

SPEAKING OF SUSTAINABILITY

THOUGHTFUL DISCOURSE ON GREEN BUILDING DESIGN FROM INDUSTRY INSIDERS

by Luigi Benetton

Events like BP's Gulf of Mexico oil spill spur people to fret about the environment. Fortunately, encouraging signs exist. Whether people bring their own bags when shopping or choose fuel-efficient vehicles, society seems to be getting the message.

The same is true in the building industry – or is it? “All of the necessary technologies exist to create great buildings. It's just a question of implementing them,” says Ron Mazza, principal at Read Jones Christoffersen Ltd.

So, given the fact buildings emit more greenhouse gases

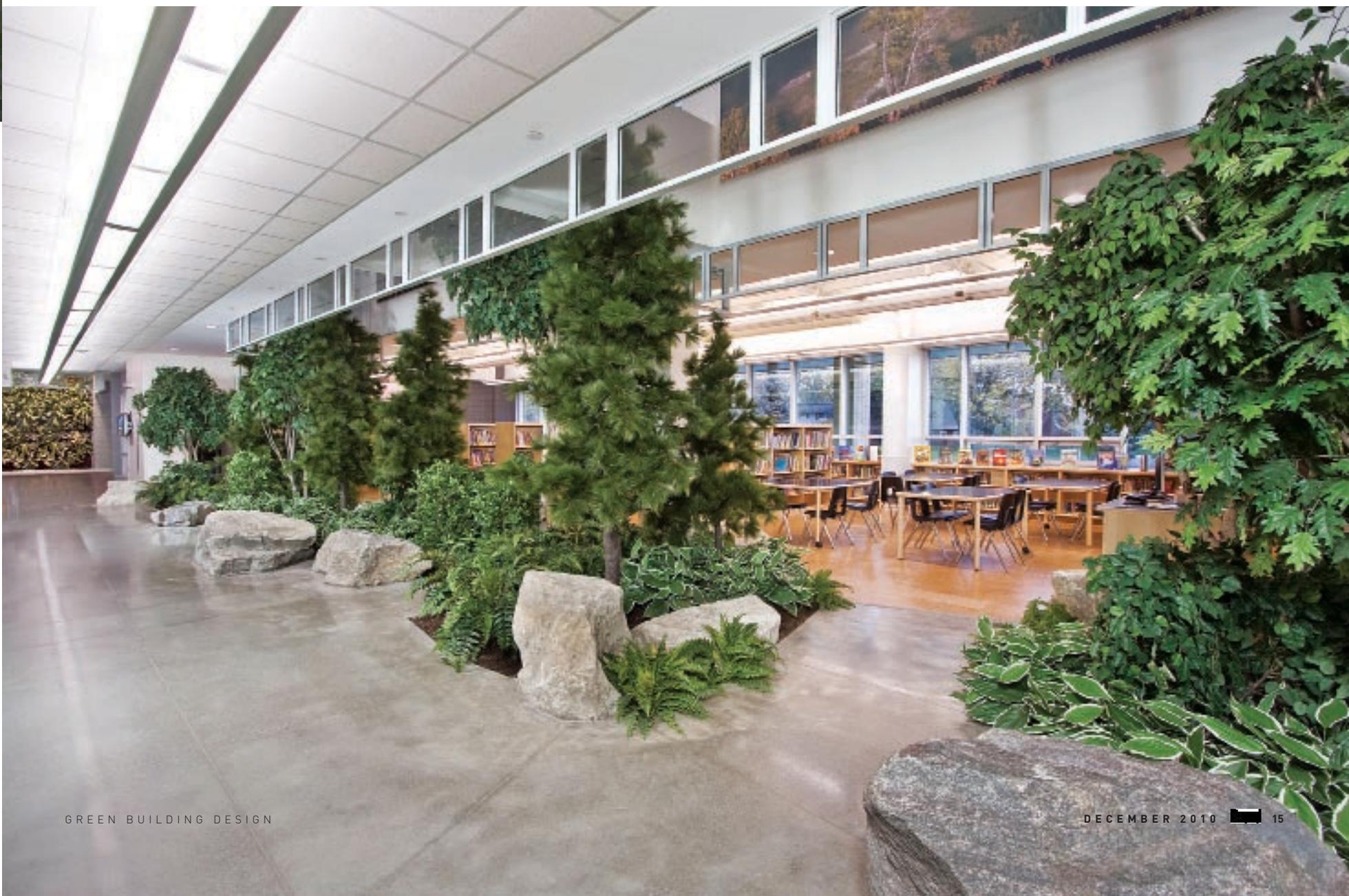
than any other source, why isn't every new building green? The quick answer: economics and the environment clash, so the industry seeks answers to deal with both. On many fronts, the industry is making headway. One cultural shift involves an increasingly front-loaded project design phase founded upon a team approach.

“The owner, builder, designer and so on must make fundamental decisions about how the design works at an early stage,” says Mazza. “There's no separation of systems like there used to be, with no interaction between systems. For

instance, radiant systems are in the slabs, so now structural has to take mechanical into account.” Building information modeling (BIM) systems help make this possible, he adds.

Alex McGowan, vice-president of technical services with Levelton Consultants Ltd., notes that, “BIM is still in the early stages of implementation in most of what we have seen,

McLean + Associates | Architects: Dr. David Suzuki School in Windsor is striving to become Canada's first LEED Platinum educational institution. Technologies include wind turbines, geothermal exchange heating and rooftop rainwater collection. (Below): interior forest hallway with living wall in distance. Photos by Dan Reaume Photography.



and many designers still think of it as a fancy version of CAD.” But regarding the question of what technological advances have made green building design easier to adopt, he adds, “Improvements in energy-modelling software: better used interfaces, faster solvers that can handle more input data (lighting, ventilation strategies, controls, etc.) If it will encourage more integrated design, so much the better – the integrated design process is the key to greener buildings.”

Richard Bolus, senior partner at CEI Architecture Planning Interiors, recommends developers “use the tools and techniques that are cost-free. Get the proper site, understand where wind is coming from – that kind of thing.”

Braden Kurczak, division head of green buildings for Enermodal Engineering Ltd. urges clients to focus on energy conservation before energy generation. “Make sure your building has a good skin,” he says. He uses a triangle to explain his reasoning. The base represents high-value measures like the building envelope, the middle would be still-important elements like mechanical systems, and the upper third contains newer technologies. Net zero resides at the peak of the triangle. When you climb the triangle, costs rise for the same amount of benefit. “One dollar spent on insulation is worth ten spent on photovoltaics,” says Kurczak.

Sourcing more efficient mechanical systems is another goal, but Geoff McDonell, mechanical engineering manager at Cobalt Engineering, refers to Kurczak’s point. “Europeans build

envelopes that let them spend less on mechanical and electrical lighting systems,” he says.

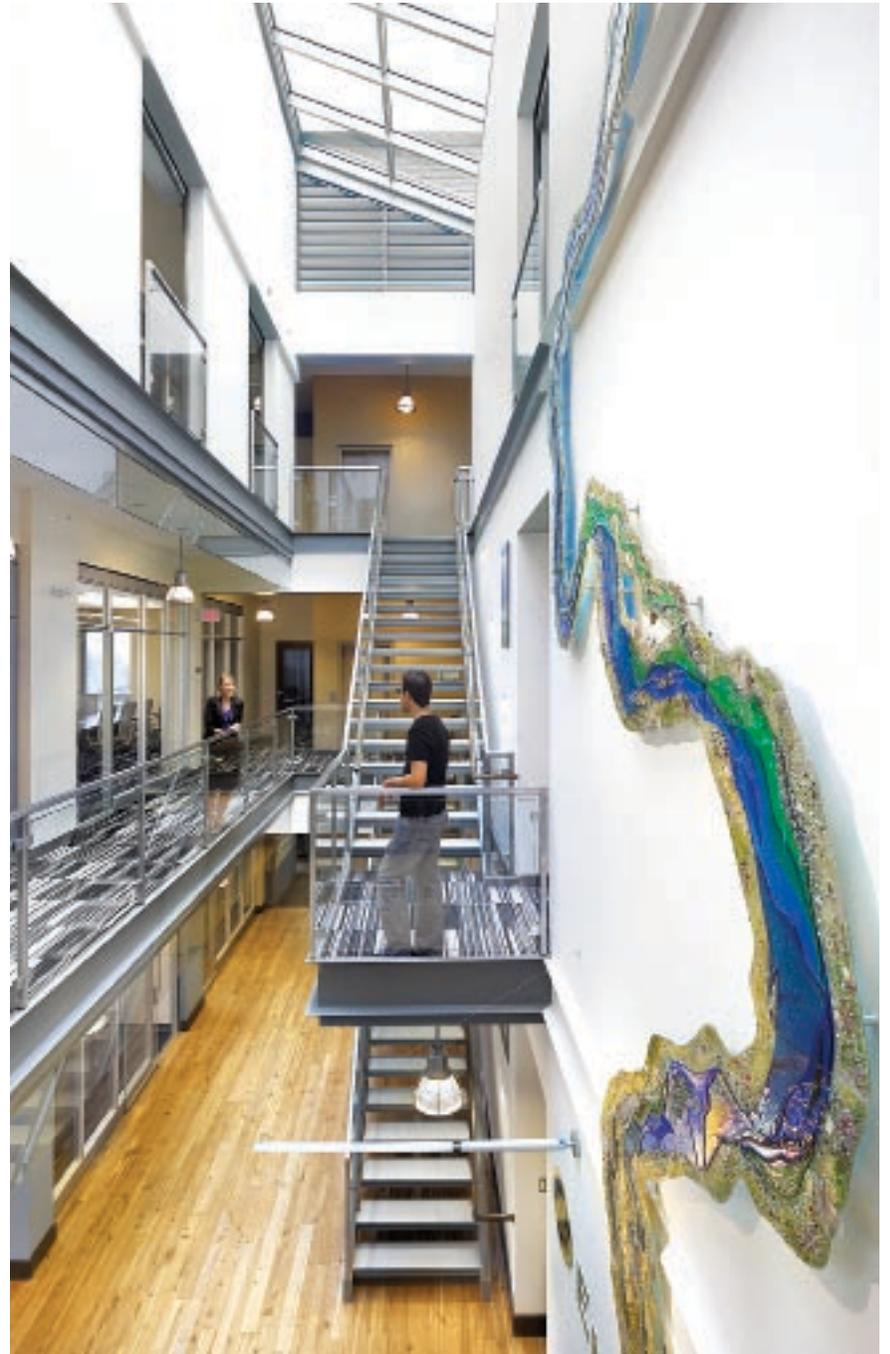
Naturally ventilated buildings reduce strain on mechanical systems, though they take some monitoring. “You have to rely on sophisticated numerical models to tell you whether occupants get all the fresh air they need,” says Larry McFarland, principal at Marceau/McFarland Architects Ltd., adding air quality measurement tools are becoming equally sophisticated.

Natural lighting, often via central light wells, contribute to the transparency that David Driscoll builds into designs (like the Hamilton Health Sciences David Braley Cardiac Vascular and Stroke Research Institute) to deliver daylighting. Aside from the energy cost savings, “people tend to work better with daylight,” says the principal at Parkin Architects Limited.

Demand for common “celled” buildings, though, continues to thrive thanks to long-established office cultures that don’t fit open designs well. Besides, as McFarland notes, “it becomes noisier. Acoustics can become a problem in sustainable buildings.”

Like mechanical systems, the thinking on which materials to use is also evolving. Choices can be as specific as the handrails in stairwells. “People install steel pipe and regularly repaint it during its useful life,” says Driscoll. His preference: maintenance-free stainless steel.

Wood also plays a role. “It’s the only building material that sequesters carbon until it decays. If we can keep carbon from getting into the atmosphere,



Enermodal Engineering’s Kitchener headquarters, with its limited glass-to-wall ratio, is the most energy-efficient office in Canada (70 kWh/m² –metered energy use) and still has 99% daylighting. Photos by Shai Gil, courtesy Enermodal Engineering.



it’s a step forward,” McFarland says.

Buildings as carbon sequestration devices? The chances of that happening improve when buildings last. “The best building is one you never need to replace,” Mazza states. “We had 25-year-old buildings we had to demolish. They were so inflexible we could not use them for anything else.”

Mazza lists choices that help designers create reusable buildings like creating fewer interior walls, spacing columns widely, and raising floor heights and loadings.

Such thinking runs counter to traditional demand for “super-idiosyncratic” buildings. “Certain institutions want to be idiosyncratic, and we’ll do that for them,” admits Douglas Birkenshaw, principal at Bregman + Hamann Architects, “but we want to ensure that our projects can be transformed into other things during their useful lives.”

Customers might see things Birkenshaw’s way if the possibility of a

building outlasting the organization that occupies it looms as large as it does in today’s automotive industry. That’s why General Motors’ plants currently being built in the U.S., for instance, are designed for conversion into shopping centres should a plant shut down.

Furniture makers also pitch in. Certain current furniture lines serve to configure open office space and make conversions less onerous. “As long as electrical and other building services are handled easily, changes can be made quickly,” Bolus says.

But Bolus looks to older building stock for most green building opportunities. “For every LEED building, 30 buildings cry for help,” he claims.

Vancouver’s Simon Fraser University acquired a 1910 bank building that now houses offices, classrooms and meeting rooms. “It cost less than building new,” McDonell says. He figures this type of activity will drive property managers to retrofit aging

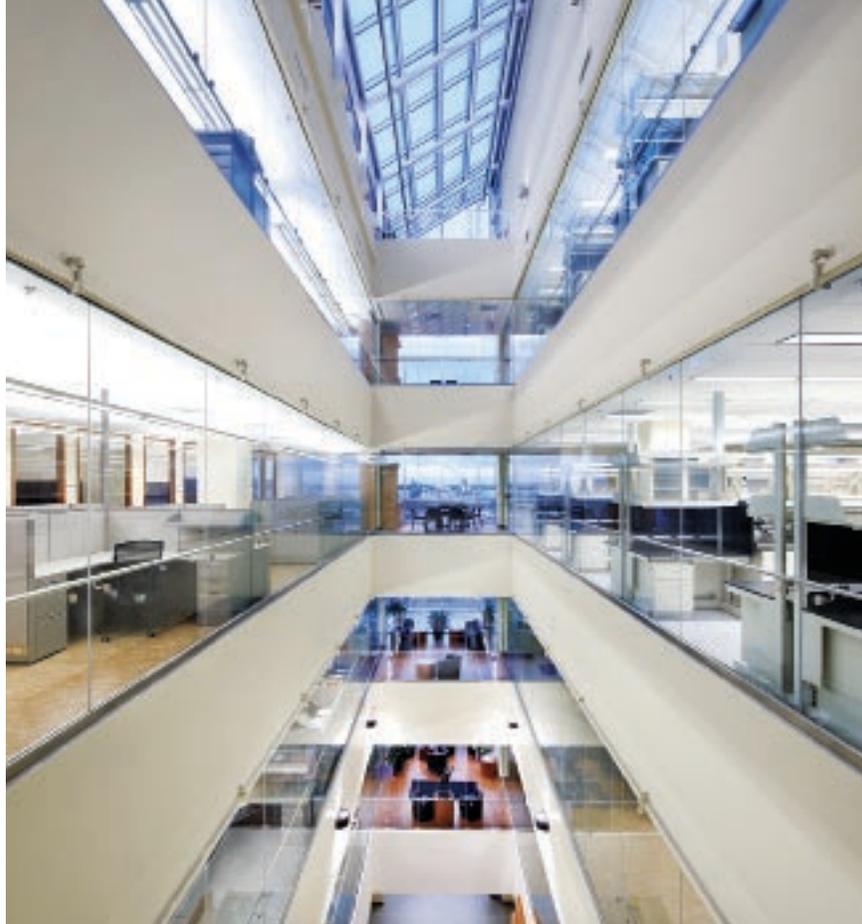
properties “partly for love of the earth, and partly because people don’t want to lease energy hogs.”

Birkenshaw notes improvements to Toronto skyscrapers like First Canadian Place and TD Centre. Recladding, installing double-glazed windows, swapping out mechanical systems and other steps make sense given the goal of upgrading to LEED Silver ratings.

Going even further is the Integrated Learning Centre at Queen’s University in Kingston. Like similar buildings at other universities, “It’s meant to be a teaching tool,” Birkenshaw says. “You can go online and see how much energy it’s using.”

For all the concrete examples of the greening of Canada’s buildings, hurdles still impede the movement. Perhaps most enduring is the cost argument, which experts largely dismiss as myth. LEED-certified buildings cost between four and ten per cent more than non-LEED buildings to erect, but long-term operations and maintenance cost savings make them cheaper to own during their useful lives.

For example, McFarland mentions the Gulf Islands Operation Centre for National Parks, Canada in Sidney, B.C. “Five years ago, the building was seven per cent costlier to build. It’s about 65 per cent less expensive to run.”



Hamilton Health Sciences’ David Braley Cardiac, Vascular and Stroke Research Institute at the Hamilton General Hospital site, an academic partner of McMaster University, Hamilton, Ontario. Photos by Richard Johnson Photography Inc., courtesy Parkin Architects Limited.

The total cost of ownership argument works for those owners whose cost horizons stretch far into the distance, but it falls flat when the horizon is just over the next rise. Al Jaugelis, technical director for Innotech Windows + Doors, understands this well. “Many developers have a short-term perspective. They build, sell and move on,” he says. “The operational savings of green improvements tend to only attract long-term owners.”

Certain governments now shape public-private partnerships for infrastructure buildings to lengthen developer

cost horizons. At Parkin Architects, Driscoll, who designs courthouses, prisons and other public works, says the Ontario government leases buildings from developers for the duration of their useful lives. “The builders gladly make buildings energy-efficient,” he says. “They have to pay for them over the long run. The lowest-cost bid still wins, but now the cost includes outlays during the building’s life.”

Derek Neale, of Neale Staniszkis Doll Adams Architects, cites the main objections he hears in response to building green. “Capital costs versus payback periods, accuracy of

An advertisement for Hemisphere Engineering. The top half features a photograph of a waterfall cascading over dark rocks in a forested area. The bottom half features a large, green, curved pipe. The text is overlaid on these images.

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performance assessments and the gap between public and political perception,” says Neale. His response? “We need accurate and unbiased information upon which to produce green buildings.”

He expands on his point with, “There is a need for greater understanding of the application of green building design principles when applied to the extreme variances of Canada’s regional climate zones, i.e. ‘bang for the buck.’ For example, alternate fuel vehicles. During the long winter months in the prairies, gas-powered vehicles require electricity in the form of block heaters in order to function.”

But sometimes newer technologies don’t deliver on the hype. Birkenshaw recalls waterless urinals that demanded specific maintenance schedules and smelled foul.

Driscoll faced the odour argument using a health-care facility design tactic, where exhaust ducts in operating room floors (not ceilings) draw any anaesthetic gases down instead of up. “Gases” emanating from urinals might not be as hazardous as anesthetics, but they prompted “a different way of ventilating a washroom,” Driscoll says.

Different thinking rarely goes into building codes, which McDonnell figures are ten to 15 years out of sync with today’s green building standards. He notes that, “you still have to treat water used to flush toilets, even in the latest 2006 B.C. building code,” he says. Retrofits present their own specific challenges. “When you renovate something that’s a small portion of a much larger piece, it’s harder to get green stuff in there,” Driscoll says.

Kurczak urges holistic viewpoints on retrofit clients. “When they need a new boiler, they also ought to look at the rest of the building,” he says. “Maybe, if they upgrade windows first, they can buy a smaller boiler or re-commission the one they have and delay that capital outlay.”

Alex McGowan of Levelton Consultants goes even further in the discussion. “These ‘green retrofits’ – improving airtightness, increasing insulation levels and turning down the thermostat – may contribute to moisture-related problems as less energy is available for drying the building envelope,” he says. “Just as we learned in the 70s, we can’t change only one part of how we build – the whole building-as-a-system is an interactive assembly.”

LEED itself, while a net positive, must continue to evolve. Bolus admits LEED “makes buildings that are better than they used to be. Still, there’s room for improvement.”

Green building standards like LEED serve as an industry lingua franca. “When it emerged, LEED encompassed a ‘whole building’ philosophy,” explains Geoff McDonnell. “It



The Gateway Lodge Residential Care Facility in Prince George, B.C. is configured in an east-west direction to maximize solar orientation. Ground source heat pumps with a vertical closed loop system comprising 78 wells 275 feet deep provide the major heating and cooling source. On-site stormwater is managed with bio-swales and drywells for groundwater recharge. A high-performance building envelope for thermal efficiency was provided. A ventilation heat recovery system is incorporated, as well as energy efficient lighting and water efficient plumbing fixtures. Factory-built prefabricated panelized walls were used to reduce construction waste and shorten the construction schedule. The materials were selected based on their durability, recycle-content, non-toxicity and local sourcing. Photos by Derek Lepper, courtesy Neale Staniszkis Doll Adams Architects.



was very logically laid out, so it gained early traction.”

The most glaring omission is where LEED ends. “Nobody comes back to evaluate it over the life of the building,” Driscoll notes, “outside of a check a year after completion.”

Trends like governments leasing buildings from builders and tracking energy and water consumption online may help fix this problem. “What’s the cliché – you can only manage what you measure?” asks Kurczak.

But few care for the complexity surrounding LEED measurements. “It’s turning into a bureaucracy in terms of documentation and evaluation,” McDonnell explains, adding that the next version ought to streamline the process.

Mazza questions certain uses of the LEED building scorecard. “People count the points they can get most inexpensively,” he says. “I don’t think that was the original intent. You see many bike racks and showers. That’s an

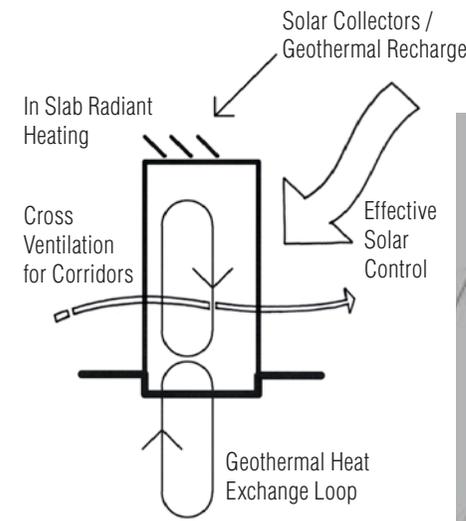
inexpensive point, but the intensive energy-saving elements are more expensive. LEED makes better buildings, but it does not make the best buildings for the money.”

Kurczak figures the industry is catching up to current green building standards. “Now the standards need to advance so the industry can catch up again,” he says.

Once operating, buildings stay green only if people run them that way. Ali Syed, senior energy management project advisor for Hemisphere Engineering Inc., sees plenty of green potential during energy audits. “I’ve seen HVAC systems running over holidays and after facilities close,” he says.

McDonnell sees Canada’s building industry as “fractionalized. Everybody, including contractors building green buildings, works in their own little offices.” He envisions a different mindset, one in which people learn more about related disciplines (or “building science cross-training”) so they can make tradeoffs at the table.

That’s the kind of training faculty will impart at the CEI-designed Okanagan College Centre of Excellence in Sustainable Building Technologies and Renewable Energy Conservation in Penticton, B.C. Even the building itself offers lessons. Built for net-zero water and energy consumption and designed to meet the



1601 West 7th Ave., Vancouver, B.C. The Provincial Homelessness Initiative (PHI) is dedicated to achieving a significant level of sustainability. Neale Staniszki Doll Adams Architects had been directed by BC Housing to achieve a LEED Gold standard, a minimum of six LEED points for Optimized Energy Performance and a maximum 10% end-use energy from fossil fuels.

Living Building Challenge, the most unusual twist in its construction was the use of wood destroyed during the B.C. pine beetle epidemic.

Even builders long out of school are changing their mindsets. “When we started, getting contractors to stream waste was difficult,” Birkenshaw re-



calls. “Now it’s a no-brainer. It has shifted quickly, in just three years.”

“You can throw a PV array on your building and say you have it,” Birkenshaw says, “but the money you spend on that is much better spent on your envelope.”

“To the untrained eye, our office building doesn’t look green,” says Kurczak, while calling it one of the greenest in Canada. “You need to put the non-sexy stuff in there.”

Fortunately, certain externalities offer synergies like that of pine beetle wood in B.C. “For Okanagan College, the City put in an advanced wastewater

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The Hub at Simon Fraser University is LEED-certified, uses geothermal heating and cooling, and incorporates green roofs at various levels. Photo by Derek Lepper, courtesy Neale Staniszki Doll Adams Architects.

treatment plant,” Bolus recounts. “We incorporated that into our overall wastewater management plan.”

Energy costs may make buildings like Okanagan College the rule. “There is no way out,” Syed states. “Building owners will face increasing energy rates.”

“You’ll see a behavioural change in society. If a carbon tax is introduced, it will hit people’s pocketbooks,” Mazza agrees. “In 25 years, resale values for inefficient buildings may drop.” He figures sticks, not just carrots, may be unavoidable. “Climate change is a long-term threat – it’s hard for societies to deal with nebulous long-term concerns,” he explains. “It’s easier to react to more immediate issues that make people change their behaviour overnight.”

The argument doesn’t consist entirely of sticks. “Green buildings are better to work in, so it’s easier to attract staff,” says Birkenshaw.

Meanwhile, green options continue to multiply. Driscoll claims a marked increase in the number of companies selling solar panels in Canada while McDonnell tells of higher efficiency equipment, long available in places like Japan and Europe, now appearing here. “In Germany back in 1994, high-efficiency equipment was mainstream. I saw it start to come to Canada in the early 2000s through some small suppliers.”

To encourage developers, municipalities may reduce the cost of permits. “If you reduce water use and sewer services,” McDonnell reasons, “why should you pay what everybody else pays?”

“Until recently, the primary impetus for green building design has come from the public sector,” notes Neale of Neale Staniszki Doll Adams Architects. “With regard to our firm’s projects, this includes regional health authorities, the City of Vancouver and the province of B.C. partnership for social housing [BC Housing] and electoral municipal governments such as the Regional District of Nanaimo. Our private sector clients have developed green design through indirect initiatives by institutions such as Simon Fraser University Community Trust for projects at SFU UniverCity. The future will see more green design initiated solely by the private sector.”

To bring homeowners on board, electrical utilities may want to emulate Toronto Hydro’s Feed-in-Tariff (FIT) program. Two-way electrical meters measure renewable energy produced and fed back into the grid. An above-market price for this energy helps shorten the payback period on the homeowner’s investment in power generation.

Programs like FIT may encourage the spread of regenerative design, perhaps the most audacious vision of the bunch. Going beyond net zero, regenerative design turns out buildings that create enough energy and clean water for their own needs and feeds a surplus back to the community. Bolus notes that Okanagan College may go beyond net zero, so it may show how regenerative buildings are done.

Even if they aren’t regenerative, places like Okanagan College contribute to the spread of the “green meme.” Says Driscoll, “Green buildings teach their occupants that green matters, and occupants then take interest in the planet.”

But in the end, it’s practical matters that count. Levelton’s Alex McGowan believes that durability is by far the most important green building design component. “Any building that rusts, rots or falls apart and has to be rebuilt before the end of its expected service life is neither sustainable nor green.” ■

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