



# Game Changing

A shift in thinking proves green building design doesn't have to cost more

by NATALIE BRUCKNER-MENCHELLI

**T**his past year has seen great strides being made in the world of green building design. Partially due to changing codes, regulations and greater incentives, but in the most part it is down to greater education and awareness of what it actually takes to design a green building.

"Studies like the Canada Green Building Council's new A Roadmap for Retrofits in Canada have been a real game changer. The paper talks to sustainable building solutions that vary dramatically from province to province. The key message is, depending on what market you are in and what area, building renewal has more value depending on the region of Canada you are in," explains Jeff Rabinovitch, principal at RJC Engineers.

The paper Rabinovitch is referring to details four different initiatives that the building industry needs to look at across the country to maximize green building design: recommissioning – the optimization of the performance and operation of an existing building's system, which includes upgrading lighting, improving indoor air quality and replacing boilers; deep retrofits that involve major system and equipment replacement or upgrades; renewable energy; and fuel switching actions.

"For instance, in B.C. it says that aside from the reduction in usage of grid energy, which is dollars in a consumer's pocket, solar isn't very effective in reducing

greenhouse gas and carbon emissions because electricity is predominantly from hydro. While in Alberta, our energy comes from carbon based fuel sources, so we need to move away from carbon based sources and use clean energy," says Rabinovitch.

Indeed, Rabinovitch believes that in Alberta solar energy systems should be installed wherever possible and he has already seen an uptick in demand for rooftop solar installations as a result of government mandates and grants. Incidentally, the Government of Alberta has a series of energy efficiency and solar rebate programs available for commercial use, offering a grant of up to \$500,000 for installation of a solar photovoltaic (PV) system for commercial and non-profit organizations.

Curtis Loblick, sustainability team lead at Williams Engineering agrees, having also seen increasing interest being paid in solar installations for greening a building.

"Photovoltaics are really starting to take off in Alberta and Saskatchewan because the amount of sun they get makes it a viable option," he says. The challenge, however, has always been the price point, but as demand increases that price is coming down. "It wasn't long ago that you'd look at a solar panel and it had a 25 year life, and a 25 year payback, but now we are at the point where the return on investment [ROI] can be less than 10 years."

Loblick adds that there has also been a 180-degree turnaround in how people view green building design and the benefits from already available technologies to cut long-term costs; green building design is no longer the first thing to go when budgets are cut.

One example of a project that had green building design at the forefront of its strategies is The Brewery District – a nine-acre, master-planned, sustainable, intelligently conceived work/live/play community located in New Westminster, B.C., which is estimated for completion in June 2019. Williams Engineering worked closely with Wesgroup Properties LP on the three residential high-rise buildings and provided mechanical systems design for all three buildings.

Using existing technologies such as a central heat recovery ventilator (HRV) unit, electric baseboard heaters with individual room control and an innovative ventilation design that includes corridor ventilation provided through a high-efficiency natural gas fired rooftop outdoor air unit located on the roof of each building, resulted in highly efficient buildings.

But it's not just newbuilds that play a role in the green building design market. Indeed, existing buildings, which make up 80 percent of Canada's building stock, are expected to play a major role in Canada's goal of reducing GHG emissions. It's all about those design tweaks.

Williams has been working on the Fish Creek Calgary Public Library (FCCPL) since 2007 when the company performed its first building envelope investigation on the facility. Over the years they have performed numerous case studies on its design and have updated a number of features including a complete roof replacement and electrical and mechanical upgrades.

While forward-thinking leaders are indeed driving us toward a more sustainable future, policies are also helping change the market.

"The biggest change we have seen in green building design over the past 12 months has been the shift toward strict building energy performance targets and measurements," says Derek Bartley, project consultant – mechanical, certified Passive House designer, Norman Disney & Young. "This is reflected in the City of Vancouver's rezoning policy, which requires targets for Total Energy Use Intensity [TEUI], Thermal Energy Demand Intensity [TEDl] and Greenhouse Gas Intensity [GHGI] to be met. The City of Vancouver also recognizes the Passive House standard as a pathway to compliance."

Bartley's colleague, Chi Zhang, project consultant – mechanical and energy at Norman Disney & Young, adds that the City of Vancouver's new Green Buildings Policy for Rezoning requires owners applying for rezoning to be either Passive House certified, or qualify under the policy's performance path. "The performance path has 11 requirements for projects looking to develop on land that require the city to upgrade the zoning allowance [typically to building to higher density]. The requirements fall into three broad categories: green buildings, healthy buildings and resilient buildings. The greatest departure from the previous policy is that LEED is no longer a requirement for residential buildings; instead three performance metrics measuring total energy intensity, thermal [heating] energy demand intensity and greenhouse gas intensity will need to be met," says Zhang.

One building that NDY has worked on that demonstrates green building design is the upmarket condominium development on the historic Shannon Estates mansion grounds. The entire site, which comprises of three historic buildings and seven new additions along with amenity facilities, targets LEED Gold certification.

NDY was engaged to provide the mechanical design for the site as well as head it's sustainability endeavours. Heating, cooling and hot water is provided by an on-site thermal energy system, which is designed to reduce carbon emissions by 70 percent.

Working somewhat behind the scenes to further drive the industry forward are the utility companies.

Over at BC Hydro an important resource tool called The Building Envelope Thermal Bridging Guide is helping to explore how the building industry in B.C. can meet the challenges of reducing energy use in buildings, in part by effectively accounting for the impact of thermal bridging.

"With the release of the Guide, the Commercial New Construction program introduced a mandatory requirement in May 2015 to calculate, model and report effective wall R-values. This analysis work helped to educate and prepare the marketplace. This type of analysis work is now a requirement to the BC Building Step Code that was introduced in April 2017," explains Oscar Ceron, manager of BC Hydro's New Construction program. The New Construction program provides industry and customer training, financial support for the design and implementation of new high performing buildings, partnering with other organizations such as FortisBC Energy Inc. to drive towards more efficient buildings.



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The BC Energy Step Code is a voluntary provincial standard that provides an incremental and consistent approach to achieving more energy-efficient buildings that go beyond the requirements of the base BC Building Code.

In addition, BC Hydro offers an online self-serve option called Business Energy Savings Incentive. "Here, customers can register and apply for simple energy efficient retrofit projects with a pre-defined list of configurations and approved products," says Ceron.

Like BC Hydro, FortisBC is working on increasing the amount of data out there to better educate the industry and provide a baseline from which to springboard off of.

"Sharing findings is an important part of the work we do so customers better understand ways to help reduce both energy and costs," says Nicole Bogdanovic, spokesperson at FortisBC.

"For architects and designers working on commercial building projects in B.C., staying informed about FortisBC's incentives and rebates can reduce the cost of incorporating high-efficiency into their designs and send a positive message to their clients about their commitment to attaining superior building performance," she adds.

Both natural gas and electric customers can access custom programs for a wide-range of new building and major upgrade projects. These programs include grants for energy modelling, support from an energy expert and rebates on energy-efficient measures once the project is complete.

For example, FortisBC's Custom Design Program for New Construction provides customized rebates that address the complex and specialized energy-efficiency requirements in new commercial building construction. It's a unique program that represents two utilities working together in a streamlined approach to make sure projects can achieve savings effectively. Through the program, FortisBC co-funds the energy studies offered through the aforementioned BC Hydro's New Construction Program.

Over in Ontario, the Independent Electricity System Operator (IESO) is also working on a number of initiatives that fall in the green building design realm, including the highly successful High Performance New Construction (HPNC) program that provides assistance and incentives for building owners and planners who design and implement energy efficient equipment within their new space.

The HPNC program, as Bryan Young at IESO describes it, combines "a dollars for widgets approach" (combining rebates for specific pieces of equipment along with incentives for modelling), along with an energy modelling option. The program is delivered by Ontario's local hydro companies, like Toronto Hydro and Hydro Ottawa, who are working closely with their customers on new construction projects.

The IESO wants to incent owners to be as energy efficient as possible with existing technologies for buildings that will be around 40/50/60 years. Demand for the HPNC program has increased during the latest framework (Conservation First Framework). "It is far cheaper for us to incent consumers to reduce energy consumption than it is to generate, transmit and distribute. It is a 200 percent ROI, meaning that every dollar we invest results in a cost avoidance of \$2 for generation and distribution," explains Young.

Jen Grado from Toronto Hydro adds that the HPNC program is aimed at exceeding building code requirements, and says that the response has been phenomenal. "Designers are more engaged than they have ever been. The conversation isn't just about electricity anymore, it's about integrating systems. Over the past six months we have been looking at how to reclaim heat and integrate different utilities to ensure we are capturing all forms of efficient energy," says Grado. "We are no longer seeing isolated decision making. It has become a full spectrum conversation."

This holistic approach to the design is receiving greater focus these days.

One program that focusses on just such a holistic approach is the IESO's Energy Performance Program that takes a look at the total building energy consumption instead of looking at specific equipment. The Program provides customers with commercial and institutional facilities with the opportunity to receive energy efficiency incentives on a pay-for-performance basis.

Another interesting initiative is the Program Savings By Design with Alberta-based fossil fuel delivery company Enbridge. This green building initiative was created to help builders design and construct buildings and houses with higher energy performance, and also to help homebuyers save on their energy costs.

This comprehensive program offers support and financial incentives during the design, construction and commissioning stages of building and housing projects.

It is fair to say that the past 12 months have seen a rather encouraging change. And one sentiment expressed by the experts is that while leading-edge design philosophies like Passive House, as well as the movement toward Net Zero Energy and Net Zero Carbon are about pushing the envelope the way LEED once did, today's focus is ultimately on collaboration and utilizing existing technologies in combination to achieve the ultimate in green design, dependent, as the Canada Green Building Council study showed, on geography as much as anything else. ■

# Building Better With Sustainable Design

## Winners of the LafargeHolcim Awards 2017 for North America

**S**ustainability has become a core principle of architecture and construction in North America. Winners of the LafargeHolcim Awards for Sustainable Construction presented in Chicago show how the leading edge of sustainable design means reaching far beyond "common sense." Their approaches use proven instruments that are cleverly applied to improve the quality of life, so the world builds better.

The LafargeHolcim Awards is about more than just beautiful buildings. It stands out as the world's most significant competition for sustainable design. The criteria of the \$2 million US competition is as challenging as the goal of sustainability itself. The competition is for projects at an advanced stage of design, not finished works. It seeks designs that go beyond current standards, showcase sustainable responses to technological, environmental, socioeconomic, and cultural issues affecting contemporary construction, and deliver new, surprising, and truly visionary solutions to the way we build.



### **Gold:** Comprehensive neighborhood planning in Detroit, USA

With its large team, studio[Ci] in Detroit is tackling one of the city's greatest challenges: In a neglected district of the city, they want to create a community based on collective empowerment that functions as sustainably as possible. The community owned and managed infrastructure will include local energy and food production, water and waste management, while also strengthening civic empowerment. "Taking the pocket vacancies normally characterized as the biggest problem in Detroit, the design turns them into an opportunity to create a compelling sustainable neighborhood," praised the jury.

### **Silver:** Flexible sustainable housing in Vancouver, Canada

High density or low density housing is prevalent in North America - but nothing in between. LWPAC + Intelligent City in Vancouver is filling the gap: A flexible-use passive house employing prefab wooden elements was designed that will give residents the greatest possible freedom and could become an icon of sustainable construction. The concept is so flexible that it can be used equally well for a single building or a large development. "The proposal is able to merge sustainability with affordability, focusing not just on components but systems in its concentrated effort to strive for net zero energy," said the jury.

### **Bronze:** Holistically designed greenhouse in Boston, USA

Kennedy & Violich Architecture in Boston designed a greenhouse that is much more than simply a climate-controlled envelope: It houses a preeminent plant collection, supports an innovative public education curriculum that integrates sciences, humanities, and the arts, and enables studies of plant form adaptations. The approach of using local materials and labour is particularly respectful of the environment. "Sustainable design is at the very core of the structure, form, and system. The project meets sustainability metrics as a matter of course and then goes much further to achieve a virtuosity of integration," noted the jury.