



# Building Resiliency

Entering a new era of sustainable design strategies

by NATALIE BRUCKNER-MENCHELLI

Net zero has become a bit of a buzz word in the sustainable buildings market. However, experts in the sector will tell you that while net zero energy goals certainly have their place, there is a lot more going on behind the scenes when it comes to sustainable design strategies.

Zero carbon, Passive House, increased thermal performance, convergence and integration, and increasing collaboration between the industry and government; these are just some of the key strategies currently underway to help owners and developers reach their goals to make buildings more efficient.

And then there's the numerous regulations and targets such as the 2016-2019 Federal Sustainable Development Strategy, the updated Ontario Building Code and the various initiatives offered by utility providers to take Canada's new and existing building stock onto the next rung of the sustainable design ladder.

"Over the past year we have seen a distinct acceleration in what is now considered to be basic environmental design. Most of our projects today are LEED certified, but we are finding clients, especially in the rental residential market, moving away from chasing LEED points and looking toward long-term strategies," says Vaidila Banelis, senior partner at Zeidler Partnership Architects.

As a result, Banelis says enhanced commissioning is starting early on in the design process and there is a greater focus on an evidence-based design criteria to ensure the building is doing what the original models claim. "Our clients are looking at 30-plus years of life for facades rather than 10, for example."

Banelis adds that there has also been a distinct shift in thinking. "What LEED doesn't take into consideration are the social environment, the physical environment and the connectivity at grade. We are taking more of a global picture when it comes to design strategies and seeing a real push from our friends in Scandinavia on evidence-based design. They are doing significant site studies to make sure we not only understand what the site is today, but how the building can improve the environment around it."

The Ryerson University Student Learning Centre is a great example of this. Zeidler designed a lightweight and transparent glass skin on the 155,000-square-foot centre, which features a surface design that creates varying light qualities within the interior spaces.

It is fair to say, sustainable design strategies are changing relatively quickly here in Canada and as a result, this is altering the dynamic in how those involved approach a project.

"There has been a realization that in order to achieve a sustainable design it has to be a full team effort. The owner, architect, engineers... they all have to be on the same page and working together," says Curtis Loblick, senior project manager at Williams Engineering Canada.

"This is extremely important when we start to talk about projects such as net zero. Each decision, whether that's from the architect, owner, mechanical or electrical engineer, has to work in harmony. As do the technologies, which need to speak and work with each other," says Loblick.

Two examples of teams combining strategies for the good of the project are Meadows Community Recreation Centre and Library in Edmonton (LEED Silver), where Williams acted as the civil, electrical and mechanical consultant, and Jasper Place Library (LEED Gold), where Williams provided mechanical and electrical consulting engineering services.

However, for Loblick, his focus is on existing building renovation and strategies to reduce consumption and cost. "I'm starting to see more requests for energy audits to see how we can reduce the greenhouse gas footprint. We can keep building new, but whether we build it net zero or not, we need to look at the bigger picture. We have a stock of existing buildings and we need to look at ways to make those more efficient through controls, implementing analytics and monitoring such things as space temperatures and air handling units."

Joseph Chow, associate, chief energy modeller and professional engineer at Norman Disney & Young, agrees with Loblick, and says he has seen greater collaboration between industry, academia/professional associations, government and its divisions. "This is very encouraging to the sustainable design strategies market," explains Chow.

He adds that initiatives like the provincial Step Code and the City of Vancouver's revamped rezoning policy are signs that sustainable thinking is an important and permanent addition to how buildings will be developed, built and operated.

One notable upcoming strategy is the introduction of the Passive House standard into the City of Vancouver's Green Building Policy for Rezoning, which came into effect on May 1, 2017. "Under this new policy, owners and developers will have the option to choose whether the project is designed to meet Passive House standard or LEED Gold BD+C, with 10 additional sustainable design conditions for all new rezoning applications," adds Derek Bartley, mechanical consultant, LEED AP BD+C and certified Passive House designer at Norman Disney & Young.

Strategies for systems are changing here in Canada, too. In the past there has been a focus on single systems to help meet sustainable design strategy goals, but Bartley says there is increasing awareness in the provision of integrated systems by suppliers. "One recent improvement we have seen is the provision of heating and cooling fan coils, control valves and thermostats, all as an integrated system in providing more energy efficient space conditioning and ventilation," says Bartley.

One example of a project that showcases Norman Disney & Young's work with approximately 210 apartments and over 60 condominiums is the master planned development Shannon Estates – a mix of new construction and revitalized heritage buildings in the Kerrisdale neighbourhood of Vancouver, B.C. Norman Disney & Young designed and is optimizing the regulated thermal energy system, which generates energy by the smart application of cascaded hydronic systems, solar thermal energy, parkade and sewage heat recovery, and through chiller heat recovery.

RJC Engineers has also seen the impact that the Passive House standard is having, as well as the Built Green design/rating systems.

In order to meet more stringent sustainable design targets, RJC Engineers say that in B.C., there has been an increase in thermal performance of building enclosures using improved materials and assemblies. "This is being achieved by reducing thermal bridging across exterior-insulated wall assemblies in particular. A number of thermally broken or reduced-conductivity

cladding attachment systems are now available for specification and construction,” explains Terry Bergen, managing principal.

Bergen adds that some design and construction strategies now eliminate traditional cladding connectors entirely, and rely on the physical properties of screw fasteners, board insulation and structural walls to provide buildings with nearly un-bridged continuous exterior insulation.

“Another design approach includes ‘super-insulated’ double-stud wall cavities, full of insulation. Insulation strategies are then complemented with better performing air barriers, which result in highly effective enclosures. Better industry-wide understanding of the importance of air barriers, and in particular careful application in the field by trades, has led to significant improvements of air barrier effectiveness and overall thermal performance,” says Bergen.

Elimination of bridging effects of the building structure is more in the forefront of design consciousness, and consideration is being given to alternative approaches to providing balconies for large high-rise buildings. “Proprietary thermal isolators for balcony slabs are starting to be seen regularly in North America, or designers are exploring building geometry solutions to reduce the bridging effects of building structure,” he says.

Bergen goes on to note that these strategies have become common practice in many of RJC’s projects across Canada, and refers to the Capital Park development in Victoria as one such example. “The project’s developers and architects considered these strategies and performance goals as design starting points.”

While LEED and reducing energy are indeed a focus of the industry, Doug Webber, VP sustainability and energy at WSP, says the most dramatic and interesting change he is witnessing is the shift in focus to carbon.

“Until recently, we assumed energy and carbon were the same thing, but it has become clear they aren’t aligned in every case,” he says. “Net zero energy is no longer an important metric, this is being replaced by net zero carbon. There is a similar shift from a focus on new building to existing buildings where the biggest potential for impact lies. The past 10 years was about proving what is possible. Now it’s about achieving results at scale, particularly with respect to carbon emissions.”

WSP is currently working on the Ontario Association of Architects retrofit to zero carbon, and is seeing increasing interest in zero carbon buildings from both the public and private sector. “With all the talk about carbon and climate action plans there is an interest in understanding what it takes to get to zero.”

While there is indeed a great deal of traction when it comes to developing sustainable design strategies, one challenge that still remains is cost, or perceptions of cost. An interesting takeaway from the latest McGraw Hill Construction Canada Green Building Trends survey is that respondents find utility incentives to be more compelling than government incentives when it comes to encouraging more focus on building design strategies.

FortisBC delivers approximately 21 percent of the total energy consumed in B.C., about 35 percent of that energy is delivered to commercial customers. “That’s why it’s important to support customers who are managing energy use in new and existing commercial buildings,” says Ramsay Cook, program manager, commercial and industrial conservation and energy management programs. “FortisBC does this through a number of carefully designed programs that aim to improve the return on incorporating high-efficiency

into projects and make sure these efforts continue to reduce cost over the life of the project.”

One program offered by FortisBC is the Custom Design Program for New Construction, which provides customized rebates that address the complex and specialized energy-efficiency requirements in new commercial building construction. “It’s a unique program that ensures projects achieve savings effectively by providing funding for front-end energy studies as well as capital incentives for measures that will reduce energy consumption for our customers. The dollar amount is proportional to the anticipated savings,” explains Cook.

Natural gas customers can also access rebates for energy efficient commercial natural gas boilers, water heaters and food service equipment. FortisBC electric customers can access rebates for electric lighting, HVAC and pool pumps, refrigeration and restaurant equipment.



▲ Shannon Estates, Vancouver, B.C.

“Reaching out to FortisBC early in a project is the best way to maximize possible incentives and be informed of pre-qualification requirements. Technically trained representatives work directly with the project team to provide ongoing help and support,” says Cook.

Over at BC Hydro the company offers an online self-serve option called Business Energy Savings Incentive. Customers can register and apply for simple energy efficient retrofit projects with a pre-defined list of configurations and approved products.

In new commercial building construction BC Hydro has witnessed increasing demand for heat pump based building designs (both de-centralized and centralized heat pumps) and air side and water side heat recovery systems, and there is greater emphasis on building envelope performance as a result of the new BC Building Step Code, the City of Vancouver’s green building policies and the focus on reducing the buildings heating loads through building envelope improvements and ventilation heat recovery.

“Sustainable building design appears to be gaining momentum in incorporating occupancy comfort and health benefits in the process. This approach will apply passive building design principles [free of thermal bridges and super air tight buildings with energy efficiency, building shape and orientation] and highly integrated mechanical systems [space heating/cooling, ventilation and service hot water heating] utilizing technologies like high-efficiency heat pumps, heat recovery and heat storage,” says Oscar Ceron, senior program manager, commercial marketing at BC Hydro.

Lighting design still remains one of the key strategies and BC Hydro has seen upwards of 80 percent penetration of LEDs across the indoor lighting equipment use in projects they support. “This is more predominant in

the recent new health care construction. Outdoor lighting is predominantly changing to LEDs across all sectors from new construction to retrofits,” explains Ceron.

One key observation from BC Hydro is that coupling sensors with intelligent software will allow in-depth and extensive monitoring of other systems than lighting, such as HVAC, fire and security, and intuitive analytics will allow building managers to continuously minimize the operation costs.

In fact, this idea of greater understanding by those operating the buildings is perhaps one of the largest focusses for those in the utilities sector and an integral strategy to reaching the goals of today and tomorrow.

“We recognize that training is key to sustainable design strategies, but now it’s about quantifying the impact of training,” explains Bryan Young at IESO. “Our capital incentive programs, what I call our dollars for widget programs, look at the what. We also need to

look at the how – how people interact with that heating system/pumping system. As governments ask us to reach higher targets, we need a ladder to help us get there. which comes in the form of an integration between dollars for widgets programs and training.”

Up until mid 2016 the IESO had just four training incentives; the Certified Energy Manager certificate; the Certified Measurement and Verification Professional (CMVP) Certification Incentive; Certified Building Commissioning Professional certificate; and The Building Operator Certification program. Today IESO has a portfolio of 10 training incentives at three levels: the foundational layer; specialization; and the four original certifications at the professional level.

For Young, the most exciting development of late in the sustainable design strategies realm is the evolution of convergence and integration. “You’ve got this convergence of government policy and public desire right now. On January 1, 2017 we have the introduction of the new building code in Ontario that affects commercial buildings and results in an immediate 13 percent improvement in energy performance in new buildings,” Young explains. “At the federal and provincial levels you have a significant set of policy drivers around climate change that are starting to gain traction. There’s also the corporate social responsibility driver that is not to be dismissed. That speaks to the organizations and the people who actually get it.”

Young, who has been an environmental specialist now for 15 years, says the sustainable design world is heading for exciting times. “I’ve never seen an opportunity like this where energy efficiencies have mainstreamed and regardless of what is happening south of the border, there is significant momentum here in Canada to do the right thing.” **A**