



DESIGN QUAR- TERLY

ISSUE 06



DESTINATION ZERO

The forces driving the next generation of sustainability and the tools to achieve it

DESIGN QUAR- TERLY

ISSUE 06

**THOUGHTS, TRENDS AND INNOVATION
FROM THE STANTEC BUILDINGS GROUP.**

The Stantec Design Quarterly tells stories that showcase thoughtful, forward-looking approaches to design that build community.

IN THIS ISSUE: DESTINATION ZERO



Sustainability is evolving rapidly, our targets and strategies for achieving them have changed. Why? The urgency of our environmental situation demands immediate action.

Today we're targeting Net Zero Energy and Net Zero Carbon. To get there we'll need to leverage the power of parametric design tools, develop a deeper understanding of what makes a community more sustainable, and understand where to focus our efforts for maximum result.

In this issue we explore the forces driving the progression of sustainable design, strategies to achieve it and the importance of delivering on what we promise.

01

Getting to Zero

The approaches, markets and tools for sustainability are evolving. Net Zero is the goal.

BY SAMANTHA LANE &
RACHEL BANNON-GODFREY

06

Retrofitting for the future

Retrofitting buildings for sustainability might just be the most important thing we're not talking about.

BY GRAHAM TWYFORD-MILES

10

Where the action is

Designing for density is an inherently sustainable approach.

BY BETH ELLIOTT AND
MATT SHAWAKER

14

Teaching nature

Creating spaces for lessons in sustainability

BY JONATHAN ALDIS
AND SHIVANI LANGER

19

Modeling sustainable solutions

Emerging digital design tools allow designers and engineers to achieve sustainability—on a budget.

BY ANDREA FRISQUE
AND SERGIO SÁDABA

23

Higher standards

Looking back on the pioneering design for the National Renewable Energy Laboratory in Golden, Colorado

BY PORUS ANTIA

27

Ask an expert: Carrie Sabin

What are sustainability rankings and why do they matter?

BY JOHN DUGAN

31

Final Thought: Sustainability is at our core

When I think about what I do and how it will affect future generations, I'm reminded that sustainability is at our core.

BY GORD JOHNSTON

GETTING TO ZERO

CALIFORNIA MILITARY DEPARTMENT



California Military Department
Consolidated Headquarters Complex (CHQC)
Rancho Cordova, CA
A large-scale ZNE (Zero Net Energy) project.



The approaches, markets and tools for sustainability are evolving.

Net Zero is the goal.

BY RACHEL BANNON-GODFREY AND SAMANTHA LANE





Sacramento Municipal Utility District East Operations Center
Sacramento, California

There's no getting around the fact that government and civic architecture is leading the way when it comes to NZE and NZC.

In Canada, civic projects such as the Varennes Net Zero Library and Parcours Gouin Trail Net-Zero Energy Reception Pavilion have set the pace for buildings to come. While in the United States, Net Zero Energy projects such as the Sacramento Municipal Utility District East Operations Center, Dearing Elementary School and the Denver Water Complex Operations Center (opening in 2019) are setting the tone for responsible development.

A new world of possibilities is opening up for design.

An expanding tool kit of approaches, materials and systems is making it possible for designers to respond to a growing buildings market: Net Zero Energy and Net Zero Carbon. What was once a niche for government clients is now emerging as a must-have for many educational institutions, even private developers.

What's driving the push to Net Zero Carbon and Net Zero Energy?

Urgency. Global organizations recognize that energy consumption by the built environment is significant and that it must be addressed to contain and reverse climate change. The urgency is reflected in agenda-setting documents such as the *United Nations' 2030 Agenda for Sustainable Development* and the *Paris Agreement*. New targets by government, public sector institutions and private sector leaders outline goals for reduction of carbon footprint in the built environment. See *"Staying on Target,"* page 5. Simultaneously, new government regulation and codes are pushing the building and development industries toward low carbon intensity. *California's California Energy Efficiency Strategic Plan* stipulates that all new commercial construction will be NZE by 2030, for example.

The good news is that motivators for clients to pursue Net Zero Energy and Net Zero Carbon are

changing. Potential clients for NZC and NZE are beginning to see the business case for making these investments, namely lower energy costs for operators, an improved energy resiliency, greater security in energy prices, as well as an attractive "green" story to help market their buildings and attract top talent.

Commercial developers who may have missed the boat on the first round of sustainable development with LEED are looking for a new competitive edge. The promise of significantly lower (even zero) utility bills for potential office lessees or condo buyers is a powerful selling point for them in these typically competitive markets. Private developers can also offer prospective lessees spaces that will support their corporate social responsibility mandates.

The education market for NZC and NZE buildings is ripe. Schools want to walk the talk. Schools are teaching about renewable energy, even offering courses in designing for solar energy. Naturally, they want to say they have a building that supports that kind of learning, a living laboratory. In higher education, NZC/NZE buildings aid in achieving energy security and low operating costs.

Due to their large scale, institutional NZC/NZE buildings can require energy offsets to meet their targets. But don't discount their value as

marketing tools. In the war to attract top talent, the story of a low carbon building can help an institution show that its values align with the student it hopes to attract.

Net Zero Carbon

In the Paris Agreement, Net Zero Carbon emerged as a significant pathway to mitigating the impact of fossil fuel-based energy consumption. The market is becoming more educated and committed to a Zero Carbon future. Mayors from over twenty cities around the world have committed to achieving Net Zero Carbon buildings, with end goals ranging from 2030 for new construction to 2050 for existing buildings. We are in the midst of a global transition, one in which buildings play a key role.

When designed properly, a NZC building prioritizes energy efficiency to minimize loads first, then leverages carbon-free renewable energy (e.g. solar PV) to offset the remaining fossil-fuel use and hit that net zero equation.

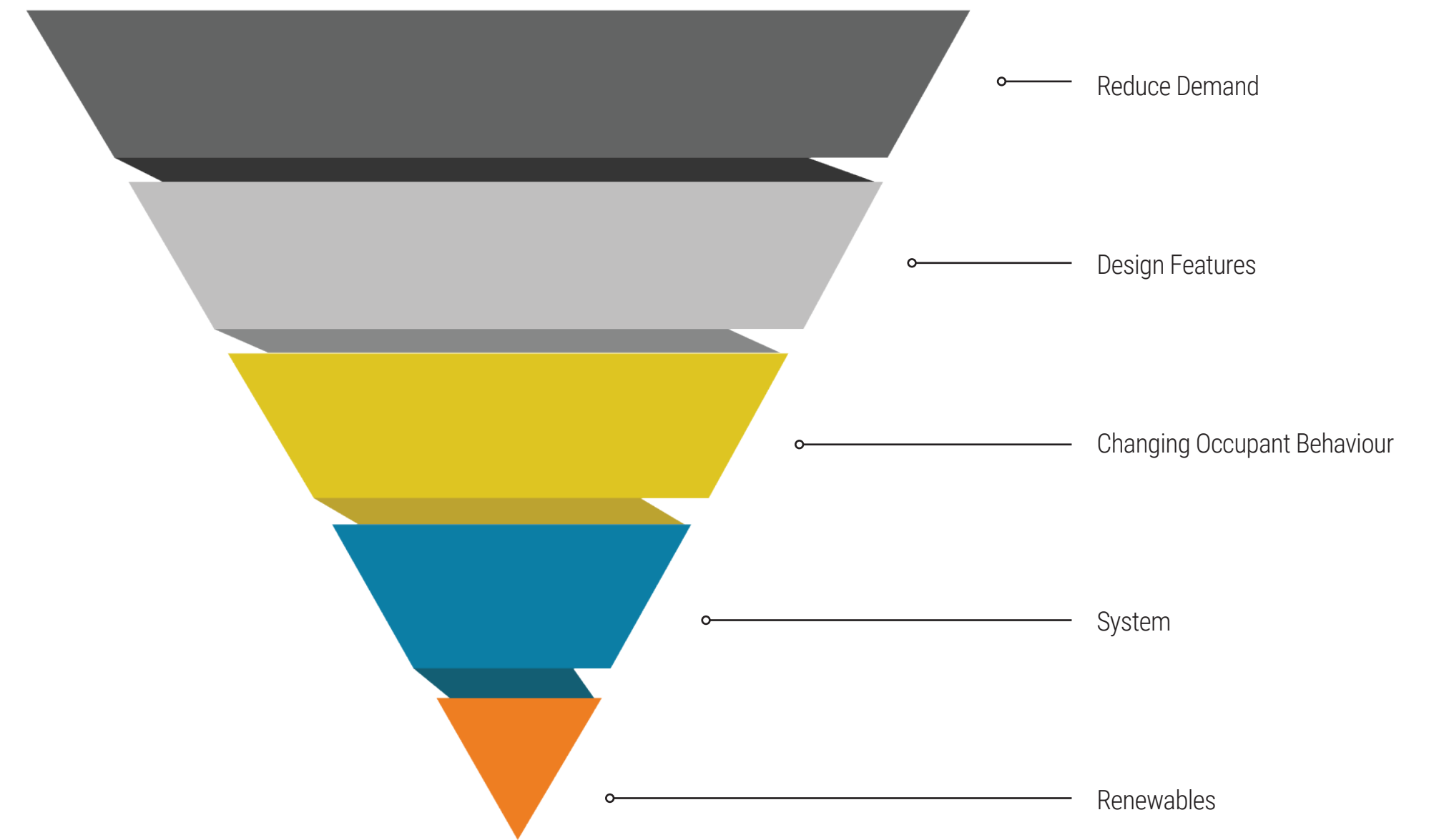
The 'cleaner' the utility grid serving the building, the fewer renewables are needed to reach zero carbon. However, if the building is served by a grid with a high carbon content, the relationship between energy efficiency, renewables, the grid, and the zero carbon goal changes significantly. NZC requires the design, engineering and analysis team to carefully consider the impact of the local and regional utility infrastructure on the building's goals. >



evolv1
Waterloo, ON

Commercial Zero Carbon buildings are here. The 100,000SF commercial property evolv1, which Stantec designed for the Cora Group in Waterloo, Ontario, is now operational. In 2018, evolv1 won the first-ever Zero Carbon - Design

certification and Zero Carbon Award from the Canada Green Building Council (CaGBC). It's currently being evaluated as a Net Positive Energy building - delivering more renewable energy to the grid than it consumes.



A PYRAMID APPROACH TO NZE/NZC

To achieve NZE or NZC performance within a realistic budget, we need to outline it as a project goal at the onset. Click the interactive pyramid above to learn about the five steps to achieving NZE/NZC in your next project.

EXPANDING POSSIBILITIES FOR REACHING NZE AND NZC

Beautiful envelopes

As building energy codes become more stringent, the market expands for products and systems that can make Net Zero Carbon and Net Zero Energy projects a reality. We have more economic tools to design a Net Zero energy or carbon building than ever before.

Previously, North American Net Zero designers were really limited by the range of envelope products available, especially in heating-dominated colder climates, where envelope design is critical for efficiency, human comfort and survival. To achieve Net Zero, our design palette was limited to a monolithic box with few windows and super-insulated walls, or the so-called marshmallow approach.

Things have changed dramatically, designers are exploring an array of products from vendors with attractive aesthetics and pricing. With the availability of triple and even quad glazing (which permits daylight harvesting while super insulating a building), designers can create more elegant and nuanced designs that respond to their context and function. A Net Zero building doesn't have to be a bland windowless box. Now, our designers have more freedom to create beauty, fill spaces with natural light and connect the building to its surrounding

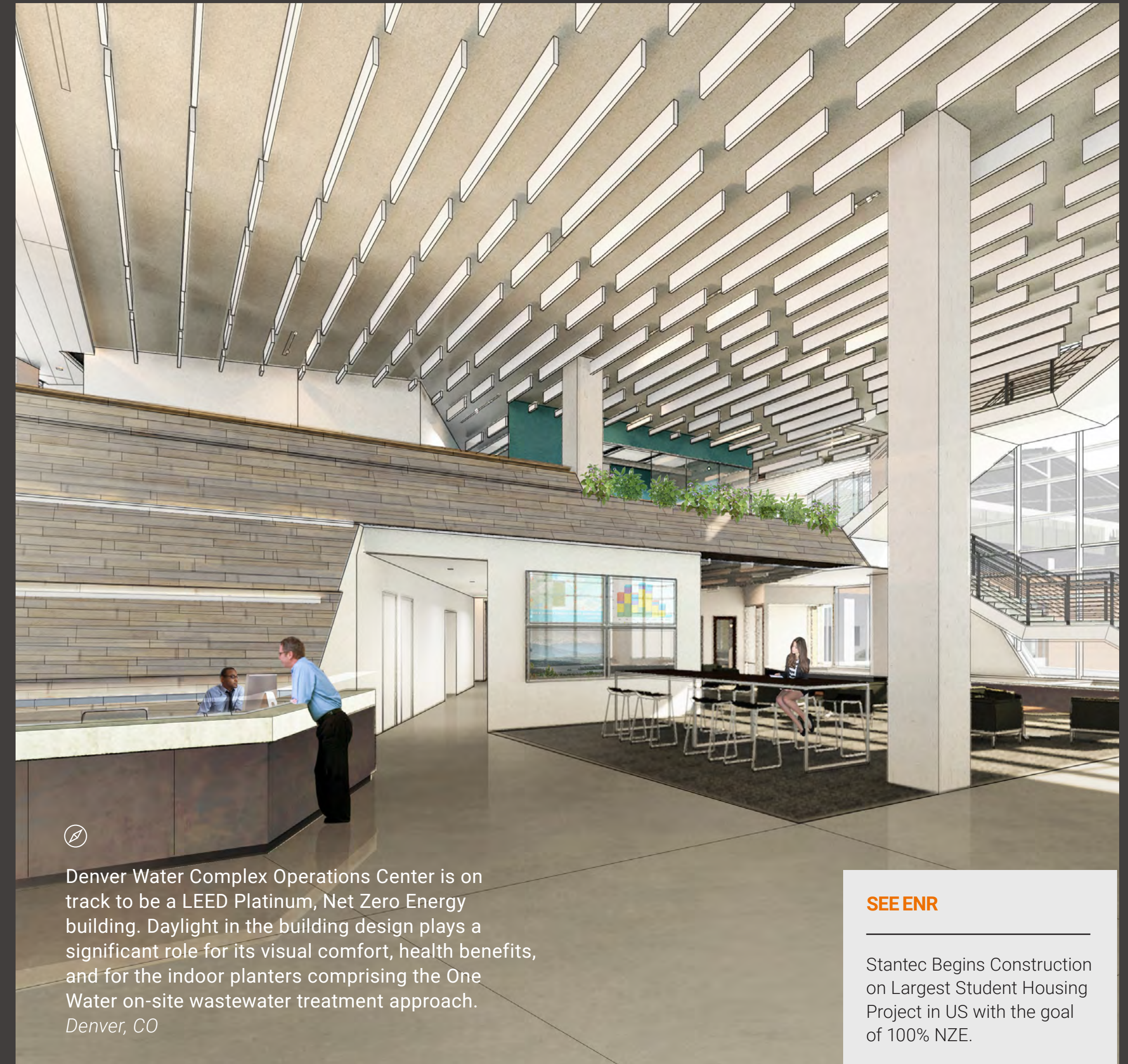
community and nature, leveraging the power of biophilia within these buildings.

Alongside these envelope-related products, we're considering the embodied carbon of building materials, the health and wellness of interior materials and the availability of lower-impact materials such as *engineered timber*.

A bigger toolbox

Building systems are also advancing rapidly. And many of the manufacturers of the latest super-efficient and innovative renewable systems are keen to see them demonstrated in the marketplace, as they anticipate a booming market for these systems. The price of photovoltaic systems has dropped in recent years, solar panels will only become more affordable. Pushed by the demand for clean energy, battery systems for off-grid storage are making rapid advances—and will only become more important as clients look for energy security and resilience in their new buildings and retrofits.

The variety of solutions to mitigating the carbon footprint of our buildings, old and new, is growing: from wind turbines to biogas-fueled heat and power generators to carbon sequestration. Ground source heat exchange systems, which can be used almost anywhere, are becoming more popular for heating and cooling. >



Denver Water Complex Operations Center is on track to be a LEED Platinum, Net Zero Energy building. Daylight in the building design plays a significant role for its visual comfort, health benefits, and for the indoor planters comprising the One Water on-site wastewater treatment approach.
Denver, CO

SEE ENR

Stantec Begins Construction on Largest Student Housing Project in US with the goal of 100% NZE.

As we dive deeper into a carbon neutral future, our toolbox continues to accrue more inventive and surprising options like carbon sequestration using algae or chemical processes that turn emissions into valuable carbonate by-products like soap.

Digital modeling

Today's digital design technology allows designers, architects, planners and energy consultants to explore numerous, complex interactions between the building, its systems, the climate, budget and operations over time. These tools enable us to understand and represent with more detail and predictability than we could previously. Digital modeling tools allow us to quantify and visualize complicated dependencies for achieving low-cost sustainable strategies. All these tools provide a platform for design teams to compare different solutions not only for energy, thermal comfort, or daylighting performance but also for cost, capital, operational, and life cycle cost. Our goal is to reach the optimum solution for each client. These tools are crucial to the process of making Net Zero buildings a reality. [D](#)

George Mason High School
Falls Church, VA
Design-build team of Gilbane, Stantec, and Quinn Evans Architects is targeting Net Zero Energy-ready.



[RETURN TO TABLE OF CONTENTS](#)

MORE SUSTAINABILITY

Building performance engineer **Samantha Lane** is based in Stantec's Calgary, AB office. An energy modeler, Certified Passive House Designer, and experienced sustainability consultant, she's passionate about inspiring teams toward delivering energy efficient and sustainable projects. **Rachel Bannon-Godfrey** has more than 15 years of experience in the design, construction, and analysis of high-performance and Net Zero Energy buildings, along with energy efficient and renewable energy technologies. She is Sustainability Discipline Leader for the Stantec Buildings Group, and sits in our Denver, CO office.

Staying on Target

The United Kingdom's Labour Party has a plan to transfer the UK **from 9% to 60% renewables by 2030.**

Canada plans to reduce its **greenhouse gas emissions by 30%** below 2005 levels by 2030.

California Energy Efficiency Strategic Plan stipulates that **all new commercial construction will be NZE by 2030**

Stantec has joined in the 2030 Commitment of the AIA, working towards **carbon neutral buildings by 2030.**

In Toyota's Challenge 2050, it pledges to **eliminate all CO2 emissions** from new vehicles, manufacturing and facilities in North America.

Microsoft pledges to **cut carbon emissions by 75% by 2030.**

The Seattle 2030 District targets a **50% reduction in energy use** by existing buildings and **70% reduction for new buildings in the downtown district by 2030.**



Retrofitting for the future

Retrofitting buildings for sustainability might just be the most important thing we're not talking about.

BY GRAHAM TWYFORD-MILES



The current built environment consumes energy and releases greenhouse gases.

If we're serious about the transition to a low carbon future or meeting our commitments under the Paris Agreement, we need to talk about the carbon savings potential of existing buildings.

Even if every new building were designed for net zero energy, we'd still be faced with the significant carbon footprint of North America's existing building stock. The vast majority of our existing buildings will still be in use fifty years from now, so retrofitting them is key to decarbonizing the built environment.

Building retrofits present design teams with complex challenges. But retrofits can result in a renewed asset that also produces less carbon, uses less energy, improves occupant health and well-being, and reduces costs to own and operate.

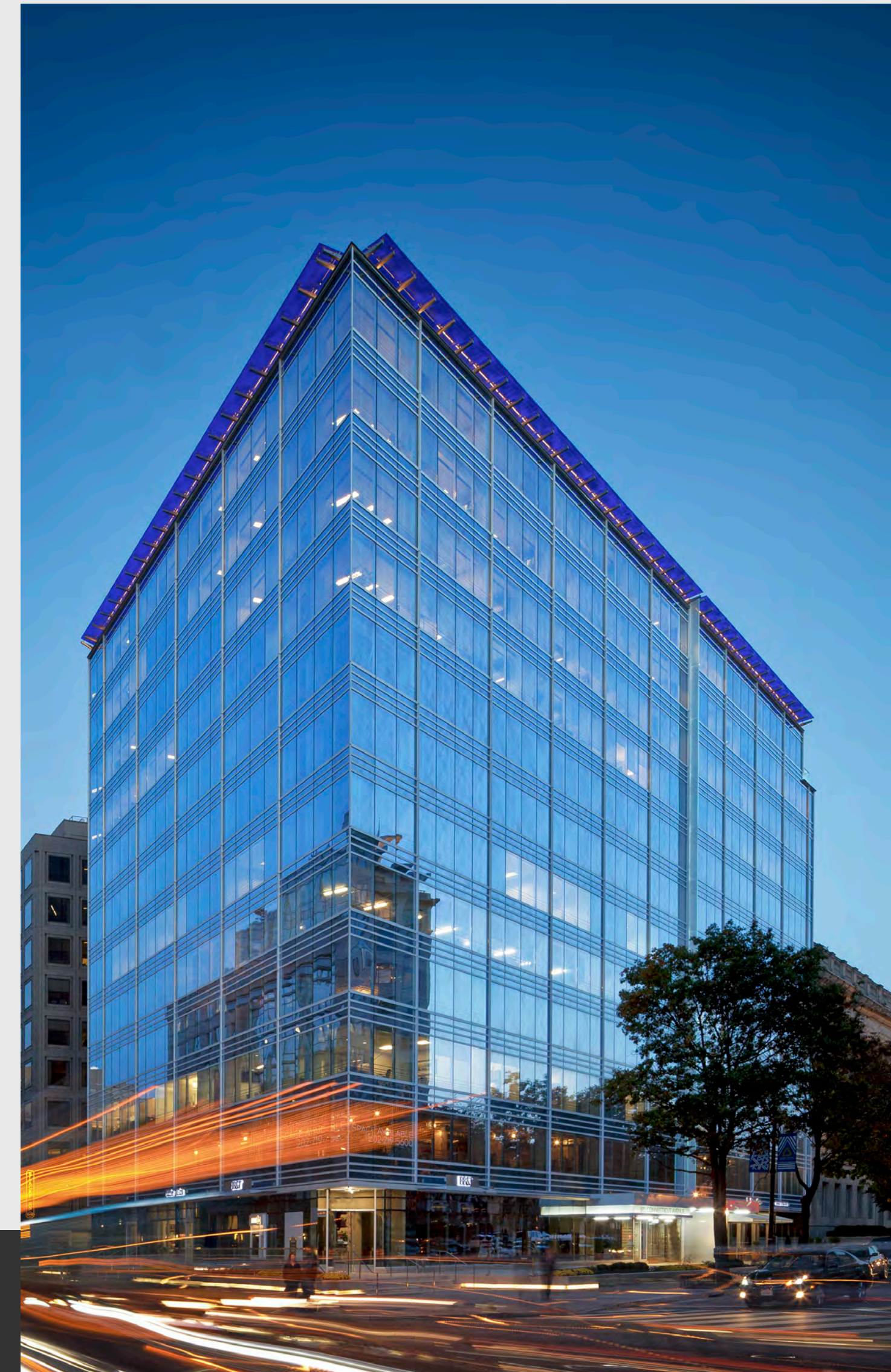
We need to change how we think about existing building projects. Evolving government priorities and regulations will encourage and eventually require retrofits for carbon savings and energy efficiency, and the private sector will follow suit. But that still begs the question, just how do

we make yesterday's buildings less carbon-intensive and what are realistic targets for retrofitting? How much can we do on a generous budget, what about a slim one?

Canada, as a signatory to the Paris Agreement, is targeting reductions in greenhouse gas emissions for 2030 and buildings are a significant part of that reduction. Retrofitting government buildings is an important step in demonstrating leadership in emissions reductions.

It's in this context of targeted reductions that real estate management company Brookfield Global Integrated Solutions (BGIS) has undertaken building retrofit studies for key buildings in their Canadian portfolio. BGIS has engaged Stantec to provide detailed energy assessments, building performance modeling, financial analysis, and performance engineering services, to support major upgrades to the facilities they operate.

Feasibility studies are an important first step in assessing the possibilities for retrofitting, and the range of strategies available for achieving carbon reduction. In detailed feasibility studies on more than 30 BGIS-managed buildings across Canada, we are investigating design concepts that will bring each building closer to net zero carbon operations. These studies include 25-year life cycle cost analysis of the buildings and recommendations for improving performance, which are essential for finding a pathway to carbon neutrality. By bringing a whole building design approach to these studies, we maximize the potential for carbon savings and energy reduction over the life of the building. >



815 Connecticut Avenue NW
Washington, D.C.



1 | Existing Building Condition Assessment: Complete a detailed study of energy use by the existing building and its systems.

2 | Energy Model Development: Develop a detailed digital model calibrated to available utility data following ASHRAE Guideline 14 and aligned with actual and potential building operations.

3 | Baseline Generation: Capture current and potential baselines.

4 | Energy Efficiency Measure Selection: Work the project team to identify EEMs suitable for the building based on performance, cost and replacement schedule.

5 | Energy Conservation Measure Analysis: Perform detailed energy simulations to assess the impact of each EEM.

6 | Financial Analysis: Complete a lifecycle cost analysis to evaluate the cost of each EEM, testing against operations, maintenance and replacement as well as energy costs.

7 | Recommendations and Reporting: Complete detailed report showing the results of the above analysis and the recommendations agreed to through multiple client workshops and review cycles.

To find best option for carbon reduction within budget, we leverage digital tools from parametric design to solar modeling software. By doing so, we can modulate options for design, systems, performance and cost. Studies like this are vast, complex, time-consuming undertakings, requiring multi-disciplinary collaboration and expertise in everything from building envelope to efficient mechanical systems to the cutting edge of parametric modeling software. But they are critical in achieving our carbon targets. It will take many studies such as this to kickstart what could be one of the most significant undertakings on the road toward a Net Zero Carbon future.

Why retrofit for carbon?

Reducing greenhouse gas emissions is critical to mitigating the effects of climate change. Existing buildings are responsible for a significant portion of Canada's emissions.

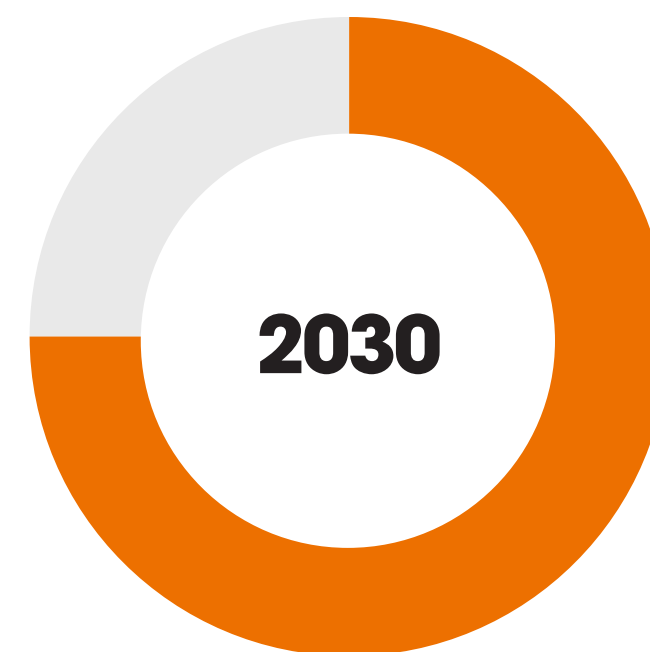
Canadian GHG Emission Sources:



The buildings industry has an important role to play in reducing Canada's carbon emissions.

- Industrial
- Buildings
- Electricity
- Agriculture
- Other
- Transportation

Canadian Building Stock:



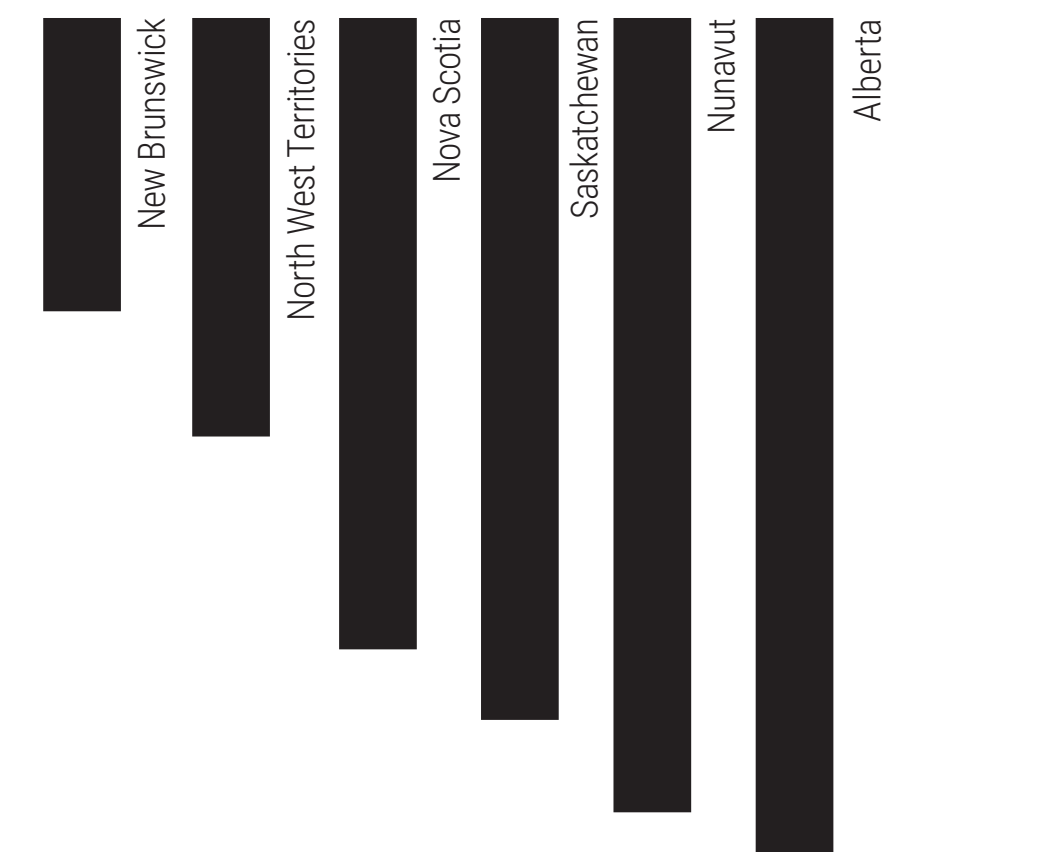
New building energy codes alone won't be sufficient to meet our emission reduction targets. Retrofitting existing buildings is a key piece of achieving Canada's climate targets.

- New Construction
- Already built in 2019

Rethinking the grid.

Fuel switch to electricity:

In "Clean Grid" areas, we must remove combustion from buildings and switch to electric boilers, ground-source heat exchange and ground-source heat pumps.



Fuel switch to alternative energy sources:

In "Dirty Grid" areas, we must switch from carbon sources to alternative energy sources such as solar PV, local biomass, wind power, and combined heat and power (CHP).

Performance Targets

We conduct an in-depth investigation of design strategies and energy efficiency measures (EEMs) that can substantially improve the energy performance and reduce the energy cost and GHG emissions of the subject building. We bundle the various possibilities for design interventions in four buckets; each defined by a different goal—ranging from the sky’s the limit budget option to a bare-bones ‘what would it take to reduce carbon by 20%’ option.

1

Minimal departmental standard

Reduces the building’s energy consumption by 24% from requirements of the National Energy Code of Canada for Buildings (NECB) 2011.

2

Highest GHG reductions while achieving a positive net present value (NPV) within 25 years

Reduces building’s carbon footprint (annual GHG emissions) as much as possible, while producing a positive net-present-value (NPV) for the project when evaluated over a 25-year lifecycle.

3

Carbon neutral

Achieves Carbon Neutrality. The bundle of EEMs reduces the carbon footprint of the building to net-zero without resorting to carbon offsets or renewable energy purchase.

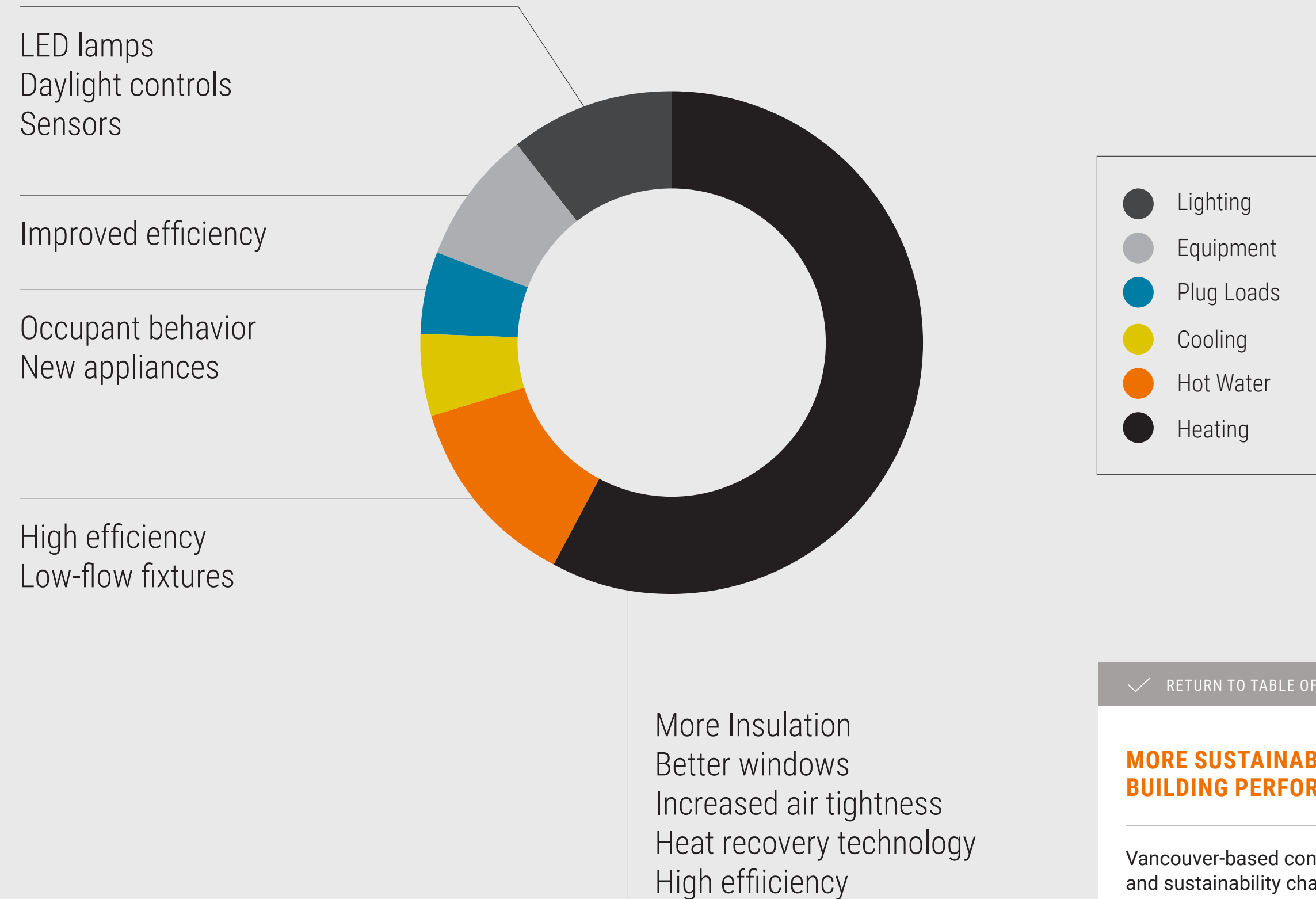
4

Best value

Provides the best compromise for the building in terms of achieving significant GHG reductions and overall project feasibility.

Energy appetites in existing buildings

We can reduce energy consumption in buildings with more efficient technology and educated behavior.



✓ RETURN TO TABLE OF CONTENTS

MORE SUSTAINABILITY & BUILDING PERFORMANCE

Vancouver-based consultant and sustainability champion **Graham Twyford-Miles** is passionate about improving the sustainability of our communities through thoughtful development planning and creative, performance-based design.

WHERE THE ACTION IS



Designing for density
is an inherently
sustainable approach

BY BETH ELLIOTT
AND MATT SHAWAKER

South Bay Center
Boston, MA



Headlines around sustainability are often devoted to the next generation of high-tech solutions—glass that can change its tint, for example. And as designers, we are enthusiastic about employing a range of sustainable design strategies from Passive House to solar orientation to daylighting. These strategies help designers deliver less carbon intensive buildings, but these approaches generally end at the building level. But what is truly one of the most sustainable actions we can undertake as designers? **Densifying our existing cities. If we want a more sustainable future, we really need to design for more sustainable lifestyles. Density is one way we can achieve that.**

Dense cities are sustainable because they're inherently more efficient. Those that dwell in denser cities typically drive shorter distances, walk more, and take more transit. They have a lower carbon footprint. City dwellers tend to live in smaller spaces which require less heating and cooling per person. Research shows there are other benefits, too. Those spending less time commuting by car tend to have healthier hearts. Density also provides opportunities to set the stage for the kind of social interactions and cultural experiences that enhance our life.

So, if I am asked, what's the sustainability goal for this urban design project?

I'D SAY THE GOAL IS TO MAKE A GREAT LIVABLE CITY AND THAT IN AND OF ITSELF, IS SUSTAINABILITY.

Enhancing city life for people

A density approach speaks to the way we experience and appreciate cities historically. Dense, human-scaled places with lively street life are perennially attractive to us. The designer that takes a human experience point of view within a city sees the benefits of density. If we can highlight the richness of city life and make it more desirable than the suburbs or exurbs, that's a sustainable point of view. Generally speaking, if we can enhance city life—those opportunities for activity, culture and social connection—we're making city life more desirable and in effect promoting density.



Oakridge Center
Vancouver, BC

How can we achieve and promote density and quality of life? There are ways to achieve a healthy density in the city that preserve privacy. We don't need a tower of apartments. There's lots of ways of achieving it in more human scaled forms.

Micro units: Driving affordability into urban housing

In micro-living, building residents trade private space for affordability. They live in smaller, studio-like apartments but in multi-unit buildings rich in amenities and common spaces and with easy access to the city's cultural offerings. It's a lifestyle that says the city is my living room... and laundry room and fitness center. Those shared public amenity spaces mean you'll actually get to know your neighbors! >

READ MORE ABOUT MICROHOUSING

From the Design Quarterly: "Living small means the city is your living room"



Confidential private development master plan
Dallas-Fort Worth metro area, Texas

Urban gardens

In shared urban gardens, urban dwellers have an opportunity to grow some of their own food and get their hands dirty in the soil without needing to maintain a private yard. We can insert these gardens into almost any development either on a rooftop of an individual building to pocket parks that break up the streetscape in the neighborhood. Bonus? Gardening has a psychological benefit. Another bonus? Urban gardens make excellent homes for urban wildlife.

Cities such as Boston have adjusted zoning laws to permit everything from ground and rooftop farming to beekeeping and aquaponics. Cleveland and Boston have created zones for urban agriculture. And Minneapolis has a garden lease program that promotes gardening in vacant lots and grants for turning brownfields into community gardens. To promote urban gardening, local governments must clear away some red tape, but it tends to be a low-cost way to green the city.

Pedestrian and bike friendly

Part of the key to making a dense place more livable and desirable lies in the creation of streetscapes where residents feel comfortable to walk, bike or ride. The most successful examples are found in places where the impact and role of the car is balanced against other uses within the streetscape.

If we take the human point-of-view, the difference between what works and what doesn't in promoting dense city living is easily seen. There is little appeal in stepping out of our front door onto a narrow sidewalk with no greenery or trees, right next to a four-lane road packed with cars. Ask yourself, would I want to live there? Designing with the pedestrian experience in mind means creating stronger ties between nature and the city as well as thinking about street-side retail and restaurant uses. Together, these strategies deliver a more vibrant and dense approach to land use.

Animated public spaces (super blocks, plazas, etc.)

Step out onto a small street in a city, perhaps a plaza where cars and pedestrians share space with a leafy tree canopy. Immediately, it feels quieter and less stressful. It's a place where human comfort has been considered. It feels like a nice place to live. Cities such as Barcelona, Portland, Copenhagen are doing interesting things with super blocks and >



IT'S ABOUT CREATING DESIRABLE PLACES SCALED TO HUMAN LIFE WHERE HUMAN CULTURE AND ACTIVITY CAN FLOURISH.



creating pedestrian-friendly areas in the city. These places are attractive to people and a boon to density.

Design for cultural life 24/7

Cities are discovering that they can activate their downtowns and stadium districts by thinking of them as vibrant places to welcome visitors all year-round rather than one-note weekend destinations. In Stantec's work on the **Park at Wrigley** and the **Rockies stadium district** in Denver, **SHED** in Winnipeg and **Water Street Tampa** we're finding inventive design and programming strategies that make these city districts welcoming (even in the off season) to a wider spectrum of people than ever before.

Transit-oriented design

Rather than counting cars on a road, city planners and voters are beginning to see the value in developments. Cities with robust public transport options are favorable to transit-oriented development in areas where residential and commercial potential is high because of proximity to light rail or subway systems. TOD promotes density by incentivizing both transit and real estate development while reducing parking requirements in zoning. It favors denser developments that integrate office, retail and housing. TOD has been successful in **New York City**. TOD allows developers the ability to develop higher-density and more retail—in exchange for cost-sharing for items that benefit the wider community. Ideally, TOD promotes walkable communities and contributes to resilient economic development.



The Beat
Boston, MA

✓ RETURN TO TABLE OF CONTENTS

MORE ON TRANSIT ORIENTED DESIGN

Formerly the downtown planner for the City of Minneapolis, **Beth Elliott** brings her planning experience to making vibrant communities from Stantec's Minneapolis office. **Matt Shawaker's** experience as both a design consultant and developer has given him a deep understanding of the interconnectedness of great landscape architecture and urban design. With Stantec's Denver, CO practice, he is passionate about design that promotes sustainability and walkability of communities.

The pleasing human-centered rhythms of the city

Researchers say that the human brain requires about a 1000 stimulations an hour, that's something stimulating your brain every four seconds or so. Walking at a pedestrian pace that equates to seeing something interesting about every 25 feet. Not uncoincidentally, designers find that appealing retail storefronts are about 25-feet-wide. These tend to be found in great lively urban places. Likewise, walking along a series of big box stores tends to bore us. While this sounds like a recipe for great urban design, it's a challenge. How do we resolve the service and retail needs of dense areas with human scale? How do we make a grocery store interesting?

Stimulating? And where are we going to put parking, which we will need? Are we massing buildings with their relationship to light and comfort for people on the street?

Achieving density isn't about hitting arbitrary metrics. It's about creating desirable places scaled to human life where human culture and activity can flourish. While density might have a wonky tone to it, it's actually a value based on what we love about the great cities and civilizations of the world—their walkability, their color, their vibrancy and their endless options and opportunities. Living a life with a lighter appetite for resources means living where the action is. **D**

Teaching nature

Creating spaces for lessons in sustainability

BY JONATHAN ALDIS AND SHIVANI LANGER



Northwest ISD
Outdoor Learning Center
Northlake, TX





At Lee Elementary School, a forward-thinking school and client targeted and achieved Net Zero-ready. Our design uses sustainable elements on the school grounds to bring nature into a city school environment.

Children are more plugged-in today than ever.

The digital era and its 24-7 entertainment consumption options has brought us alarming statistics for average daily screen time for children: four hours a day. And our primary and secondary schools tout their access to tablets and technology—and coding classes.

But our instincts tell us that kids need a balance. With the 2005 book *Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder*, child advocacy expert Richard Louv identified a problem, supported by research; a lack of nature in young peoples' lives. There are numerous scientific research studies that connect exposure to nature and positive outcomes for the development and health of young people; for example, that it contributes directly to improvements in short term memory. While there's more to learn about this connection, experts say that spending time in nature enhances educational outcomes by improving children's focus, behavior, love of learning, and academic performance. Even views of nature from a classroom can improve how well kids perform in these areas.

Louv's book kickstarted a conversation that led to an embrace of outdoor time and nature as a setting for learning over the past decade by many educators and schools. Now, many educators are recognizing that a natural or outdoor setting provides a powerful hands-on learning in the sciences and more. And that students who spend time in nature benefit in terms of academic outcomes. Coincident with this new awareness of nature in education are efforts by school districts to embrace sustainable buildings and operations in new construction and retrofitting. A school's sustainability tools can be implemented and used in curriculum, making the building and its landscape an asset for teaching students about humankind's relationship with the natural world. >

Opportunities for meaningful experiences

Youth that say that they "have had a personal experience in nature" (66% of those surveyed in 2015) are...

ALMOST TWICE AS LIKELY to say they prefer spending time outdoors

Significantly more likely to express concern about **pollution, global warming, and the environment**

More likely to say **ENVIRONMENTAL PROTECTION SHOULD BE PRIORITIZED OVER ECONOMIC GROWTH**

More likely to agree that we can solve climate change by

ACTING NOW

2x More than twice as likely to "strongly agree" that protecting the environment is "cool"

Source: The Nature Conservancy

Outdoor Learning Centers

Outdoor learning centers (OLCs) are places where students can be brought to participate in a curriculum around nature and the outdoors. Outdoor learning centers have been a part of learning curriculum for some time, but school districts are now increasingly prioritizing them in light of the identification of nature deficit disorder. Exposure to nature isn't just about planting tomatoes, it's about taking kids outside to be connected to the physical realm for the physical problem-solving opportunities that nature offers.

The challenge for designers is to make these places accessible, durable and worthy of their role as settings for learning in nature.

EQUITY AND ACCESS

So that they can access shared OLCs, some school districts bus children long distances or arrange expensive overnight field trips and often aren't able to bring everyone to the site for the experience. Many of our clients want to explore opportunities to create and control their own outdoor learning centers where they

Spring Branch ISD -
Gloria Marshall Elementary School,
Spring, TX



can offer the experience to everyone at various grade levels within a manageable travel time. School districts have shifted funding to programs that get kids outside to learn.

MULTIPLE NATURAL ZONES FOR LEARNING

We closely examine sites to see that they can provide multiple natural zones for learning. For example, at Elise Walker OLC for the Irving Independent School District, we found four distinct zones; prairie, wetland, woodlands and shaded areas that could support an outdoor curriculum and designed activity areas for each.

CONNECTIVITY DESIGNED HANDS-ON

Teachers bringing kids to the OLC must be able to efficiently and safely visit each activity area for learning. Students may be broken up into multiple groups circulating on the path. These pathways aren't drawn on paper and superimposed, rather we create them with the client, walking through the site, putting ribbons on trees, envisioning the places where the students will gather. Hands-on design for hands-on learning. >

GATHERING PLACES WITH A NATURAL AESTHETIC

Our designs for OLCs feature buildings and decks that act as gathering places and laboratories at the trailhead and within the nature site. We favor natural materials in these structures, glulam engineered lumber structure and Texas limestone for example, wherever possible and create features such as a butterfly roof design that collects stormwater that can be used as teaching tools. Moreover, these buildings can serve multiple purposes—one of ours doubles as a storm shelter and another serves as a handsome gathering place for school district functions.

MINIMAL IMPOSITION ON NATURE

Students learn at the OLC activity zones by making sketches and recording observations. Whenever possible, OLCs should highlight natural features available in these zones while making pathways easy to access. A boardwalk over marshland where stormwater accumulates becomes a place where kids can observe a marsh bog environment.

VALUE AT ANY SIZE

Outdoor learning centers are in demand in both densely populated districts and rural ones, and therefore range in size from 20 to 2500 acres.

Sustainable Schools As Teaching Tools

TEACHING SUSTAINABILITY ALONGSIDE SUSTAINABLE BUILDINGS

When we're designing sustainable features in a school, we can't help but note that these features can very easily serve as active and engaging teaching tools for the students. Green building rating systems like LEED are also encouraging us to think about integrating building's sustainable features into the school curriculum with a 'School as a Teaching Tool' credit. Our philosophy of design and sustainability considers the educational possibilities of sustainable elements very early on in the design phase.

VERSATILE TEACHING TOOLS

When we pitch a learning tool such as a human sundial (in which a student's shadow can be used to tell the correct time) to a client, we note that it is a tool that can be incorporated in the school's public landscape space, and be a community resource usable by other schools and neighbors. A tool like human sundial is hugely versatile and can be incorporated into curricula from elementary (shadows, climate, daylight) all the way up to architecture school. >



Dearing Elementary School
Pflugerville, TX

At Dearing Elementary School, the external courtyard was designed for learning. We included a cistern with a spigot and planters receiving a trickle of harvested water so kids could plant around it and on the planter. In the same area we included the human sundial, all integrated into the landscape.

HANDS-ON TEACHING TOOLS, A GUIDE

Human sundial – When a student stands on the appropriate month marked on the ground, their shadow is cast on a numbered marker that tells the time. Can be used for lessons on the seasons, sunlight, time.

Stormwater harvesting cistern – A water tank used to collect and store rain water runoff, typically from rooftops via pipes.

Roof garden – With teaching gardens, kids learn about different types of plans and how to care for them.

Windmill – We locate a small metered windmill in a school garden, allowing students to learn about renewable wind energy and energy transfer.

Solar panel – Students can learn about harvesting electricity from the sun with a metered solar panel located in a sunny area of the school garden.

PROVIDE HANDS-ON LEARNING EXPERIENCES

When we design rainwater collection for our schools that water is most often used for irrigation. In almost all schools where we have rainwater cisterns, we have placed them in courtyards, teaching gardens and roof gardens. Cisterns are designed with visible gauges (that display the level of water inside the cistern) and with spigots that allow kids to use the water to maintain plants in the gardens. We have often incorporated other teaching tools like the sundial and interactive solar and wind panels in the same garden/landscape courtyards as the cisterns.

MAKE IT INTERACTIVE!

Sustainable features such as a small windmill, solar panels or rainwater collection tools are always active and can be metered so that students can see in real-time how much electricity or water the system is harvesting via interactive digital monitoring dashboard systems. These digital dashboards have been incorporated in many elementary schools that demonstrate energy efficiency features of the building along with the performance of active systems

listed above. The new interactive dashboards have web interfaces that can be viewed from any device inside or outside of school, providing far greater opportunities for learning.

MAKE IT VISIBLE!

Many studies have shown that connection to the outside benefits all ages and incorporating learning with the outdoor environment takes that connection one step further. Every building is a complex mix of many systems working together and transparency in the operations and metering of these systems, can be a huge learning tool for the students. Examples of transparency incorporated in elementary and middle schools include using a transparent water collection pipe from the roof and running it through the science lab to create a live interactive representation of the rainwater collection system. Similarly, we have designed mechanical and electrical rooms with transparent walls and metering. Interactive digital displays are also a step towards transparency. The goal has been to make learning real-time and systems as transparent as possible in order for learning to live with students a lot longer.

MAKE IT AFFORDABLE AND LONG LASTING!

Building these learning features into new schools is rarely a budget buster—and it's the right thing to do to set our children on a path to the future. Learning tools should be made as flexible as possible, so they can have a long life in the curriculum.

IT JUST FEELS RIGHT


Teaching our children about nature and natural systems is a centuries-old tradition. As our world is increasingly accessed through apps and gadgets and digital media, we must become more deliberate and intentional about connecting with nature in education. **D**

✓ [RETURN TO TABLE OF CONTENTS](#)

MORE EDUCATION

Architect **Jonathan Aldis**, based in Plano, TX, has a passion for education design and thoughtful planning and has worked on projects ranging from minor renovations to high schools and master-planning entire bond issues for his clients. Project architect **Shivani Langer** specializes in education facility design and leads Stantec's Sustainability Research and Benchmarking program from our Austin, Texas studio.



 Elise Walker Outdoor Learning Center
Irving, TX

Modeling sustainable solutions

Using the latest in digital tools, designers and engineers can achieve sustainability on a budget

BY ANDREA FRISQUE & SERGIO SÁDABA



Bellevue Plaza
Seattle, WA.
Stantec was mechanical, electrical, plumbing engineering basis of design consultant and is currently electrical design and engineering consultant for Bellevue Plaza.
Architect: Graphite Design Group

Designing for sustainability today is all about achieving return on investment.

Today's design decisions reflect a web of interactions that are far too complex to represent and manipulate in two dimensions. Recent innovations in digital modeling tools allow designers, engineers and consultants to quantify complicated dependencies and represent them more accurately.

When used skillfully, these tools become the platform in which design teams compare different solutions not only for energy, thermal comfort, or daylighting performance but for initial investment, capital, operational, and life cycle cost. These tools make it possible for designers to dial in the appropriate and most cost-effective sustainable strategies early in the design process.

Whole building energy simulations

Today, parametric whole building simulations (or whole building energy simulations if you like) enable designers to find the most cost-effective solutions for achieving energy efficient or low carbon buildings. These digital tools have advanced and are becoming more integrated, enabling us to do parametric energy simulations anywhere we do energy modeling on a project.

With whole building modeling, we work backwards from the targets, usually energy performance and cost, to find that most effective solution to meet a specific target. We look at cost to determine available solutions.

What metric are we targeting for sustainability?

In the Passive House approach, the targets are thermal energy demand and total energy use intensity. If we are targeting carbon intensity, we would design around a certain greenhouse gas emissions target, or zero emissions over a year.

With those targets in mind, we can simulate all combinations of all the design features that are on the table. And then combine that information with cost differences, not just initial cost but also maintenance, life expectancy of equipment, and associated end of life costs. All of those metrics can be figured into our model. Then you can pick the performance metric that the building needs to meet at the lowest total cost.



For a developer, that might mean looking at total capital cost investment. While institutions that own and operate buildings are interested in total cost of ownership over time.

Visualize success

But this isn't just a spreadsheet that spits out a number. It's visual. Parametric analysis and tools can represent the optimal solution out of thousands of possibilities in multi-dimensional visual form. We can see what's possible in a building within the numbers we've been provided. This makes for a well-informed design decision.

Custom fabrication possibilities

Digital tools can be taken even further and used to design specific building elements.

The model can be sent to a manufacturing facility with CNC (computerized numerical control) machines or robot manufacturing equipment that can make customized pieces, façade panels for instance, for the building. While we're far from a seamless integration of architecture and energy modeling and custom manufacturing, it's exciting to see this process emerge as a viable method for making buildings.

Testing assumptions

If you're planning to use the same HVAC system as last time, why spend time and money modeling and looking at engineering options early in design? A waste of time? On a recent project, we convinced the team to allow us to explore different HVAC options in terms of energy, area needed on plant rooms and core, and cost and the different performance of each system in relation to different façade options (window wall ratio, glass solar heat gain coefficient, external shading, daylighting, and R-value) due to a change on the energy code cycle. The modeling results showed that if we kept the same HVAC system as before, the project would require a pricey triple glass façade with darker glass to hit targets. Modeling revealed another option; decouple ventilation and use water based internal units that would save on costs and energy use.

In another case, a design team was looking at incorporating solar thermal panels to produce hot water on a multi-residential tower in the Northwest. However, after modeling the project and analyzing different systems we deemed it more energy- and cost-efficient to incorporate air source heat pumps driven by PV panels. This changed the overall mechanical system, reduced plumbing systems and achieved project goals.


Timing is everything

Employing these tools is a form of digital collaboration—one that's most effective if it's done from day one. Projects benefit greatly from creating models and solar analysis early, so that decisions are informed by the data, not just gut feelings, personal preferences or business as usual. For this reason, a feasibility study for sustainability is worth the time and expense. It can be a challenge, but increasingly projects need to invest more in concept development to reap the rewards of energy modeling.

Making sustainability affordable

Pushing performance for buildings requires an artful balancing act between lofty goals and budget reality. But there's another aspect to digital modeling that may hold the key to affordable low-carbon buildings; industrial manufacturing methods. If we apply our model and manufacture components as we do automotive components we tend to find that that pre-fabricated, modular components are higher quality and lower cost than conventional components. For clarity, this doesn't mean cookie-cutter mass production. This kind of bespoke manufacturing also allows us to make buildings with thousands of unique façade panels. Digitally-designed pre-fab components could mean more affordable high-performance buildings.




Pavillon d'accueil net-zéro
du Parcours Gouin/ Parcours Gouin Trail
Net-Zero Energy Reception Pavilion
Montreal, QC
Architect: BBBL Architectes

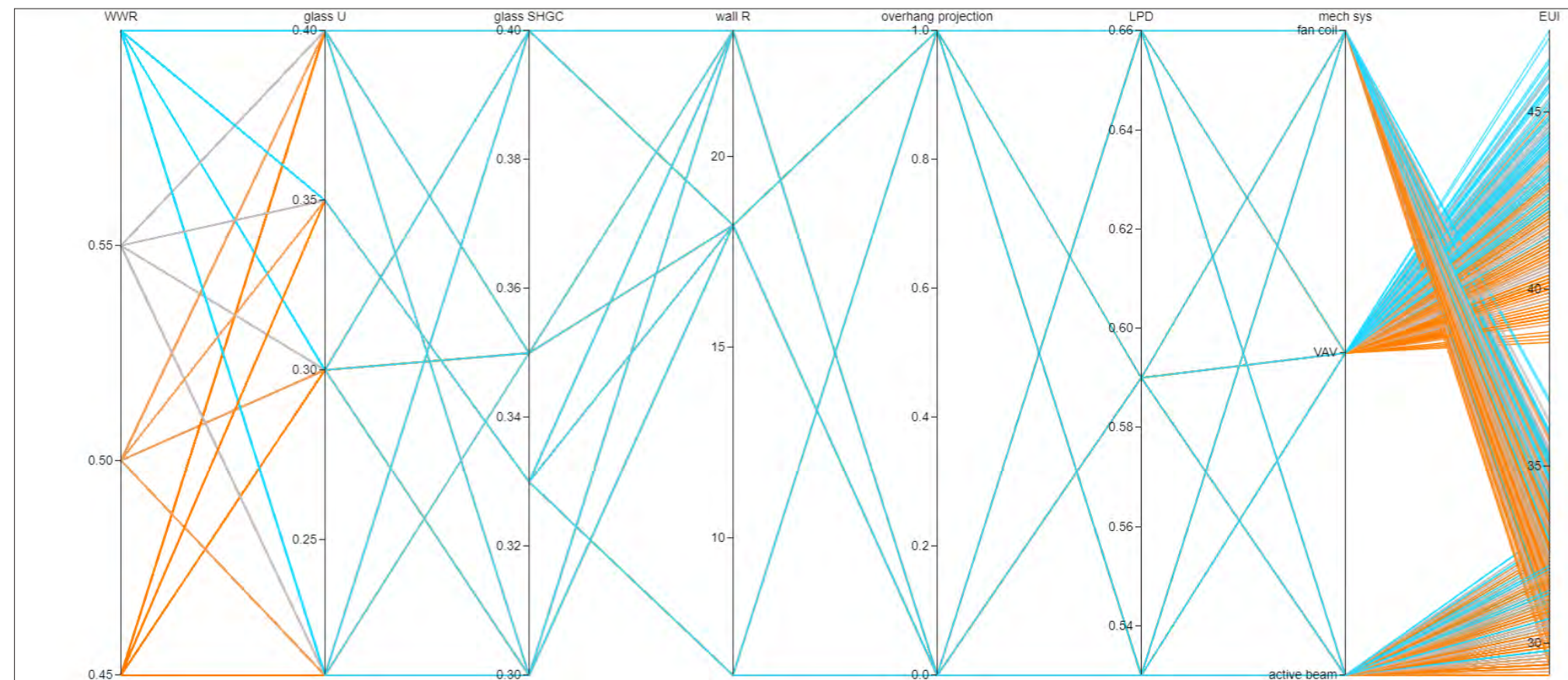
Digital tools

BY SERGIO SÁDABA

The digital tools used in energy modeling are beginning to function like the tools for architectural parametric simulations. Designers using Rhino, Grasshopper and plug ins for parametric architecture can not only test form and massing of buildings, they can connect to energy modeling software like Energy+. We can run through a wide range of features of a design concept in Rhino, that's where engineering performance and architecture are coming together in the early stages.

Based on an academic paper that proved the concept, Stantec customized free, open source software to create our own parametric energy modeling software, which we have utilized on projects such as evol1, Canada's first Net Positive Energy design certified, commercial building.

At early stages of design, we may look at weather data with Climate Consultant. We might use Sefaira Architecture in concept design to provide an early reaction to some design gestures and check early intuitions. We also like to compare façade performance not only on the context of annual energy demands or daylight penetration but peak loads, solar radiation, or glare. For more advanced analysis, we utilize tools like Autodesk FenestraPro, Diva for RHINO. For detailed analysis, once most systems and components have been decided, we might use Open Studio for Energy+ or Therm. Finally, for renewable feasibility we might employ PVWatts for information on decisions around solar or to design a full PV array. **D**



The parallel coordinates tool can present energy modeling data in an interactive way, where sets of parameters can be chosen to view an outcome of interest (EUI), net present value, or payback period.



West Village at
UC Davis
Davis, CA is targeting
Net Zero Energy



✓ RETURN TO TABLE OF CONTENTS

MORE COOL TECHNOLOGY & RESEARCH

Based in Stantec's Vancouver, BC office, **Dr. Andrea Frisque** is a recognized expert in high-performance buildings, with experience in sustainable-design analysis and computer modeling and advanced knowledge in heat and mass transfer, fluid dynamics, and thermodynamics. **Sergio Sádaba** leads Stantec's high-performance buildings engineering team in the Pacific Northwest from Seattle, WA.



LOOKING BACK ON THE

FIRST LARGE-SCALE NET ZERO ENERGY BUILDING

What the National Renewable Energy Laboratory RSF says about striving for zero today

BY PORUS ANTIA

In 2007, when the National Renewable Energy Laboratory (NREL) in Golden, Colorado issued a design competition for a new 222,000 SF research support facility (RSF), it wanted to make a splash in the industry. The U.S. Department of Energy, which runs NREL as a national laboratory, wanted to show that ultra-energy-efficient buildings were achievable. The project's requirements were highly researched and written in detail with requirements ranging from "mission critical" to "blue sky" or "if possible." It specified LEED Platinum as a requirement, but the project aspired to be Net Zero Energy, a certification which didn't exist yet. >

NREL's mission was to prove how its own research on energy efficiency, commercial building technology, and renewable energy could be translated to viable commercial properties within a reasonable budget. The building competition came with a \$65 million budget and a stringent mix of requirements in energy, sustainability, safety and design-build process—its energy use would be off-set by a renewable system. There were no prototypes for the building NREL envisioned, it would be a first of its kind.

The design-build team, led by Stantec as architect and mechanical-systems designer, had experience building smaller Net Zero Energy and LEED-Platinum facilities up to 40,000 SF in the United States. To win the competition, the team had to scale up its ideas and approaches in order to deliver NREL everything it specified, not just the essentials. To win NREL RSF, we implemented a range of strategies and in doing so, created a model for the largest net-zero energy building in the nation—on a budget. The result?

AN ICONIC BUILDING WHICH SPARKED THE NET ZERO DESIGN MOVEMENT, ONE THAT TODAY—ALMOST 10 YEARS AFTER OPENING DAY—STILL SHINES A LIGHT ON THE WHAT'S POSSIBLE WITH HIGH-PERFORMANCE, SUSTAINABLE DESIGN.

Completed in June 2010, the NREL RSF-I is home to approximately 800 Department of Energy and NREL administrative staff.



National Renewable Energy Laboratory (NREL) Research Support Facility
Golden, CO

HOW DID IT HAPPEN?

Ambitious but clear goals and an integrated team

As an organization focused in the field of building energy performance, NREL had the detailed knowledge and research to target and specify a clear EUI (energy utilization intensity) goal for its new building. They knew what they wanted and knew it was possible.

The highly researched targets resulted in a specific goal. The original target of 25 KBTU per square foot was adjusted to 35 KBTU per square foot to include the energy use of a 2000-person data center. That was an extraordinary level of detail for a building at that time.

NREL mandated several critical inputs in their RFP that ultimately influenced the building's energy appetite, and which created the basis for the performance-based energy model. We committed to meeting every one of NREL's challenging mission critical, highly desirable and if possible objectives as a strategy to win the project. NREL insisted that delivery come from an integrated team of architects, engineers and builders so that everyone involved, from day one, understood the

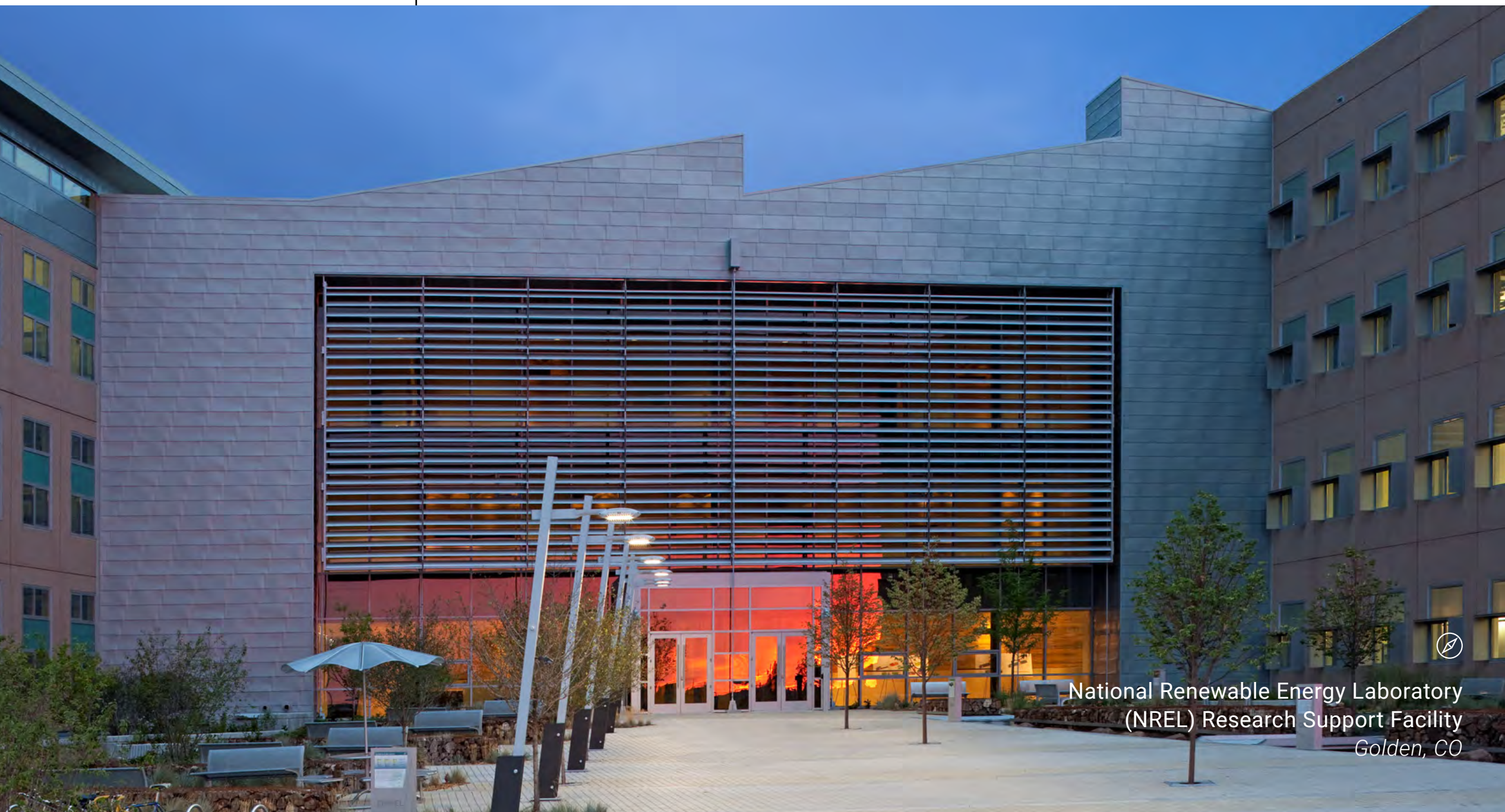
project goals and strategies. Maintaining that integrated team communication around a given solution was a huge part of what set this project up for success.

Architectural solutions and strategies

Our solution to the goals set out in the design competition—which required a 90% daylit building—was to design a form and shape of the building that could maximize daylighting. We chose an H-shaped building with narrow 60-foot wide floorplates which enabled us to use natural daylight but also to naturally ventilate the space. That's just one of the architectural and passive strategies we employed to achieve efficiency—before any mechanical or renewable systems were selected.

The two long wings of the H-shaped building stay cool in warmer months due to the internal facing thermal mass in the walls, not unlike the cathedrals of Europe. Continuous insulation and extensive exterior window shading further contribute to an envelope-driven, low-energy building performance strategy. >

WE DAYLIT 90% OF THE NREL RSF WHILE ACHIEVING
A 28% WINDOW-TO-WALL RATIO.



National Renewable Energy Laboratory
(NREL) Research Support Facility
Golden, CO

When we realized that the site had expansive soil and would require a raft slab, we proposed an underground thermal labyrinth that could be used to pre-heat or pre-cool the air for the building at minimum additional cost. Further strategies employed included making sure the building was oriented to the path of the sun to reduce heat gain and enhance daylighting, making sure there was no thermal bridging and utilizing triple-pane windows, evaporative underfloor cooling, radiant ceilings, natural ventilation and night venting. We utilized a transpired solar collector on the south façade to make hot air and release it to the labyrinth to pre-heat the building. We did something similar with the hot air from the data center, containing it and dumping it into the labyrinth to use for pre-heating the building.

Natural daylight, natural ventilation by design

With our narrow floorplates, we could naturally cross-ventilate by using an operable window system. Windows were comprised of a vision window and daylighting window, which incorporated a light louver system that could project light 14-feet-deep into the space per vertical foot of light louver installed. That's how we daylit 90% of the building without turning

to large glass openings, which would have detracted from the insulation needs of our high-performance envelope. We daylit 90% of the NREL RSF while achieving a 28% window-to-wall ratio.

Serious goals, serious stakes

One key to our success was modeling the project as accurately as possible, to ensure that we could hit our targets during both design and construction. NREL was so serious about hitting Net Zero Energy, that it tied financial incentives to achieving energy goals in each phase. In fact, if we couldn't demonstrate that we were on target in the early months to hit the goals we promised in the design competition phase, then a contractual mechanism allowed the design-build team and client to part ways. Those targets were paramount to NREL, because they wanted to use this building as an example for the entire industry, to show it how to achieve Net Zero Energy at cost comparable to conventional.

A second opportunity

The resulting RSF-I building was the demonstration center that NREL envisioned. In fact, the client was so happy they asked us to do it again. The same design-build team was asked to design and construct a 110,000SF >

addition (NREL RSF-II) to the campus. For RSF-II, we were able to apply some lessons learned from RSF-I. For example, we found that we didn't need concrete partitions in our thermal labyrinth because there was enough thermal mass in the raft slab and basement walls for thermal storage. We also realized we could reduce the window frame area by using larger operable windows. And we discovered we could naturally ventilate the stairwells instead of using active cooling. But probably the most rewarding discovery was that we'd done very well the first time around.

A long-term commitment

NREL RSF-I was conceived as a living laboratory. NREL planned to write dozens of scientific research papers on the building and its performance, so it has made investigating and tracking a zero-energy building's operational energy performance a priority. In fact, the building monitors its energy use and production, light levels and water usage and displays the data in the building lobby. Through a close connection with NREL's Shanti Pless, I was able to remain in the loop on the measurement and verification stage of the building long after the design-build team had left the site. It was important for Stantec, as a consulting firm, to stay connected with the operational side of a zero-energy building

and access performance data to confirm that the targets we set during design were met. This is key to the reputation and success of our ongoing building performance and sustainable design practice.

Proven Net Zero

Annual energy use has been tracked against our energy model since the building opened in 2010 and it consistently falls within 5-10% of predictions, which sets a high standard for the industry. Currently, NREL is applying for the new LEED Zero Certification with the USGBC that addresses Net Zero operations and resources in building

NREL RSF I&II succeeded because they were driven by a committed and educated client who wanted to create a truly replicable strategy for NZE buildings and a truly integrated team that focused on the little details with the big picture project goals in mind. We know it succeeded because of the extensive post-occupancy focus on zero energy operations. Today, Net Zero is no longer a novelty, yet we still have a long way to go move beyond what we designed for NREL across our built environment. Now we know what's possible when we strive for zero. **D**



National Renewable Energy Laboratory
(NREL) Research Support Facility
Golden, CO

✓ RETURN TO TABLE OF CONTENTS

MORE ON SUSTAINABILITY & RESILIENT DESIGN

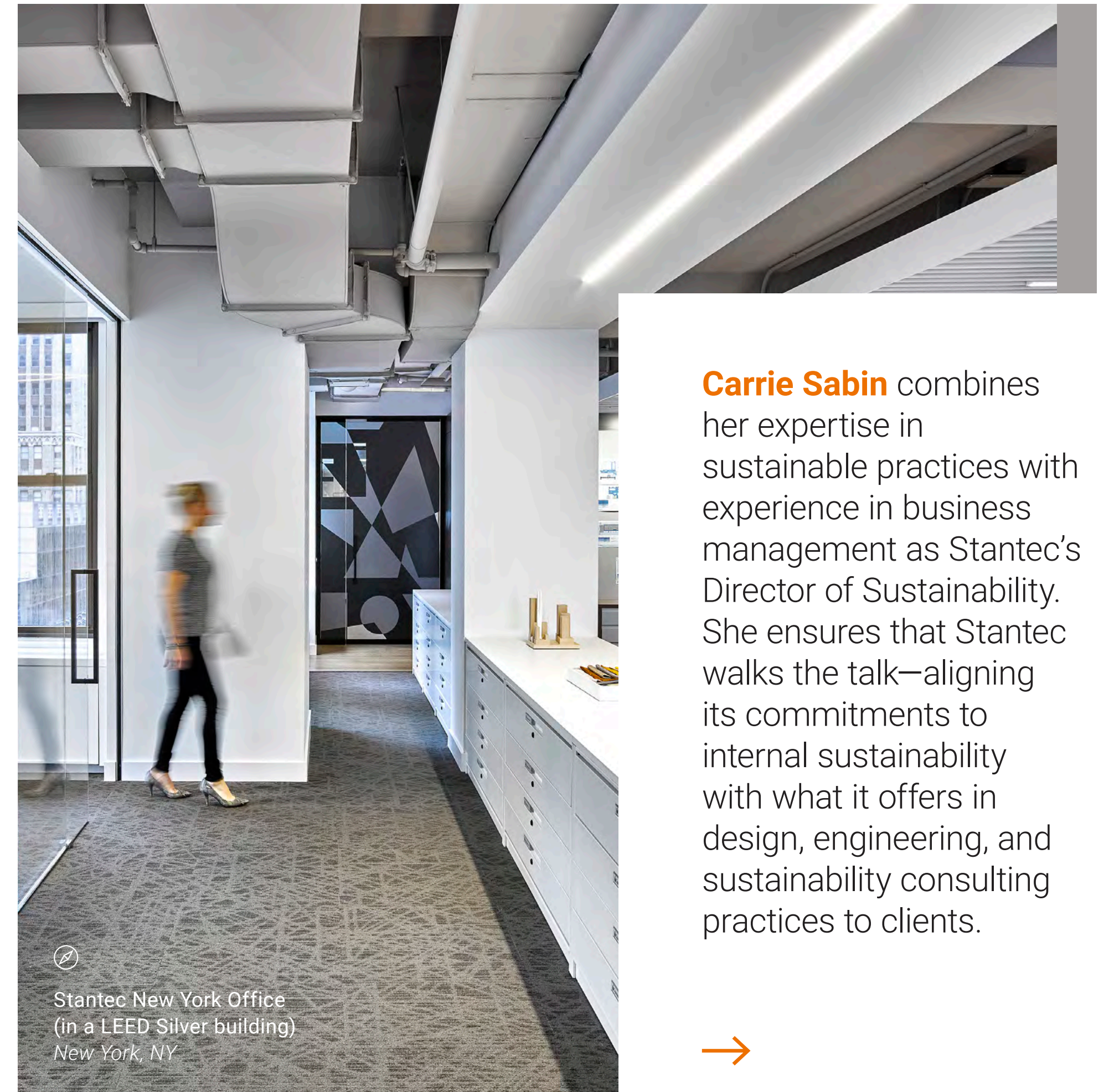
San Francisco, CA-based **Porus Antia** leads the company's energy and sustainability practice in California. He manages a multidisciplinary group of engineers and technologists with a focus on high-performance, energy-efficient built environments.



ASK AN EXPERT:

What are sustainability rankings and why do they matter?

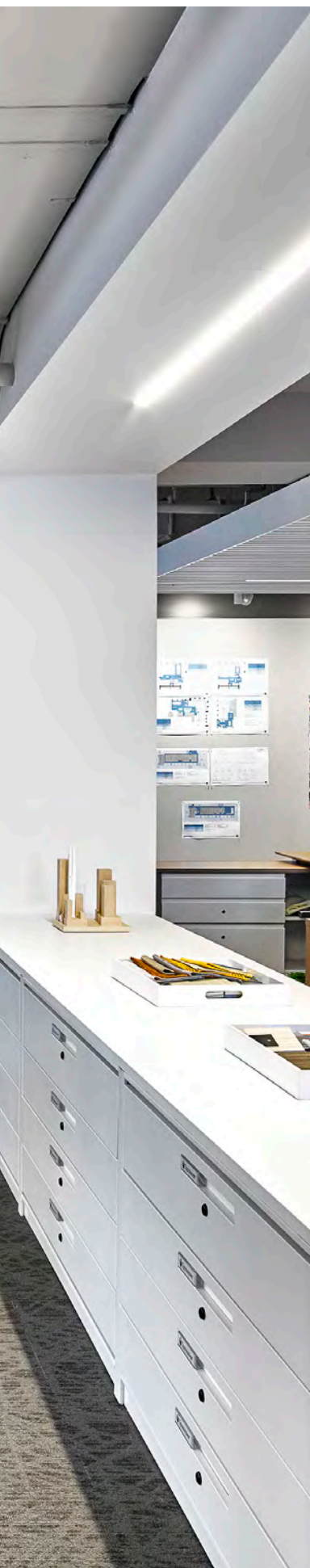
INTERVIEW BY JOHN DUGAN



Carrie Sabin combines her expertise in sustainable practices with experience in business management as Stantec's Director of Sustainability. She ensures that Stantec walks the talk—aligning its commitments to internal sustainability with what it offers in design, engineering, and sustainability consulting practices to clients.



Stantec New York Office
(in a LEED Silver building)
New York, NY



By incorporating sustainability into our mindset, it's easier to implement the day-to-day actions.

Q What's your role here at Stantec?

CARRIE: I am the director of Stantec's Corporate sustainability and environmental program. We follow an environmental, social, and governance (ESG) model. I lead our efforts for the environmental portion, helping to realize Stantec's commitment to operate in a responsible way.

For the social and governance side of things, I collaborate with colleagues so that our programs are compliant with international frameworks and incorporate industry best practices.

We work hard to incorporate the sustainability mindset into strategy, risk management and in our integrated management systems. It's also about furthering the thought leadership in the space; how can Stantec push the envelope as it relates to sustainability?

Q Do you tap into our practice for specific expertise in gauging Stantec's sustainability performance?

CS: Yes, absolutely, that happens all the time. We have experts internal to Stantec that we regularly use as subject matter support. For example, earlier this year we refined our materiality assessment,

which is an evaluation of ESG topics related to our business and where we have the biggest impact on our world. We utilized Nicole Flanagan, a sustainability expert from our Environmental Services team, to facilitate a session held with our senior executives. Her team is helping with the follow up exercises and producing the final deliverables. We hire our own experts because they are top-tier consultants who are well recognized in their respective fields of expertise.

Q Do you think sustainability is compatible with business?

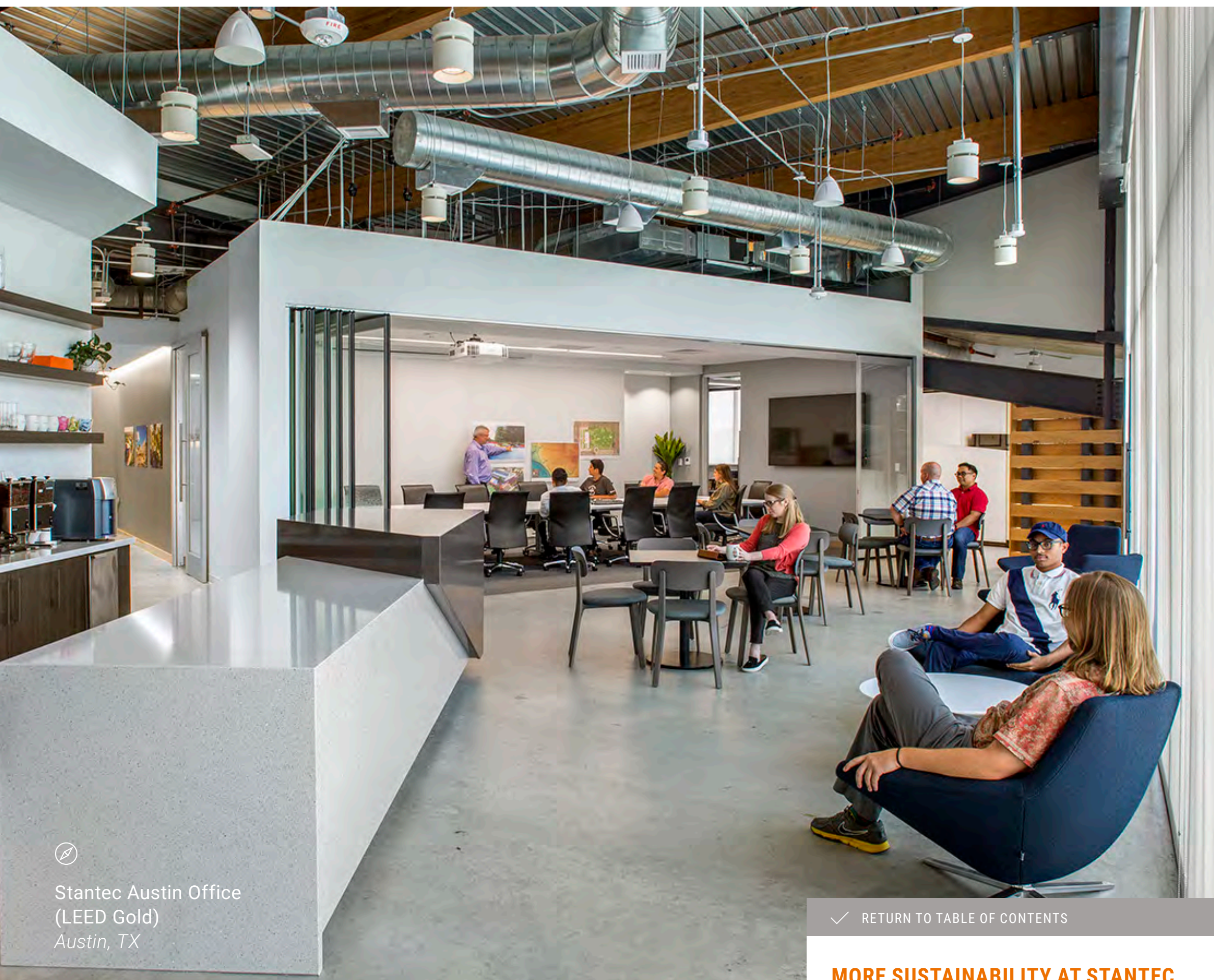
CS: At every level, sustainability just makes smart business sense. If you're going to run a company, operating in a sustainable manner will save you money and position you to be profitable well into the future. In the short term, sometimes there is a cost of investment, but often sustainability initiatives can also produce cost savings in the form of operational efficiencies. A visionary company realizes that sustainability is the smart business decision over the long haul.

Q What are Stantec's sustainability programs? Which ones are working?

CS: We have numerous examples, but from an environmental standpoint, I'd like to mention that members of our Procurement and Real Estate teams are our unsung heroes, working behind the scenes, and making positive changes in ways that others might not think of. Their efforts have been highly effective at making significant improvements in our corporate commitments.

For instance, Stantec has been able to reduce our per employee Scope 1 and 2 emissions by 36% since our 2013 baseline year. We've been able to do that primarily by office consolidation. We have a presence in many cities so when we have a lease expiring and/or multiple small offices within the same market, we look at consolidation and moving into more energy efficient buildings.

As Stantec designs our new office spaces, we try to optimize the space layout in a way that addresses resource conservation and employee well-being. We use interchangeable furniture and design, so that we can move it from office space to office space. There's a huge focus on access to natural light, air quality, access to public transport and walkability—our current and future employees demand it! And, of course, as designers, we like to showcase leading-edge concepts as a key business development tool for existing and potential new clients. >



Stantec Austin Office
(LEED Gold)
Austin, TX

✓ [RETURN TO TABLE OF CONTENTS](#)

MORE SUSTAINABILITY AT STANTEC

Thinking about sustainably at every opportunity has really transformed the way we approach designing our workspaces. It has lowered our emissions and optimized our square footage per employee—while providing the private and collaborative spaces we need to do our work. The great news is that this approach has also provided significant cost savings at the same time. So, there’s a real business benefit to the approach.

We find that by incorporating sustainability into our mindset, it’s easier to implement the day-to-day actions.

Q What are sustainability rankings and why do they matter?

CS: When it comes to corporate sustainability there are a handful of important rankings that investors depend on to evaluate a company’s ESG performance. Stantec works hard to live our values and be transparent about our sustainability journey. Our success is reflected in our top marks on the various rankings.

For example, in 2018, Stantec received an A-score from **CDP** (formerly known as the Climate

Disclosure Project). This recognizes that not only are we aware of our risks, but we are actively managing and taking leadership steps toward addressing climate change. CDP is the gold standard, a globally recognized climate change index. Over 7,000 companies reported through CDP in 2018 and fewer than 5% achieved a score in the A range.

We’re incredibly proud of this accomplishment. We received the score for a combination of what we’re doing to manage our operations and physical facilities, but also for how we are approaching sustainability in strategy and risk management, our connections to clients, and a commitment to sustainability by senior executives all the way up to our Board of Directors.

Q Are we cognizant of the global targets regarding climate change?

CS: We are. Stantec sets short-term, mid-term, and long-term emission reduction goals which support keeping global warming under 1.5 C.

We’ve signed on to various climate programs. We push ourselves a little bit further each year. >

For example, our Buildings Group has signed on to the AIA Commitment to the 2030 Challenge, working towards a portfolio of carbon neutral buildings by 2030. We're also starting to measure our impact against the United Nations Sustainable Development Goals—focusing on the goals where we can have the greatest positive impact.

Q What do you like best about your work?

CS: I am happy to be able connect my personal passions with my day-to-day job. That's amazing. I love being able to make a difference and to help implement change. **D**



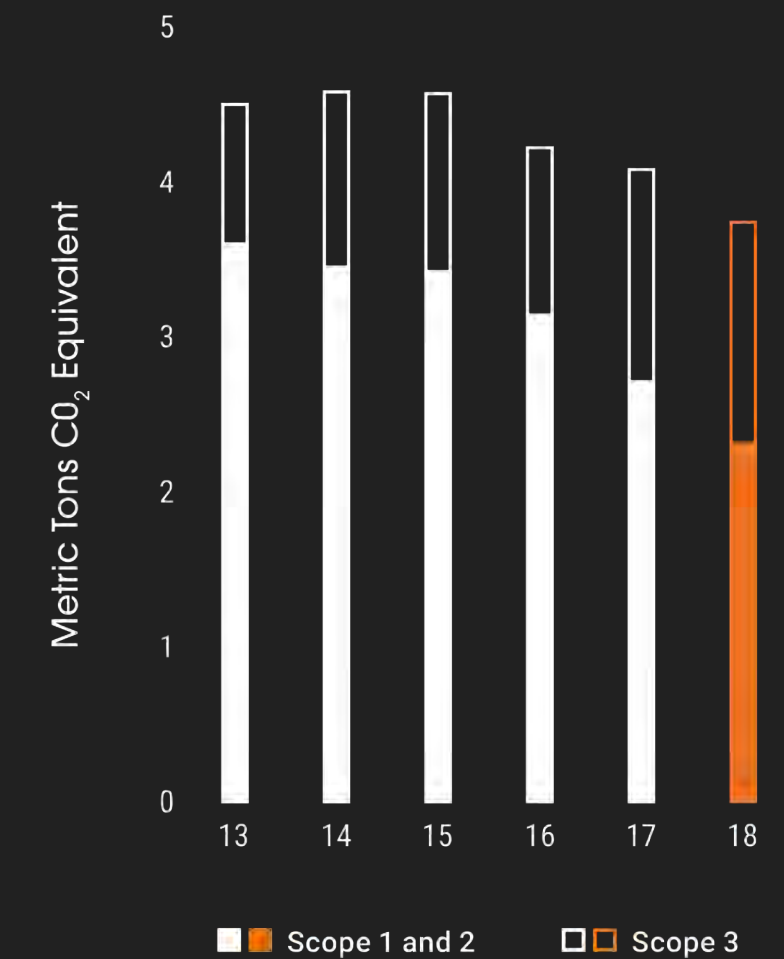
CARRIE SABIN
Director, Environment & Sustainability Program, Stantec

Carrie Sabin manages Stantec's corporate sustainability commitments from our Steamboat Springs, CO office.



**Stantec Corporate Head Office
Edmonton, Alberta**
In 2018, Stantec relocated three offices and 1,200 employees into Stantec Tower, our new LEED corporate headquarters (LEED Gold exteriors and LEED Silver office space), which uses energy and water efficiently, purchases renewable energy, encourages sustainable commuting, and focuses on the well-being of its occupants.

EMISSIONS PER EMPLOYEE BY YEAR



- Scope 1**
Direct energy sources (gasoline and diesel for fleet fuel, and Stantec-controlled natural gas, fuel oil, and propane for office energy)
- Scope 2**
Indirect energy sources (electricity and landlord-controlled natural gas, fuel oil, and propane for office energy)
- Scope 3**
Other emission sources (air travel, rental car use, work-related personal car use, line loss* and paper use)

*Line loss: Loss of electricity in transmission between the source of supply and point of distribution to the consumer.



FINALTHOUGHT

Sustainability is at our core

When I think about what I do and how it will affect future generations, I'm reminded that we do what's right.

BY GORD JOHNSTON



Everyone wants to be part of something bigger. Being part of an organization that is really striving to make a difference in the world is a powerful motivator, and I think one of the reasons Stantec is a great place to be.

GORD JOHNSTON

My personal commitment to sustainability began early in my career. As a water treatment plant operations engineer, I witnessed firsthand how the environment, and what we do as designers, contributes to our ability to make clean, safe water for people to use. In my current CEO role, I think a lot about what we do—providing essential consulting services to improve our communities—whether it's roads, or transit, power or utility infrastructure, water plants, or buildings. How do you provide these services that people need really in a way that reduces the impact on the environment?

With that in mind, I got certified as an Envision Sustainability Professional. I think at this point I am the only ENVSP who's CEO of a major engineering and consulting company. For me it's important, because at Stantec, sustainability is at our core.

Our commitment to designing communities to support a sustainable future is ingrained in the services we provide to our clients, the way we treat our people and how we run our business. Across everything we do, we strive to address the three elements of sustainability: environmental, social, and governance (ESG).

We incorporate sustainability in our work because it aligns with our values, it's good for the environment, it's good for the community,

but also because it's good for business. It is a differentiator for us in the marketplace. It's important that we walk the talk—practice the kind of strategies we recommend to our clients.

Every year we issue a Sustainability Report. What I really like about our report is it makes us take stock—to write down progress against goals and to understand how we're evolving—it gives us focus. This year's headline is that we have moved from a C to an A- ranking in the CDP (Carbon Disclosure Project)—it's a huge accomplishment and one not many others in our space can claim. So, I feel we're making measurable progress toward delivering on our promise to design with community in mind.

And while we're thrilled with our progress, we know there are further dimensions for us to explore. We've started thinking beyond well-recognized A/E/C metrics like WELL, LEED or Envision to measure our progress.

Now, we look to measure our collective impact against the United Nations Sustainable Development Goals (SDGs). The UN's blueprint to achieve a better and more sustainable future for all, the SDGs address the global challenges of poverty, inequality, climate, environmental degradation, prosperity, and peace and justice with targeted milestones for 2030. >

5 Goals of Sustainable Development

For Stantec, we've identified the five United Nations Sustainable Development Goals that most closely align with our business and expertise, and we're focused on making a difference in these areas:



Clean Water and Sanitation



Affordable and Clean Energy



Industry, Innovation, and Infrastructure



Sustainable Cities and Communities



Climate Action



Certainly, when you look at something like affordable and clean energy, number seven, that connects to our Energy Remix approach which is all about designing a transition to renewables, whether it's solar or wind or biomass, or pump storage. When you look at industry innovation and infrastructure, our work is in making cities and communities more sustainable. In our Urban Places initiatives, we are redeveloping brownfields, reimagining them as vital urban places. And clean

water and sanitation, number six, that's what the water group does day-in and day-out for clients around the world.

Internally, we practice sustainability in our offices in a variety of ways that reflect our culture. As I was walking up to our office in Delft, The Netherlands, I noticed an electric vehicle plugged into a charging station, with a big sign on it that said "charging, brought to you by Stantec." I thought, that's pretty cool! The Delft staff also

Sustainability is built into Stantec's purpose, promise, and values. See how our Company works to protect the environment, improve quality of life for people at work and in our communities, and govern our operations ethically and responsibly by reading [Stantec's 2018 Sustainability Report](#), available now.

volunteers during **Community Week** with a group called By the Oceans We Unite, which drags the ocean for plastic, sponsoring the netting on an expedition.

I was inspired by the depth and passion for sustainability in that office. I think it's contagious. As I travel and visit our offices around the world, I try to start the conversation with local teams by sharing these stories, but also by challenging them and asking "How can we incorporate some of those things here and continue to reduce our footprint?"

A big part of this is we do what's right and this pays off in personal satisfaction. Everyone wants to be part of something bigger. Being part of an organization that is really striving to make a difference in the world is a powerful motivator, and I think one of the reasons Stantec is a great place to be.

One can see our commitment to sustainability outside the office in the non-profits to which we contribute our time. Our engineers volunteered with organizations such as Water for People, a non-profit group that provides potable water and sanitation in less developed countries, helping with wells, pipelines, or treatment—we allow >

them to donate time to that work. While others contribute to Engineers Without Borders which empowers communities around the world to meet their needs.

This is how we will contribute to a better world and how we are inspiring our people to connect more fully with the work we are doing. There's always more we can do, and we're really continuing looking for ways to push from a broad sustainability perspective. We're actively adopting new technology, be it Skype, Microsoft Surface or internal communications hubs to reduce the need for our people to always travel, drive, or fly to meetings. That's good for business, but those are also things that are good for the environment, lessening our overall carbon footprint. In the typical Stantec way, we talk about some of these things, but not all, and a lot of the time we just do it. And maybe we haven't stood on the mountaintop and shouted our stories as loudly as others have, but I think we've achieved some really substantial results along the way.

We're doing some great things. If all that happens is that it causes other firms to pull up their socks and run harder to try and catch up with us—then we all benefit. So, I'm asking you. "What are you doing to incorporate sustainable thinking into your everyday life?" **D**

✓ RETURN TO TABLE OF CONTENTS

MORE SUSTAINABILITY

Gord Johnston is the president and CEO of Stantec, responsible for providing executive leadership to the Company and managing its growth. He has over 30 years of private and public sector experience in the design and project management of infrastructure projects throughout North America and abroad.

MAKING AN IMPACT

Stantec achievements in sustainability

A-
CDP Ranking

Top Score
ISS Ranking

1st
Net Zero Carbon
Design Certified
Commercial
Office Building in
Canada, evol1

Discovery Levels
a method of baselining minimum sustainability requirements – because sustainable thinking is just responsible and good practice.

1000+
staff are LEED, WELL,
Passive House, En-
vision, Green Globes
and Petal certified
professionals

Certified
Rick Hansen
Foundation
Accessibility
Certification

Top50
Corporate Citizens
in Canada by
Corporate Knights
for six years in
a row.

WELL
International WELL
Building Institute
Founding Member

AA
MSCI Ranking

1st
WELL Community
globally

NREL
Largest Net Zero
and now Net Positive
Energy Building in
the World: National
Renewable Energy
Laboratory RSF,
Golden, CO

**69 LEED
Platinum
Certified
Buildings**

DESIGN QUAR- TERLY

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