



From Zero To Hero

Green building design experiences a shift in thinking

by NATALIE BRUCKNER

The green building design sector is advancing at such a rapid rate that it can be a little difficult to stay abreast of all the changes. Passive design, net zero, carbon positive – these are just a few terms and standards that now fall under the green building design umbrella.

Mark Hutchinson, VP, Green Building Programs at Canada Green Building Council (CaGBC), says that the biggest challenge is indeed keeping up. “New standards and requirements are regularly being introduced, and technologies are evolving. There is also uncertainty about the future price of utilities and the price of carbon beyond 2022, which makes it more challenging to assess lifecycle costs,” says Hutchinson.

Over the past year, however, Hutchinson has seen growing recognition of the importance and urgency of reducing carbon emissions, and the role of the design community in preparing buildings to operate efficiently, using only low-carbon energy sources.

Parametric analysis and an integrated approach to assessing all aspects of design are proving to be very valuable, says Hutchinson, especially when pursuing aggressive carbon reduction and energy efficiency goals. “The continuing drop in costs is making solar photovoltaics more interesting, and there are interesting developments in the performance of heat pumps,” he adds.

With the roll out of new standards and a plethora of green technologies and systems on the market, it can be difficult to figure out the best options. As a result, CaGBC recently formed the Zero Carbon Building steering committee to help guide the program’s evolution and requirements as it grows beyond its 20 early-adopters. “We are also increasingly focused on accelerating the growth of the retrofit economy. We are currently piloting the Investor Confidence Project [ICP] as a mean to standardize and accelerate the approval of funding for retrofits,” he says.

A couple of great examples of green building design are evol1 and Mohawk College’s Joyce Centre, both in Ontario. “evol1 is a commercial office that highlights the business case for zero carbon construction, while the Joyce Centre will



evol1, Waterloo, ON.

actually train building designers and operators of the future. Both incorporated innovative strategies to achieve zero carbon outcomes,” says Hutchinson.

He adds that the City of Calgary’s new compost facility is also a showcase project as it is the first new construction project certified under LEED v4.

Over on the West Coast in Vancouver, green building design and construction remains the second-largest sector under Vancouver’s Green Economy umbrella, driven by progressive, local green building policies, and international demand for local expertise.

According to Thomas Hansen, Calgary branch manager and sustainability practice leader at Williams Engineering Canada, the increase in the number of building design standards is giving owners more options to reach their design sustainability goals.

Hansen's approach to green building design is refreshing. Instead of seeing challenges he sees fantastic opportunities ahead. "The advent in how quickly things are moving and big data and its influence on sustainability means that the sophisticated owner has a greater understanding that green building design isn't just about a sustainable building, it includes everything from the operation of the building to the wellness of its occupants. After all, you can have the highest performance building but if it doesn't fulfill the need of the occupant, it isn't hitting the mark."

When it comes to technologies and systems, Hansen says "the systems are pretty set and we have the technologies available to help us meet Passive Design principles. What I see coming down the pipeline next is on and offsite storage and production – integrating systems, thermally and electrically, within the community and the district."

As for projects that truly showcase green building design, Hansen defers to 1400 Alberni Street – the world's tallest Passive House building. "Passive House is still relatively new in Canada and you are starting to see some applications at a mixed-use residential/commercial level, but to be building it on this scale is new to Canada. You need to have something to show people what's possible."

Mark Bessoudo at WSP says he is also continuing to see an emphasis on a building's carbon performance, as opposed to just the energy performance, and says this is a result of government policies such as Canada's national carbon reduction commitments.

"WSP is currently working with the CaGBC and several funding partners to quantify the cost for getting new buildings to zero carbon," explains Bessoudo. "What's interesting about this study is that we're looking at how different factors – from asset type and size to climate zone and carbon-intensity of the electricity grid – influence the cost designing for near-zero and net-zero carbon performance."

WSP has been working with Canada's federal government to develop a plan for achieving deep carbon reductions at the individual asset level and across entire

departmental portfolios. Bessoudo agrees that health and wellness also continue to be prioritized for both property managers and tenants. "We've seen more interest with the Fitwel Certification System over the past year, and the recent launch of WELLv2 has also garnered attention."



Bentall Kennedy's offices, Toronto, ON.

The Bentall Kennedy's new corporate office at One York in downtown Toronto, where WSP acted as sustainability advisor, is a great example of their involvement in the green building design sector. "The project achieved WELL for New and Existing Interiors Silver certification [WELL v1], making it one of the first projects in Canada to achieve certification. The project implemented extensive design strategies to enhance the environmental quality of the space, including a biophilic design plan," says Bessoudo.

BC Hydro is continuing with its commitment to work with companies and individuals to make it easier to go green.

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Based on the success of the BC Hydro Building Envelope Thermal Bridging Guide (BETBG), BC Hydro was asked by the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Standard 90.1 Envelope Subcommittee to help develop a number of building envelope types to be considered for inclusion in the ASHRAE Standard 90.1.

One example of a project that benefitted from the program was the Joseph & Rosalie Segal & Family Health Centre that features a number of green building design elements such as active chilled beam technology, a high-efficiency HVAC system, and high-performance glazing that will ultimately help save more than 800,000 kilowatt-hours per year of electricity and save 77 tonnes of CO2 annually.

In addition, BC Hydro championed and submitted a project proposal to the Canadian Standards Association (CSA) to develop a Canadian national standard on Building Envelope Thermal Bridging Heat Loss Calculation Methodology that can be considered for adoption by the Canadian National Energy Code for Buildings.

"The proposal has been approved by the CSA to proceed with the development work," says Toby Lau at BC Hydro. "It is estimated that by adopting the BETBG requirements would result in reduced heating losses and gains in newly-constructed and upgrade of existing buildings."

RENDERING BY HCMA ARCHITECTURE + DESIGN/COURTESY RJC ENGINEERS

FortisBC has also been actively involved with the BC Energy Step Code and has adopted it as the energy performance standard for its New Home Program. Owners who build a more energy efficient home than the minimum BC Building Code requirements qualify for a whole-home rebate.

In May FortisBC recognized 10 regional organizations that achieved outstanding energy savings in their sectors with the annual Efficiency in Action Awards. Through their combined efforts, this year's award recipients reduced natural gas use by more than 12,000 gigajoules annually, which is equivalent to the annual natural gas use of approximately 140 homes in B.C.

When it comes to regulations, Leslie Peer, technical specialist for building science and restoration at RJC Engineers, says they are only just catching up, as technologies, systems, and our understanding of low energy and carbon neutral building design are well evolved.

"We know how to build buildings to Passive House level and we have three window manufacturers in B.C. that meet Passive House standards. We know how to do it, now it's just a matter of getting it done, and I can't wait to start," says Peer.

RJC Engineers is working on four of CaGBC's 16 projects that have been chosen to participate in a two-year pilot of Zero Carbon Building Standard. Among those projects is the City of Vancouver's zero emissions Fire Hall, whose design will incorporate the generation of on-site renewable solar PV energy in order to offset all of the remaining greenhouse gas emissions.

RJC Engineers is also involved in the structure and building envelope of EcoLock in Kelowna, a five-storey personal storage and co-work facility that will utilize a patented High-Performance Building Block System with a negative carbon material classification.

While Peer says that retrofits are indeed a little more challenging, he adds that great strides are being made by organizations such as the Toronto Atmospheric Fund on analyzing each building and better understanding where to invest to get the biggest return on investment in reducing carbon emissions in existing buildings.

It goes without saying really that the commitment of architects to green building design is essential in its evolution, and Lindsay Oster, principal architect at Prairie Architects Inc., says that practicing sustainable architecture in Manitoba continues to be a rewarding and collaborative endeavour.

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Building Blocks on Balmoral, Winnipeg, MB.

“We have had the great fortune of working with many champions over the past year with projects that have pushed the boundaries of their typological norms,” explains Oster. “The Building Blocks on Balmoral childcare facility for Great-West Life is an exemplary case study highlighting the success of sustainability and adaptive re-use, taking a century-old building and transforming it into a leading example of sustainability, currently targeting LEED Platinum certification.”

Oster adds that the project has an array of sustainable features that include a geothermal ground source heat-pump with in-floor radiant heating and chilled beams for cooling; displacement ventilation translating to lower fan power; significant use of salvaged, refurbished and re-used materials; substantial water use reduction; an abundance of daylight and views; and use of low-emitting materials.

PHOTOGRAPHY BY LINDSAY REID/COURTESY PRAIRIE ARCHITECTS INC.

Diamond Schmitt Architects is also seeing some interesting developments within the sector. The \$95-million Innovation Centre at Red River College in Winnipeg being one example of a groundbreaking project with innovative design features.



Innovation Centre, Red River College, Winnipeg, MB.

Now under construction, the facility designed by Diamond Schmitt Architects in joint venture with Number TEN Architectural Group will include a North American first: photovoltaic glass panels. The skin of this high-performance building will create energy in addition to dynamically changing colour intensity depending on the angle of view.

The Kromatix glass panels will cover 690 square metres of surface on the south and east facades. The panels produce 280 200-kilowatt-hours of energy or 9.6 EUI, which, together with rooftop PV, contribute toward the goal of targeting net zero energy. **A**

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