

Taking Cues From Nature

Forward-thinking sustainable design strategies plan to ensure buildings are resilient to change, no matter how extreme

by NATALIE BRUCKNER

Once considered an afterthought, sustainable design strategies are now front of mind when it comes to new builds and renovation projects. While regulations have influenced this change, it's so much more than that. It's the experts in the industry who are in the driving seat with their innovative thinking and passion to reduce our footprint.

Case in point, Jamie Miller, director of Biomimicry at B+H Architects, who believes the answer to true sustainable design can be found right in front of our eyes. "My belief is that the most effective – and inexpensive – path for mitigating climate change is to support ecosystem services. In our technological advancements as a species, it seems that we have forgotten that the most effective technologies for carbon sequestration, storm management, energy dissipation, air and water filtration, noise reduction, temperature control, and general environmental stability, is nature," explains Miller.

Drilling down deeper, Miller says that any project that harmoniously integrates the built and natural environments and shifts our perspective, or improves the ecological performance of a site, is a good strategy for moving forward.

B+H Architects is working on just such a project in India. The goal was to create a building that was a contribution to its place. To measure its success, B+H focused on ecological performance metrics. "We measured the ecological performance of the site as [pre-construction] and compared that to the performance of our proposed design. Overall, our design had better overland flow retention, we increased carbon sequestration, decreased noise and air pollution, produced more oxygen, and decreased the ambient temperature," says Miller.

When it comes to the sectors where sustainable design strategies can have a greater impact, Parkin Architects Limited (Parkin) looks to healthcare.

As the team at Parkin explain, during the United Nations Climate Change Conference (COP26), 45 countries including Canada signed a commitment to make healthcare a global leader in the race to reach zero emissions. And as thought-leaders in healthcare design, Parkin sponsored and assisted in facilitating the recent Canadian Centre for Healthcare Facilities (CCHF) forum "Getting to Net Zero – Developing a Blueprint for Change."



This forum specifically addressed the opportunities and challenges of reaching net zero. "Parkin believes that as hospitals provide healing environments, we should therefore not engage in designing buildings that contribute to their ailment," says Shannon Wright, associate at Parkin

"With current changes in architecture and healthcare design, we are seeing new projects mandating LEED and WELL certifications. Other innovations found in projects like Corner Brook Acute Care Hospital include geothermal technology. PV panels, tight building envelopes, and efficient mechanical systems are also becoming standard approaches to developing design solutions," says Wright.

As for challenges, Wright says that some of the biggest facing healthcare design include: an initial capital investment; Infection Prevention and Control (IPAC) standards that affect material and product selections; and heavy mechanical and electrical redundancy and load requirements to operate facilities. "Sustainability isn't a one-size-fits-all approach," explains Wright.

Prairie architects inc., well known for its commitment to sustainable architecture, is excited to announce it was recently awarded its first Passive House project.

The Bannerman Green Housing Co-op project is a scattered housing co-op in the centre of a mature urban neighbourhood in Winnipeg. It will provide a leadership role for sustainable multi-family residential development, including deep retrofitting of existing buildings.

"We feel this is exactly the kind of catalytic project for transformative change," says Lindsay Oster,

principal architect. "The project is committed to building resilience to climate change and providing a roadmap for other projects to follow, encouraging mass adoption and replication."

The project has lofty net-zero goals and is targeting Passive House, LEED, Living Building Challenge, and Zero Carbon Building certifications, among others. "The Bannerman Green Housing Co-op is steadfast in its sustainable commitment as it was founded on the principles of net-zero energy, carbon neutrality, beauty, sustainable education and advocacy, a right to nature, equity, health, fresh water, and food security," says Oster.

As for the future, the team at Prairie understands that the biggest challenges ahead are associated with the magnitude and speed at which a massive shift to meaningful and sustained climate action needs to occur. "We know what to do – the science is clear, but it takes alliances and partnerships built around the narrative of positive environmental, financial, and social impact rather than fatalistic and forgone conclusions. However, good narratives are not enough – discourse needs to be translated into action and this is where we need catalytic projects, which give early supporters entry points to collaborate, build networks of trust, and examples to aspire to, and eventually become the seeds of change.

"We think it's these kinds of catalytic projects that can become the vehicles of transformative change necessary to address impacts of climate change," explains Oster.

Over the past 12 months, interest in net zero has been growing exponentially, and not just on the

operational energy side, but also the embodied carbon aspect, which the City of Vancouver is also now taking into consideration for the Vancouver Building By-law, explains Veronica Ochoa, building performance project designer at RJC Engineers.

“We are seeing an acceleration towards net zero emissions for both new builds and retrofits as a result of both mandate letters submitted to the Minister of Natural Resources on the subject and incentives being available. Owners and developers are going above and beyond what is required and aiming for Step Code 4, for example, and we are seeing increasing interest in the commercial building sector, too,” says Ochoa.

Interestingly, one of the mandate letters sets out a requirement for existing buildings to release energy efficiency data at the point of sale. “This is already being done in the U.K. where you need an energy performance label if you are selling or renting. It’s much like a nutritional label, but for existing buildings. It’s useful as a buyer and sets a good precedent,” explains Ochoa.

RJC is working on a number of institutional projects that truly showcase the future of sustainable design, including one commercial/office building in Vancouver that is aiming for Passive House. They are also working with a number of clients in the existing building realm that are looking to upgrade their buildings to net zero.

“While challenging, we cannot ignore existing buildings. We need to talk about adaptation, especially considering the release of the recent IPCC report,” says Ochoa.

The IPCC report delves into the importance of increasing our resilience against the unavoidable impacts of climate change, and RJC is currently working with clients on the passive survivability of their buildings by simulating a power cut, for example, and assessing the thermal impacts on the building.

“We have to be transparent about what is and what isn’t possible – the studies are out there to provide owners with the information on how to make their buildings more resilient to the potential changes,” she says.

At Williams Engineering the team has seen even greater emphasis over the past year on the decarbonization of buildings to meet climate action legislation, with clients now looking beyond the pay-back of projects and focusing more on greenhouse gas (GHG) reduction in the long run.

Williams is working on several projects in this regard – one being the Reframed Lab that aims to transform how we retrofit multi-unit residential buildings to eliminate climate pollution, reduce energy waste, improve health and safety, and increase resilience to extreme weather events.

“Working with BC Housing, Metro Vancouver Housing Corporation, and five other design teams, we are completing deep retrofit designs for six multi-unit residential buildings,” says Laurence Kao, team lead, building performance and sustainability who is leading a design team for the Reframed Lab.

The six-month Reframed Lab plans to design deep retrofit solutions for low-rise residential buildings in B.C.’s Lower Mainland, Capital Regional District, and Southern Interior.

With support from their peers and experts, teams are integrating carbon reduction, climate adaptation, energy conservation, seismic safety, and health and wellness through a comprehensive regenerative design process.

Like the other experts in the sector, Glotman Simpson Consulting Engineers has found supply, timely delivery, and pricing fluctuation to be their biggest challenge of late. “In environments where sustainable strategies involve products that limit suppliers to a narrow field, the fluctuation of pricing and delivery challenges adds more pressure on our client teams and diminishes our ability to advocate for a particular solution. On the bright side, newer and more innovative products are coming to the market every day that we can readily take up and bring to bear,” explains Levi Stoelting, principal at Glotman Simpson.

Glotman Simpson is currently involved in many exciting projects including 843 N Spring Street – a five-storey creative office building and one of the most significant steel-timber hybrid structures in the greater LA region, built over a reclaimed and reused existing upgraded substructure. And closer to home, there’s the M5, a 20-storey residential structure in Vancouver that is intended to be a replicable prototype for hybrid mass timber construction.

As for the future of the industry, the team at Glotman Simpson believe that the rapid rate of change and exploration when it comes to technologies, hybrid solutions, integrated system solutions, and construction methodologies makes this a very exciting time to practice building engineering.

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When it comes to regulatory changes, in March the Canada Green Building Council (CAGBC) and Green Business Certification Inc. (GBCI), announced that CAGBC will provide direct oversight of LEED green building certification for projects in Canada.

This move enables project teams and professionals using LEED, Investor Ready Energy Efficiency (IREE), and TRUE standards for certification to work directly with CAGBC. The change is part of CAGBC efforts to aid the Canadian building sector's transition to zero carbon green buildings. CAGBC will continue collaborating with GBCI and the U.S. Green Building Council (USGBC) to support the success of green building projects and professionals in Canada and across North America.

By integrating GBCI Canada's certification, CAGBC is consolidating green building services and support for the benefit of Canada's building sector," says Thomas Mueller, president and CEO of CAGBC. "The market asked us to simplify access to certification and focus on customer service. This move ensures the building sector can continue to use GBCI's world-leading green building rating systems and services like LEED and TRUE, as well as CAGBC's Zero Carbon Building Standards, all under one roof."

GIVING YOU THE POWER

BC Hydro continues to drive sustainability forward by administering programs through the Provincial Governments CleanBC Better Buildings portfolio. The programs provide Energy Study and Capital

incentive funding and are intended to help building owners and operators reduce GHG emissions in their existing commercial buildings by implementing efficient electrified equipment.

Vancouver Community College (VCC) was one of the institutions who participated in the CleanBC Custom Lite program, which is intended to help building owners and operators reduce GHG emissions in their existing commercial buildings.

Under the program, VCC converted its gas-fired heating equipment to a domestic hot water CO₂ heat pump. The program provided Energy Study funding to examine fuel switching equipment to move away from natural gas to clean electricity. With this study, VCC was able to make an informed business case decision.

"In terms of quantitative benefits, we have seen that using electricity-driven equipment for heating buildings or domestic hot water, reduces GHG emissions significantly. For heating purposes, heat pumps also require less input energy compared to gas-fired equipment. Participation in the project allowed our educational institution to maximize our specific contributions, expand our carbon neutrality, and reduce GHG emissions at our own pace. Thus, the greatest project benefit lies in its scalability, which naturally results in a greater amount of flexibility for the potential participant," says Sladjana Borovčanin, director, facilities management at VCC.

Over recent years, increasing emphasis has been placed on renewable natural gas (RNG) as a carbon-neutral fuel to help fight climate change

– and FortisBC is doubling down on its efforts in this regard.

A study commissioned by the B.C. government, FortisBC, and BC Bioenergy Network (BCBN) found that by 2050, renewable and low-carbon gases could provide as much as 440 petajoules (PJ) per year – roughly double what currently flows through FortisBC's gas system to homes and businesses in the province.

Progress is indeed happening: FortisBC's recently put in an application to the British Columbia Utilities Commission that plans to have all new residential hookups to the gas system be 100 percent RNG. "While this is still in the regulatory process, this is the first application of its kind in North America that would see all new builds to 100 percent renewable and low carbon gas for the lifetime of the property," says Sean Beardow, manager, corporate communications at FortisBC.

If the application is approved, this change would provide home builders, real estate developers, and new home owners with another path to meet provincial GHG emission reduction targets. The application also proposes that existing residential natural gas customers would automatically receive a small percentage of renewable gas as part of their gas supply by 2024.

In other news, FortisBC is involved in some Deep Retrofit projects that would see dramatic energy efficiency improvements in both residential and commercial projects. While still in the early stages, the outcome is expected to take sustainable design leaps ahead. ■

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