includes vegetated biofiltration areas that treat stormwater before it enters the Duwamish.

Overall, optimization of outdoor elements such as storage and fleet parking will allow the site's vegetated surface area to increase by 300 percent, including 73 new trees, all working to improve on-site stormwater management and occupant health.

Designed for resilience

As a tertiary emergency facility, the South Operations Center will be a dispatch center for drainage and wastewater emergency operations following a major storm, earthquake or other natural event.

The resilience of the building to withstand such events and be operational is critical. Projected sea level rise and river flooding frequency over the next 50 years pose unique design challenges for a site predicted to see regular annual flooding as early as 2033.

With resilience as an essential design principle, the design team explored elevating the floor above the existing slab to keep the building above most predicted flood levels. The new floor assembly layers 4 inches of concrete topping slab and 8 inches of rigid insulation over the existing structural slab.

The additional 12 inches of floor elevation delays the predicted annual flooding of the building until 2056, but also creates a space for the distribution of plumbing, data and electrical systems without complex cutting and patching of the existing structural slab.

This strategy will also result in significantly less slab demolition. The challenge of designing for resilience has proven to provide benefits in unexpected areas.

Reuse of an existing steel frame is a first step toward carbon reduction. Increasing pervious surface on an industrial site will improve site drainage and water quality. The aggregation of small steps toward resource conservation and energy performance in the South Operations Center demonstrate that even utilitarian buildings on industrial sites can achieve high performance and improve our cities at their industrial margins.

Pia Westen is an associate with SHKS Architects and member of the University of Washington's Carbon Leadership Forum. SHKS focuses on the sustainable renovation, repair and adaptation of buildings and sites for contemporary use.

WHY WE CAN'T REACH OUR EMISSIONS GOALS WITHOUT TRACKING EMBODIED CARBON

Net-zero buildings are great, but don't forget all the carbon that's emitted to build them in the first place.

Most of us in the industry can rattle off certain accepted facts about the environmental impacts of the buildings and infrastructure we design and construct.

For example, buildings generate more than 170 million tons of construction waste annually; buildings account for almost 14 percent of all potable water use; and buildings are responsible for almost 40 percent of carbon dioxide emissions.

BY STACY SMEDLEY
SKANSKA USA

We are becoming fluent in the language of construction-waste management and energy- and water-use reduction, and as an industry we are equipped with the tools and knowledge to have deep impacts across those categories. Here in Seattle, Skanska consistently sees construction waste diversion above 80 percent. And when a project is pursuing a green-building certification, teams can design to effectively reduce water by 30-40 percent or to a targeted energy use intensity in the low 30s.

But there is a metric missing from our daily conversations: embodied carbon.

An overlooked issue

A couple of years ago, I heard Ed Mazria of Architecture 2030 present on the Paris climate agreement and the commitment to a less than 2-degree Celsius temperature increase. To stay below that threshold, he said, we had to actively start reducing carbon emissions — not tomorrow, but today.

Ed also explained how on the operational side of buildings, designers and builders understand how to get to net zero through energy use reductions and renewable energy production. It is not an insurmountable stretch to get to zero emissions by 2050 for building energy consumption.

Ed then moved to embodied carbon, which encompasses the carbon emissions associated with the manufacture, transport and installation of all of the materials necessary to construct a building or infrastructure project, and how it is the missing piece of the emissions pie chart.

I knew about this from work at Skanska, based on our internal embodied-carbon tracking for the projects we ourselves commercially develop and build. But I had not expanded my thinking past our small dataset of projects that were just helping us understand where embodied carbon emissions of a building came from.

When you look at the two buckets of building emissions — operational vs. embodied — an interesting story begins to emerge. With such a focus on operational energy over the lifetime of a building, we have failed to give enough attention to the amount of carbon emissions we create in short periods to construct those buildings in the first place.

We know there is an imperative of zero carbon by 2050 to keep things on this planet from going haywire, and it's simply not enough to get to zero on the operational side of the coin if the embodied carbon emissions haven't also been reduced or offset completely.

Taking action

Thinking about things this way was a shift for Skanska, and we moved forward quickly on finding a way to approach embodied carbon similarly to how we tackle operational energy consumption, and understanding the quantitative comparisons of the two. We needed to collect any and all building carbon footprints that we could get our hands on and utilize them to set benchmarks for embodied carbon per building type, so there was at least a dart on the dartboard of where to start and what to reduce against.

We helped fund the first phase of research and data gathering for the creation of embodied carbon benchmarks across building types for the University of Washington's Carbon Leadership Forum. The outcome of this effort is open source and can be found at http://bit.ly/2pz6hFQ.

The study showed that there were a great deal of variables associated with how embodied carbon calculations are currently being completed. There is a wide spectrum of reasons why teams tackle or don't tackle this quantification based on understanding, resources or client interest. And there is a glaring need for embodied carbon to be analyzed and benchmarked so it can be better understood and tracked by the building industry. Since the Embodied Carbon Benchmark Study effort, a lot of movement has occurred in a short time, including:

- The Carbon Leadership Forum continues its work to create a life-cycle assessment practice guide as phase two of the grant.
- A national Embodied Carbon Network has been established and is growing at a rapid pace, with over 200 members across eight task forces. Skanska and a handful of others are moving forward with the expansion of datasets by benchmarking our own projects more holistically, using building material quantity and site construction data already available to us on our projects.
- Policymakers are beginning to understand materials emissions impacts, and proposing policy that would mandate that embodied carbon of materials be reported and reduced. Examples include state Rep. Beth Doglio's Buy Clean Washington Act, which was proposed in the most recent legislative session.
- And we are seeing actionable examples of what thinking about embodied carbon during the early phases of a project can equate to, both in real emissions and cost reduction, through case studies such as Skanska's Interstate 5 corridor project. The project salvaged 52,569 square yards of demolished cement concrete for reuse on site as crushed surfacing base course, offsetting the emissions and cost associated with that amount of new material production, resulting in 960 fewer vehicle loads to the site.

We are also seeing how presenting the data we already have is allowing informed clients to understand their potential embodied carbon and total carbon impact, and begin to set reduction targets that we can then help them work to accomplish. When owners see a metric that their building would need to operate for more than 200 years for the operational energy emissions to equal the embodied emissions of constructing the building in the first place, it's hard not to want to do something.

We currently have a project in early design that has committed to becoming a zero-carbon building through reductions and offsets, based on the client simply understanding the project's embodied carbon impact. We expect more to follow.

Stacy Smedley is sustainability director at Skanska USA, where she provides strategic guidance for local and national projects.

DISASTERS

CONTINUED FROM PAGE 2

resilience plans for Washington and Oregon, and in the Community Resilience Planning Guide by the National Institute for Standards and Technology.

Expectations for design professionals will be shifting as we are asked to add recovery time as a design metric. Everyone will still want cost-effective design and construction that is reliable, but we can expect that more and more often we will be asked to include quick recovery with that reliability.

This does not mean that everything just needs to get hardened or made bulletproof. In fact, maybe the opposite is in order. Sometimes the best design solutions to help users to recover more quickly are flexible and adaptable rather than bulletproof. If we can design a facility that recovers quickly with spare parts in storage, then we may be able to save on other costs.

Some clients may be happy to trade frequency of failure for speed of recovery. For example, if a bridge is washed out, wouldn't it be better if it could be repaired in just weeks with replaceable parts rather than the years it now takes to rebuild a bridge and access roads far above a stream bed that mostly just runs low?

There is an equity challenge woven in as well. The people who have the most difficulty with a long recovery are those with limited credit, limited savings and limited social networks. Small businesses suffer especially.

According to the Federal Emergency Management Agency, 40 percent of small businesses fail after a significant event disrupts the economy. That's because revenues plunge immediately while the rent and the debt never sleeps.

Habitability

Even with required performance standards for resisting catastrophic events, we can develop solutions like modular replacement parts that can be held in off-site storage. Or we can shift the design to minimize the vulnerability of interior finishes to damage or exposure to the elements with the goal of making buildings suitable for occupancy during repairs.

In the Bay Area there is an ongoing policy discussion about this very thing, which they have termed "habitability." From experience they know that if buildings are not suitable for immediate occupancy during repairs, whole communities are pushed to outlying areas, making recovery that much harder. The Association of Bay Area Governments estimates a habitability standard would raise costs less than 2 percent.

Resilience thinking is also ongoing in our own state. The Puget Sound Regional Council, which includes four counties, more than 80 cities and some area tribes, recently held a workshop looking at how to integrate resilience thinking into what they do.

The terms "resilient" and "sustainable" mean so much more than being resistant to damage or using fewer resources to operate. If we accept that climate change is shifting the baseline for extreme events already, and if we do care who is impacted, the next step is to shift our focus to a solution that reduces the impact to our communities and resources in a manner that accelerates recovery — for all of us.

Steve Moddemeyer, a principal at CollinsWoerman in Seattle, has more than 22 years of experience leading governments, land owners, and project teams towards increased sustainability and resilient infrastructure.

CHEAP SOLAR

CONTINUED FROM PAGE 5

either/or, it's both.

Beware the duck curve

A common way of thinking about buildings and climate action is through a "net zero" lens. Over the course of a year, you generate as much renewable energy on site as your building consumes.

In the summer, you are a net producer, and in the winter you are a net consumer. Does this mean you can ignore building efficiency, install a bunch of solar panels on a code-built building and call it good? Well, no.

In northern cities where both space and solar access is limited, you need deep energy efficiency to reach net-zero targets. There simply is not enough roof area on a typical two-story home in Seattle to achieve net-zero energy performance without also attaining Passive House levels of efficiency. The same is true for multifamily buildings: The only route to a four-story, net-zero apartment is deep energy efficiency plus on-site solar.

If your building is in suburban California where both sunshine and space to install solar panels is plentiful, deep efficiency may not be necessary in your net-zero energy math.

You might think you can get away with a mediocre building and make up the difference with lots of solar panels. Not so fast. You would be worsening the "duck curve" problem.

The duck curve is a daily dynamic in California energy markets. Because so much solar energy is being deployed in California, demand for non-solar energy during the very sunny midday now approaches zero. (The graph of this dip in the daily demand curve delineates the belly shape of the "duck.")

The problem is that in early evening, when people arrive home and power up their houses and HVAC systems, the sun goes down and all that solar energy disappears. This simultaneous drop in solar energy and spike in home energy consumption means that demand for energy ramps up extremely rapidly in evening hours. (This is the neck of the duck.)

Carbon-intensive "peaker plants" must then fire up to supply this spike in demand, generating lots of unwanted emissions. Because Passive House buildings maintain even interior temperatures throughout day and night with very little energy input, they are virtual "thermal batteries" that mitigate this evening spike in demand.

If more buildings in California were Passive House, fewer households would be powering up their HVAC systems in early evening and that spike in dirty energy consumption would disappear. As more utility-scale battery storage facilities come online, and as behind-the-meter home battery storage becomes cheaper, the duck curve will flatten even more.

When it comes to rooftop solar and Passive House, it's not either/or, it's both.

Seasonal storage

As exciting as batteries are for daily storage, they are ill-equipped to deal with the seasonal intermittency of solar energy. One of the trickier clean energy puzzles that humanity needs to tackle is how to power northern climates in winter.

Part of the solution will be more widely interconnected energy grids, so that southern sun can provide northern supply. Part of the solution will be wind and hydro. Another part of the solution will be power-to-gas, where excess solar energy produced in summer is used to split water into hydrogen and oxygen, and that hydrogen is stored as fuel.

But a key part of the solution lies in our buildings because heat demand from our buildings makes up a huge portion of winter energy consumption, and the thermal battery of deeply energy-efficient buildings meets that demand.

When it comes to a clean winter grid and Passive House, it's not either/or, it's both.

Investing in efficiency

The core reason that deep energy efficiency will remain central to both the clean energy transition and to global climate action is that efficiency is the ultimate distributed energy resource.

You can deploy it anywhere. It performs best exactly when it is most needed: during peak demand. It flattens the peaks and valleys of demand, making it easier to fill in the gaps with renewable energy, battery storage and demand response.

Despite the remarkable cost reductions of clean energy, energy efficiency is still the cheapest energy investment around, the "first fuel."

Passive House is not only still relevant in these early days of the clean energy revolution, it will help ensure the revolution's future success.

Zack Semke is chief marketing officer at NK Architects in Seattle.

RATING SYSTEMS

CONTINUED FROM PAGE 3

measures.

We've worked on projects in forward-thinking regions like Boston, New York and Los Angeles that have adopted resiliency measures into their building code to improve the response during the next Hurricane Sandy or Northridge Earthquake, and the benefits can go beyond literal disaster response.

Gerding Edlen's The Eddy apartment building on the Boston waterfront is in a site particularly vulnerable to sea level rise from climate change. The building has a suite of resilience features to bring its systems back to normal within three days of a disaster. The measures not only make residents safer, but also saved Gerding Edlen an estimated $9 million per year in decreased flood insurance premiums, according to the 2015 Urban Land Institute report "Returns on Resilience."

In regions where code hasn't yet caught up to the need for resilient design, these alternatives offer new frameworks for teams in any region to prepare for the specific risks in their geographic area — and for building developers and owners to demonstrate their commitment to exemplary performance in preparation for the escalating effects of climate change.

Business value

The systems I've mentioned are many, yet still just a partial list.

The green building conversation used to revolve around which rating systems would disappear and be absorbed by code. But organizations are increasingly recognizing that topic-specific systems aren't a distraction, but a vehicle to provide deeper and more relevant value for their business and a way of energizing and organizing their staff, clients and customers.

As these rating systems continue to multiply, find what's relevant to you by finding the framework that excites your organization and connects to your business mission.

Chris Forney is a LEED fellow and principal of Brightworks Sustainability.

GREEN GOALS

CONTINUED FROM PAGE 6

optimizing planning and design solutions for humans. What do they need? What do they want? Where do they go to get it?

When we map these patterns a completely different set of solutions emerges that leverages points of intersection, identifies opportunities to share resources and ultimately optimizes the human experience. Creating self-sustaining ecosystems that can evolve and adapt over time.

When we begin with people and map their needs, wants and desires, clear adjacencies and efficiencies begin to emerge. Many opportunities lie in the application of biophilic principles (which regard nature as the embodiment of efficiency). Water, energy and even waste, when balanced with human enterprise needs, will lead us to amazing new scenarios and solutions.

In our own strategic consulting practice the application of basic principles, informed by quantitative and qualitative analysis and thoughtfully balanced, typically generates 45 to 50 percent efficiencies over traditional planning process. The results to not come from elaborate design solutions, but simply by getting the bits better organized.

When you layer in advanced technology applications like artificial intelligence and smart systems, the results can double or triple the return. Given that all our economic activity is based on the consumption of natural resources, balancing our inputs and outputs within the context of the whole ecosystem is the only way to guarantee sustained economic and social prosperity in a healthy environment. Dust off your TQM and Six Sigma tools and processes and you'll be reminded how this thoughtful and holistic systems approach is just logical.

According to research by Dell Technologies, 85 percent of the jobs that will exist in 2030 haven't even been invented yet. Far from being pessimistic, this report sees a future where work chases people rather than the other way around, with companies setting out tasks to be completed then harnessing technology to match the task to the best qualified person, anywhere in the world. The greatest fear in this scenario, according to the analysis, is social disruption.

The U.S. is littered with cities and towns that grew up around an industry base that has subsequently faded and died. The success stories rise again from the ashes by taking an inventory of what they have and rebuilding community around the bright spots, like Pittsburgh's transformation from forgotten steel city to tech hub leading the world in robotics. The opportunity we have is to accept that we cannot foretell the future, but to plan strategically in the knowledge that the needs, wants and desires that fulfill people have not changed in millennia.

New opportunities

New and exciting solutions are quickly becoming reality — think of GIS, GPS, AI, autonomous cars or energy transfer. Advanced technologies, datasets and experience all afford a unique opportunity for urban planners and architects to significantly reduce the human environmental footprint by mapping and integrating human needs.

Throughout history — from da Vinci to Frank Lloyd Wright, Le Corbusier to Paolo Soleri — new town and urban planning visions have emerged, but each was weighted by a limited perspective attached to a time, technology or social evolution. For example, Wright's Broadacre City presupposed that cars would still be at the center of our approach, while others were too focused on technology or machine centric environments. Perhaps only Soleri and his unique social architecture showcased in the Arizona desert at Arcosanti addressed the social evolution — the sharing economy that is being readily embraced by millennials and generations behind them.

But none of these noted thinkers had the advantage of integrating and optimizing the built environment as we have today. This is an exciting horizon where we can truly make 1 + 1 = 4 or more, balance the human footprint, regenerating and empowering the environment to continue to support life on earth.

Doug Demers is co-founder and managing principal of B+H Architects, a strategic consulting practice. Jill Jago is communications director and senior strategist at B+H Architects.

April 4, 2018 | The Conference Center, Seattle WA

The Sustainability Conference for Business & Government

The 2018 program will feature an exceptional line-up of tracks with timely and stimulating topics in the world of sustainability.

SESSION HIGHLIGHT

The Clean Energy Future of Efficiency

Rachel Brombaugh
Executive Energy Policy and Partnerships, King County

Bretnie Eschenbach
Senior Energy Management Analyst, Seattle City Light

Jonathan Heller
President, Ecotope Inc.

Milton J. Huertas
Project Manager, King County International Airport/Boeing Field

Learn more and register @ seattle.gogreenconference.net use 'DJC' to save 20%

King County · Daily Journal of Commerce · Boeing · botanica: floral design · CLIF · DLR Group · EnviroStars · IBEW 46 The Right Choice · Port of Seattle · Rad Power Bikes · Raymond Handling Concepts Corporation · Recology CleanScapes Waste Zero · Sleeping Lady A Mountain Resort · W Surplus · Virginia Mason · Chinook Book