



*Monte Paulsen Investigates*

## *Green Homes, Out of the Box and Green Buildings that Pay Off*

*(Two Series from The Tyee Solutions Society, Originally Published on The Tyee)*



Shipping containers revolutionized the global economy, making trade possible on a scale never before seen. Now, these big steel boxes hold the potential to revolutionize urban living and design.

In *Green Homes, Out of the Box*, reporter Monte Paulsen details how these containers are being refashioned into affordable, green buildings in Europe and Asia and examines how they could be used to solve North America's housing problems as well.

In *Green Buildings That Pay Off*, Paulsen continues his investigation into sustainable, environmentally friendly building methods. He looks at a new generation in green building that pays off in financial and energy savings, improved living, and new jobs in a strengthened economy.

These series are both part of the larger *Green From The Ground Up* series, a project of the non-profit Tyee Solutions Society made possible through the support of the Vancity/Real Estate Foundation Green Building Grant Program. Support for this project does not necessarily imply endorsement of the findings or contents of these reports. The articles published (so far) can be found at <http://thetyee.ca/Topic/GreenBuilding/>

As he compiled research for the series, Monte met Linus Lam, the Executive Director of Architecture for Humanity Vancouver. The two decided to work together on a two-day event called *Quick-Homes*, which attracted nearly 100 participants, including City councilors, funders, architects, planners, non-profit housing managers, designers, and students. You can learn more about *Quick Homes* here: <http://thetyee.ca/TyeeNews/2010/04/14/Superchallenge/>

You can also view a video of the event here: <http://vimeo.com/11247497>.



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## **Tyee Solutions Society**

Monte Paulsen researched and wrote *Green Homes, Out of the Box* for the Tyee Solutions Society. It was published on *The Tyee* in April 2010. The entire series is available at <http://thetyee.ca/News/2010/04/11/OutOfTheBox/>

*Green Buildings That Pay Off* is a current project of the Tyee Solutions Society. The articles that have been published thus far can be read on *The Tyee* at <http://thetyee.ca/Series/2011/01/06/GreenBuildings/>

# Green and Affordable Homes, Out of the Box

*Shipping containers hold the potential to revolutionize urban housing.*

This series was originally published on April 12, 2010, on TheTyee.ca. The electronic version of the story is available at <http://thetyee.ca/News/2010/04/12/GreenAffordable/>



*TO LEFT: City Centre Lofts is slated to become the first mid-rise to be built out of shipping containers in North America. It will be constructed using 50 per cent recycled material. The Salt Lake City building was designed by architect Adam Kalkin. The building's footprint is about the same size as a common 25- by 120-foot Vancouver Lot.*

boxes that flow through the region's ports at the rate of more than two million a year --- are being refashioned into affordable green buildings across Europe and Asia.

And on Thursday evening, the Tyee Solutions Society will join with Architecture For Humanity Vancouver and the Design Foundation of British Columbia to kick-off the Quick Homes Superchallenge, a two-part charrette aimed at generating affordable housing concepts for public discussion.

## **The box that changed the world**

The humble steel boxes in which goods are shipped, trained and trucked around the world touched off an economic "revolution," according to Mark Levinson, author of *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger*.

Levinson chronicles the 18 million big steel boxes that make globalization possible, flooding markets with low-cost consumer goods from China, filling cities with cut-rate department stores such as Wal-Mart, and felling wide swaths of the North American manufacturing sector and the high-paying jobs it provided.

Vancouver boasts both the "Greenest Neighbourhood in the World" --- the LEED certified Olympic Athlete's Village --- as well as the world's first LEED Platinum convention centre.

But the city that calls itself the "Green Capital" has shown surprisingly little interest in a rapidly emerging building technology that promises to become not only far more environmentally friendly but also significantly less expensive than the heavy concrete construction that has reshaped the city's skyline. Indeed, Canada's first modern home built this way stands not in the Terminal City, but across the straight in Victoria.

Over the next few days, The Tyee will report on how intermodal shipping containers --- those 40-foot steel

“In 1956, the world was full of small manufacturers selling locally,” Levinson writes, “by the end of the twentieth century, purely local markets for goods of any sort were few and far between.”

One of the world’s first purpose-built intermodal container ships set sail from North Vancouver in November of 1955. The Clifford J. Rodgers carried 600 containers to Skagway, Alaska, where they were loaded on to rail to be carried over the White Pass to the Yukon.

Today, Port Metro Vancouver is Canada’s busiest port. More than two million “twenty-foot equivalent units,” or TEUs, flow through every year, according to port records. (Containers come in five basic sizes. A standard 20-foot-long by 8-foot-wide container equals one TEU. A 40-foot container is two TEUs.)

The vast majority of containers arriving in Metro ports hail from China, followed by Japan and Korea. And most return to the nations that sent them. But almost 100,000 get left behind each year.

In 2009, for example, records show that a total of 1,122,849 TEUs entered Port Metro Vancouver, while only while 1,029,613 TEUs were shipped outbound. That’s a difference of 93,236 containers.

Likewise, in 2008, Metro ports took in 96,509 more TEUs than they sent away.

Those containers don’t all pile up in the Lower Mainland. Most leave the region via truck or rail car, and many of those ultimately leave Canada via a border crossing or another seaport. But North America’s longstanding imbalance of trade with China and other Asian exporters tends to create a backwash of surplus containers in places Vancouver and other port cities.

### **Greener than concrete, stronger than wood**

Containers are built to stack nine high while carrying 60,000 pounds on a deck that’s pitching on the open ocean. They are built to survive decades of service in a marine environment, and, if kept painted, will last indefinitely as part of a building.

“These are just big steel boxes,” said Barry Naef, who directs the GreenCube Network and the Intermodal Steel Building Unit (ISBU) Association. Naef noted that these boxes present the opportunity to not merely recycle but creatively reuse what is arguably the most durable waste product of the globalization era. Stranded containers that are not repurposed tend to be melted down. As fuel costs rise, containers on the wrong side of the ocean can become worth more as scrap metal than the cost of shipping them back to China empty.

A typical 40-foot container represents about 8,000 pounds of steel, which can require about 8,000 kilowatt-hours of energy to melt and remanufacture. That’s about half of what a typical home uses in a year. As a result, buildings created from used shipping containers function like carbon reduction and long-term storage devices.

At the same time, containers tend to replace concrete in more urban settings, due to the metal boxes’ strength and easy stackability. And cement is far from green.

The manufacturing of cement is the largest source of carbon dioxide emissions after fossil fuel consumption, according to U.S. government statistics. A report by the World Business Council found that every ten pounds of cement releases nine pounds of carbon dioxide emission.

But according to Barry Naef, the biggest green advantage of shipping containers may be their strength.

“Their strength allows the structure to provide green roofs, green walls, solar hot water roofs, all without additional supports,” Naef said. “It’s hard to do these things on a wood-frame structure. “Concrete is great. But when you have to go spend so much to do a green roof, I don’t think it winds up getting built.”

### **Construction costs 25 per cent less**

In port regions such as Vancouver, end-of-life shipping containers are often sold for as little as \$1,500 in the Lower Mainland, while pristine 40-foot “high cubes” -- which feature nine-and-a-half-foot ceilings

-- can fetch \$4,000. Either way, it's substantially less than the cost of building a similar box out of wood or concrete.

The cost to convert that box to a home varies widely.

Charities providing housing to Maquiladora workers in Mexico are able to convert used shipping containers into simple homes for about \$15,000 (excluding land costs). Those homes are small, but they come complete with doors, windows, a full bathroom and kitchen appliances for less money than most Canadians spend on a car.

Companies that provide container-based worker housing to the oil and mining industries sell heavily built pre-fab units for prices that start in the range of \$35,000 per container unit. Some of these are heavily insulated for arctic conditions. Others include generators and water-processing plants. (More on these units on Wednesday.)

Custom home builders report saving an average of about 25 per cent against what a comparable home would have cost to build, according to Naef. He said cost savings vary widely according to how many hurdles are thrown up by local zoning and building code officials.

"Local building codes are a real hurdle for some builders," Naef said.

"We need to do a much better job of educating zoning boards and building inspectors," he said. "Each building inspector seems to have a different reason why they wouldn't let someone build with shipping containers. Many objections are based on false assumptions."

For example, he noted that many local building codes still require studding out all the walls in order to comply with outdated zoning ordinances. "This unnecessary duplication reduces --- but still does not eliminate --- the cost effectiveness of container-based construction," Naef said.

## **New built form emerging in Europe and Asia**

In dense cities such as Vancouver, however, the greatest cost savings and the most significant green advantages generally come down to the same thing: The less land a home requires, the better.

Containers are built to stack. And it has been through the creative assembly of stacks of containers -- coupled with the innovative ways of opening up the interiors -- that a new built form has begun to emerge in Europe and Asia. Here are a few examples:

Container City is a collection of London-area developments drawing on container techniques perfected by a company called Urban Space Management. The first project was built in East London, in 2001. The Container City projects include offices, retail shops, artists studios, a nursery, a youth centre, and a school as well as housing.

"This modular technology enables construction times and cost to be reduced by up to half that of traditional building techniques while remaining significantly more environmentally friendly," states Urban Space Management.

Keetwonen is the world's largest container housing project, as well as one of the simplest. The project is a student village built from 1,050 containers near Amsterdam city center.

Though only 320 square feet, each suite has separate sleeping and living rooms, a full kitchen and bath, large windows and a private balcony. The units are well insulated and served by a central heating system. The complex hosts cafes, shops, art studios and even mini-gyms.

And while some container projects strive to conceal the container's industrial essence, a Korean project, Platoon Kunsthalle, takes the opposite approach. The Seoul artists centre was created from 28 containers.

## Excerpts from the Ensuing Discussion in the Tyee's Comment Section:

### **Contaminants in shipping containers**

*posted by "gwebster" on April 12, 2010*

I have considered using a recycled shipping container to build a laneway house in my backyard, but I wonder about potential contamination issues. Have these containers been sprayed with insecticides or fungicides? What other chemicals might have been used in the goods originally shipped in these containers? I haven't seen any discussion about this yet.

### **Contaminants**

*posted by Monte Paulsen on April 12, 2010*

Thanks for asking, gwebster. This was one of the interesting minor points that didn't make it into the final draft of this week's series.

Some nations (Australia, for example) require the plywood floors in shipping containers to be treated with pesticides. The idea is to keep pests from migrating in these boxes. As a result, many container floors contain pesticides.

Builders using existing containers resolve this issue in one of three ways: Some remove the old floors entirely; some put a barrier between the old plywood and the new floor; some use newer containers that have only made one or two trips and have never been treated.

### **invented in Vancouver**

*posted by "Lloyd Alter" on April 12, 2010*

I am so happy that you got it right about the shipping container being invented in Vancouver and NOT by Malcolm Mclean as it says in the Box. Peter Hunter's book "The Magic Box" written in 1993 clearly shows that it was predated.

### **Haiti**

*posted by "Don\_EC" on April 12, 2010*

With so many 'surplus' containers in North America, since the Haiti earth quake, I have been wondering why donated containers -- even without improvements -- might not represent a potentially-more-useful temporary shelter than thousands of tents?

This article suggests more elaborate usage, and this could certainly be considered in the long run. But if you gave me an option of occupying a tent or having a container in which to set up a temporary home, I think I would go for the container. And considering the ingenuity of the Haitians, I expect that in short order, they would have done conversions to make them very habitable.

As well, I expect that they would be fairly earthquake proof, if located on level ground and not stacked.

### **As always**

*posted by "zalm" on April 12, 2010*

The question is not "what to live in" but "where".

# Is this Canada's Most Affordable Green Home?

*How Victoria designer Keith Dewey transformed eight used shipping containers into an airy residence.*

This series was originally published on April 13, 2010, on TheTyee.ca. The electronic version of the story is available at <http://thetyee.ca/News/2010/04/13/MostAffordable/>



*TO LEFT: Zigloo Domestique is a custom home in Victoria, B.C. Architect Keith Dewey reused eight 20-foot-long shipping containers to create its frame. Open floor plans such as this can cost less to build using shipping containers than wood or concrete, because long steel beams are included in the price of the used container. Photo courtesy of Keith Dewey*

One of Canada's most affordable green homes stands not in the swaggering "Green Capital" of Vancouver, but in B.C.'s actual capital, Victoria.

Designer Keith Dewey built his own home out of eight end-of-life shipping containers. In so doing, he saved five years worth of electricity and spared about 70 trees -- all while cutting the cost of his new home by roughly 28 per cent.

"Initially, everyone's perception is that steel containers must be cold, cramped and uninviting," Dewey said of the reaction to his custom home, pictured in the slide show above. "That perception dissipates as soon as they step inside."

Dewey, who will talk about his home this Thursday night at the Quick Homes Superchallenge, added, "I was trying to create a green house that was well

within the realm of feasibility for an average builder. So I didn't get too extreme with anything."

## **Victoria inspector supported the plan**

"The idea of using shipping containers came to my attention back in 2000, when I saw a magazine cover about a project called Future Shack, which was developed in Australia," Dewey told The Tyee. "That really captivated my imagination."

The designer toyed with the concept over the next few years, and, "when the opportunity arose for us to design our own house, it was a natural development of the ideas that I'd conceptualized."

Dewey built the home he calls Zigloo Domestique in 2006. The 1,920-square-foot home is nestled into a small L-shaped lot in the Fernwood neighbourhood. The open-plan home rests on a typical residential foundation.

The City of Victoria's building inspector required Dewey to employ a structural engineer and a building envelope specialist, but otherwise treated the project like any other single-family residential home.



“We found ways to harmonize what is already known about the residential building industry with things that are already known about the shipping container industry,” Dewey said of his approach.

For example, he framed two-inch interior walls at two-foot centres, and sprayed foam insulation into the void.

“It ended up being closer to four inches of foam, because there’s a little bit of an air gap between the two-by-two wall and the steel, and then there’s the corrugated nature of the steel wall itself,” Dewey said. “We got R-28, which is well above the minimum requirement.”

He topped the house with a conventional wood-framed roof, and dry walled much of the interior -- leaving strategically placed sections of corrugated steel as accents.

The house carries a traditional mortgage.

“I was able to convince the mortgage and insurance companies of the fact that this is a steel frame building, which just happens to have steel cladding. Once they were able to categorize it that way, then it was not problem,” he said.

### **‘A natural resource of consumer society’**

“The sustainability issue was important for me. In my mind, a sustainable concept is one that makes use of materials that have already served their purpose. So I went out looking for end-of-life containers... things that were between 12 and 26 years old,” Dewey said.

“These shipping containers, of course, we’ve got them all over the place. In a way they’ve become a natural resource of consumer society: everything comes to us in this box, but we have no use for the box now,” he said.

Dewey bought eight used shipping containers, each measuring 20 feet long by eight feet wide by 8.5 feet high. He paid between \$2,000 and \$2,400 per container.

“A lot of them had dents and dings. One even had a breach on the side,” he said. “By itemizing our inven-

tory, I was able to use those in areas where I would be cutting out portions of the wall.”

Thousands of old shipping containers like the ones Dewey bought are melted and recycled into new steel every year due to a variety of economic factors, including ocean-going insurance requirements, the high price paid for scrap metal, and North America’s ongoing trade imbalance with Asia.

By reusing -- rather than recycling -- most of the steel in those eight containers, Dewey saved something in the range of 50,000 kilowatt-hours of energy. That’s enough hydro to light his home from the day he moved in through sometime next year.

Dewey also saved a small forest. Though Zigloo Domestique makes extensive use of manufactured wood products such as paneling and cabinetry, it employs less raw framing timber than a wood-frame house.

“I figured that I saved 70 trees worth of wood by reusing the containers,” Dewey said.

The house has a concrete floor on the main level, which was poured atop a grid of hot water lines that provide radiant heat. The hot water is supplied by an on-demand (tankless) hot water heater.

“It’s a very efficiently heated house... by heating the basement and the main floor, the residual heat rises up the stairwell and flows through the remainder of the house,” Dewey said.

“It’s easy to cool, too. By strategically placing operable windows, we are able to get really nice summer breezes,” he added.

### **A custom home for a spec-house price**

“My idea was to design a custom home, using sustainable materials, and do it for the same price they were building spec quality houses out in the low-cost subdivisions,” Dewey said.

In Victoria, spec homes run about \$150 per square foot, while custom homes average about double that.

In addition to the engineer and envelope specialist, Dewey contracted professionals for all the trade work

such as electrical, plumbing, drywall, painting, etc. The only cost he avoided was his own design fee.

“I didn’t cash in any favours on this one. I wanted to see what the costs really were,” he said.

“As it all turns out, we were able to do it for \$180 per square foot,” he said.

“I would easily stack this house up against any house out there for \$250 per square foot or more. So I’m assuming we saved in the realm of \$70 per square foot, mostly as a result of the reuse of these containers.”

That works out to a 28 per cent savings, which is consistent with the 25 per cent estimate provided by Barry Naef of the Intermodal Steel Building Unit (ISBU) Association.

Dewey acknowledged that he spent an inordinate amount of time and money working out solutions to specific design problems. The building envelope, for example, required considerable attention.

“When you put two containers together, there is this inevitable quarter-inch gap. So we had to develop a library of little details that could prevent water and drainage,” he said.

“I’m sure I will be able to do these things much more efficiently next time.”

### **Public perception remains a challenge**

Dewey has several new container-based construction projects in the works. He said they all face the same challenges.

Perception is the first. The most common container buildings are the thousands of workers’ camps scattered across the booming Arab states, along with a small number of mining camps in remote locations.

“They look a bit like concentration camps... That does not help overcome the perception problem,” he said.

“That’s why I think the designer is a really important element. There are lots of engineers and fabricators

who can fabricate something low cost, easy to maintain, and durable. But if it’s not appealing, if it’s not an attractive thing for people to walk by, then it’s not going to work in an urban environment.”

Unrealistic expectations about cost are the second challenge.

“Nine times out of ten people are wanting something cheaper... People call me and they say, ‘Oh, it’s a box, and it’s cheap,’” he complained.

“There is money to be saved using shipping containers,” he said, “but the cost of the house is much more than the cost of the used container.”

Dewey does anticipate that once the form becomes more widely accepted, complete homes will be manufactured in low-wage regions and sold worldwide.

“We’re not quite there yet, but there is the potential for these homes to become extremely affordable in pre-fab manufacturing,” he said.

He designed a pre-fab workers housing complex called Modulute, which would have created 220 small, self-contained suites. Whistler approved the \$3 million project a couple years before the recent Winter Games, but the American vendor contracted to prefabricate the containers was unable to secure financing during the 2008 recession.

“It was an easily stackable configure that could have been removed and reinstalled somewhere else,” Dewey said. “It’s a bit of a shame. It would have been a real nice spotlight project during the Games.”

For the time being, he said, the container concept is catching on much more quickly in Europe. He cited Amsterdam’s Keetwonen project and London’s Container City developments as examples. (See yesterday’s slide show for pictures of those projects.)

“I guess there’s sort of a conservative mindset in North American culture,” Dewey chuckled. “We say, ‘I’ve got to see it to believe it. And I’m not going to look too hard to try to find it.’”

## Excerpts from the Ensuing Discussion in the *Tyee's* Comment Section:

### **just wondering,**

*posted by "Takuan" on April 13, 2010*

how do you fight fires in these?

### **It's the LAND people**

*posted by "cocean" on April 13, 2010*

There's no shortage of novel ideas for extremely cheap and environmentally-friendly housing. That has never been the problem. The problem is largely municipal laws that restrict the size and type of a shelter, the amount of land to be associated with it and the materials used.

And there isn't so much a shortage of land as a shortage of political will that would free up land for the use of truly affordable housing, shelter that people even in the lowest decile of income could afford.

### **I have to admit, I like it**

*posted by "zalm" on April 13, 2010*

This is the first article I've seen on this mode of adaptive reuse in building technologies that doesn't pretend to solve the affordability crisis. Land is still \$500,000 for a crappy lot in the Big Smoke, and will never be affordable even if you use cardboard boxes for houses. This is the signal failure of the market, and will require other interventions to conquer.

But for adaptive re-use, this is well thought out. For the insurance industry to cover it, it must have passed a number of inspections from proper engineers. And like most steel buildings, you can't cut too big a window into it without compromising the structural strength of the building, so that minimizes the heat loss - I'm surprised with R-28 average in the walls that it would need heating at all. Activities of daily living should keep that place comfortable on all but the below-0 days.

Of course, I'm a bit of a polar bear, as my wife points out....

### **How about the Eco-Sense project in Victoria?**

*posted by "dave49" on April 13, 2010*

Look up Eco-sense.ca. It is a project of two Victoria residents, Ann and Gord Baird, to demonstrate a sustainable and affordable lifestyle. Their off-grid, seismically reinforced cob home, fully equipped, cost \$148.25 per square foot.

They pushed at a lot of policy issues and the latest challenge is the valuation by BCAA and their resulting tax bill. Under present law, they are paying more tax because they are equipped to be energy-independent (off-grid).

Info sheet at -- [http://www.islandnet.com/~anngord/downloads/eco-sense-general\\_info\\_sheet\\_feb2010.pdf](http://www.islandnet.com/~anngord/downloads/eco-sense-general_info_sheet_feb2010.pdf)

To quote Ann and Gord, "If it isn't affordable... it isn't sustainable."

# Homeless Housing for Less

*Proposals to build free or low-cost homeless housing said to be 'stalled' by the province.*

This series was originally published on April 14, 2010, on TheTyee.ca. The electronic version of the story is available at <http://thetyee.ca/News/2010/04/14/HomelessHousing/>



*TO LEFT: C-Bourne is working with developers in Saskatchewan who plan to erect prefabricated apartment buildings, then rent the suites for \$550 to \$700 a month. The apartments could include 480-square-foot bachelor suites such as the one pictured above. Each 20- by 24-foot unit would feature a large glass wall overlooking a 20-foot-long balcony.*

But the Vancouver council's enthusiasm for the project was dampened by a distinct lack of interest from the province. Vancouver councilor Kerry Jang said, "This initiative just sort of stalled at the province."

This installment of *The Tyee's* overview of container-based housing takes a look at the three proposals.

## MC Quarters offered free housing

"Basically, we are asking the city to identify a site where we could do a pilot project. And we will provide the funding to develop that pilot project."

That's the extraordinary offer MC Quarters president Frank Lo told *The Tyee* that he made to the city.

MC Quarters is a new company that is building prefabricated worker housing in China for export worldwide. It was founded by Lo, a longtime Vancouver resident and former shipping container broker. Lo figures he sold more than a quarter of a million shipping containers before launching MC Quarters.

Lo's concept involves adapting technology developed for refrigerated containers -- which are basically one steel box inside another, with foam insulation sand-

Last summer, Vancouver City Council invited several B.C.-based companies to submit ideas about how modular housing might be employed to house the homeless.

Three container-based proposals were among the five submitted. One firm offered to build a 43-suite supportive housing complex at no cost to taxpayers. Another offered to lease dormitory-style rooms for only \$350 a month. Yet another offered to build a similar project from scratch using local labour at its Coquitlam factory.

wicked between the walls -- for use as a structure in which super-insulated housing can be built.

MC Quarters sells construction camps to mining and oil companies. His company claims its container-based work camps are both more durable and more easily transported than the wood-frame modular structures sold by competitors such as Atco, Britco or Williams Scotsman. The B.C. company's first order is for a mining camp in the Yukon.

Lo's fledgling company also prepared by far the most detailed of all the container-based homeless housing plans submitted to the city.

MC Quarters hired architect Gordon MacKenzie to plan 43 units of supportive housing in a three-storey structure to be erected on a city-owned parking lot at the southwest corner of Princess Avenue and Powell Street. (See slide show at top of this page.)

In addition to 43 very small but fully self-contained suites, the proposed 13,755-square-foot building would include offices as well as a kitchen, common area, and laundry room.

MC Quarters' proposal pegged the construction cost at \$3.1 million. That's \$72,000 per suite. Lo said he can deliver those units six months from the date he receives an order.

BC Housing recently started construction on six of 14 promised new homeless housing buildings in Vancouver. The suites planned for those mid-rise buildings are almost twice as large as the room-sized units in the MC Quarters proposal. But the BC Housing suites are expected to cost taxpayers more than \$350,000 per unit.

About \$1.6 million of the projected construction costs for the MC Quarters building is for on-site construction by local trades, with the other half allotted for the purchase of 30 prefabricated container modules. Lo -- who has already hired an architect and built a prototype with his own money -- said he has offered to put up the cost of the containers, and help raise the cost of the local trade work.

"This is basically a semi-commercial project as far as we're concerned," Lo said. "We want to do something for the community."

### **C-Bourne offered to lease rooms for \$350 a month**

Vancouver-based C-Bourne Structures is among MC Quarters' competitors.

Though C-Bourne's container housing proposal was neither as elaborate nor ultimately as generous as MC Quarters', it did include one particularly intriguing element: C-Bourne offered to lease the city however many units its needs for \$350 per month per unit.

"We lease these units all over the world," said C-Bourne partner Grant Powell, who joked that mining juniors "never actually buy anything."

C-Bourne is the Canadian distributor for Isopod modular housing. Isopod is a Canadian-owned company that has built thousands of units of container housing in places as far flung as Afghanistan, Dubai, Russia and Saudi Arabia. Isopod owns one-third interest in a proprietary factory near Shanghai.

C-Bourne submitted a conceptual proposal for dormitory-style housing that could be quickly erected on any city-owned lot, and then just as quickly disassembled when the real estate was needed for some other purpose.

"I basically said to the city, 'Tell us what type of units you want, how many you need, and where you want to put them. We'll engage engineers and architects and bring you a proposal,'" Powell told The Tyee.

Powell offered to lease the city as many dormitory-style rooms -- with a shared bathroom down the hall -- as the city wanted for \$350 a month per room. That's \$25 less than the \$375-a-month housing allowance the province provides welfare recipients.

After seven years, the city would be eligible to buy the rooms for \$10 each.

"These units are virtually indestructible. There's no drywall to mildew or wood to rot," Powell said. "If

the city didn't want to keep them, we would happily take them back."

C-Bourne is also working with developers in Saskatchewan who hope to erect pre-fabricated apartment buildings in communities near the tar sands.

"It's nuts out there," Powell said. "Some of those towns are facing an even worse housing shortage than Vancouver."

Plans for the prairie apartment buildings call for sprawling three-story walkups surrounded by parking lots. Most of the apartments would be 480-square-foot bachelor suites with full kitchens, bathrooms, Murphy beds and in-suite laundry facilities. Each 20- by 24-foot unit would feature a large glass wall overlooking a 20-foot-long balcony. (See a plan in the slide show at top of this page.)

Powell said C-Bourne can deliver and construct these instant apartment buildings in six months or less at a cost of about \$100 per square foot (excluding land). He said the developer aims to rent these apartments for between \$550 and \$700 a month.

"We can do two-bedrooms, three-bedrooms, anything," Powell said. "This is just the tip of the iceberg."

### **Mogil offered to build in Coquitlam**

While less detailed than either of its competitors, the third proposal offered the prospect of bolstering the B.C. economy by building its entire complex in Coquitlam.

Mogil Modular Structures was founded by Phil Wang and is run by his son Nam Wang. The family is from Korea, where shipping containers are more frequently used as offices and small shops.

"Japan manufactured shipping containers to start off. But the cost was just too high, so it shifted to Korea," the younger Wang noted. "Then the same cycle happened again, and the production shifted to China."

Mogil builds 10-foot-wide containers that better lend themselves for use as construction components.

Because Mogil is focused on the North American market, its super-sized containers do not have to fit on container ships.

"That extra two feet makes a lot of difference," Wang said. "Shipping containers are nice. But the width is eight foot. It's just too narrow. By the time you do the walls, you put in a desk, and all you have is a little space as a corridor."

Mogil invested in all the tooling to make shipping containers from scratch, including massive metal-bending machines, precision plasma-cutting tables and a giant painting booth.

"We are pretty much self-contained," Wang said. "We bring in raw materials. We stamp, we bend, we produce our own components. We don't source out any work."

Mogil's camp business has slowed down considerably during the past couple years. "We had a good deal with the oilfields," Wang said, "but when that slowed down there just weren't any more orders."

So the family leapt at Vancouver's invitation to propose homeless housing. Mogil built a table-sized mockup intended to show off both its design and its local fabrication abilities.

"We built this miniature model just to show that we were really into it 100 per cent," Wang said. "We think these structures are ideal for housing. We would very much like to find a way to build some housing."

### **New vs. used containers**

All three firms told The Tyee that the benefits of purpose-build containers outweigh the advantages of reusing end-of-life shipping containers.

"I am biased against used containers," said Lo. "I was in the shipping business. These containers go all over the world. You don't know what kind of freight they carry. And then you expect people to live in them?"

Lo added that new containers come from the factory with certificates that civil engineers can use to assess the load-bearing ability of the steel frame.

“You can’t even tell them what kind of steel an old container was made of,” Lo said. “If you have volume, your price difference on a per-unit basis is not large.”

Nam Wang agreed. He said that even without the volume discounts available to larger firms, the cost of cutting, re-flooring and repainting a used container can wind up costing as much as a new container.

“It’s like you converting your hatchback into a pickup,” Wang said. “A lot more effort is going to go into it to convert it, and it’s not really made for that.”

Both the MC Quarters and C-Bourne units come fitted out with fixtures that would seem familiar to any North American.

“Remember that nearly everything we install in our homes is already made in China,” Powell observed. He said C-Bourne installs the same American Standard sinks and Bosch appliances available at the local Home Depot or Future Shop.

Powell added that the next generation of urban apartment buildings could just as easily include larger windows LED lighting, bamboo floors, solar hot water heating or other green features.

### **‘We are still doing this’**

Another thing all three firms agreed upon was a sense of confusion about whether or not either the city or province will ever follow up on their proposals.

“Several months went by. We heard nothing. And then one day I got a call saying, ‘You’ve got to come pick up your stuff.’” Powell said.

In response to his questions, Powell said the city told him only that, “BC Housing was not going to give them any money for this.”

Wang recounted a similar experience.

“The whole idea with this was that we were going to give them a sweet deal so that we could help promote our product, right?” Powell said. “But if they don’t see it, they don’t see it.”

City Councilor Kerry Jang, whose Vision Vancouver party has promised to end street homelessness by 2015, acknowledged that the process was dropped.

“We welcomed these proposals in order to raise awareness about this type of housing,” Jang told The Tyee. “And then we referred them to BC Housing for consideration, because at the end of the day it’s BC Housing that has to decide whether or not these units would fit their needs,” Jang added.

“Nothing came of it after that. It just sort of stalled in provincial hands,” he said.

On his own initiative, Lo recently met with Housing Minister Rich Coleman.

“It’s a chicken and egg situation,” Lo said. The city won’t grant a site without some signal that the province will help fund the support services. And the province won’t commit to a project that doesn’t have a site.

Lo said he is neither discouraged nor dissuaded.

“We are still doing this. I think the key is to have patience. Because the whole idea is for the community to benefit.” Lo said. “I believe that it will work.”

## Excerpts from the Ensuing Discussion in the Tyee's Comment Section:

### **is it best to keep the**

*posted by "frank2" on April 14, 2010*

is it best to keep the homeless housed on the streets and in shelters -- rather than allowing some to try affordable full-time accommodations? Why not try some new options? We might learn something. Maybe even find low cost ways of dealing with the problem.

### **Great idea!**

*posted by "greengreen" on April 14, 2010*

I think this is fantastic! I would live in any of the structures shown. Really, we have people living on the streets because the city and province can't coordinate, get their shit together, and solve the problem! How absolutely pathetic! When the roof on BC Place got a slight tear last year, It took no time at all to come up with a solution. Cost was no problem. When Falcon couldn't get a taxi, f---, there was a bill of rights for passengers-problem solved immediately.

The homeless problem has been going on for at least 15 years and will be with us for the foreseeable future. These accounts have shown a very workable, affordable solution. Stop the bullshit-get on with it.

### **Empowering People**

*posted by "jim1966" on April 18, 2010*

I don't think that the BC Liberals are listening. How come our society values \$350.00 per month instead of the value of everyone's lives?. I live in a BC Housing building. I am lucky because I had a social worker who gave a crap and a doctor that did not want me to die on the streets. There are always 2 sides to an issue and this is one of them. We all want people to be safe, fed and have a quality of life that Canadians have come to enjoy. Problem is though is our "view" of the poor, the addicted and the mentally ill. How can we build or refurbish anything when the taxpayer knows that within a few short years it all be trashed or wrecked anyways. I had to prove that I was worth the effort and take some responsibility for my own

life. Then I got help. More importantly people have got to want to change and that is not always that easy to do. The second part of this is our current government. I have been saying this for a very long time and that's British Columbia's Social Services are not able to handle the real human deficit. If it could we would have a system in place that really works 99% of the time. Because of my disability I was lucky enough to get PWD and CPPD . I am one of those people who our society considers "The Deserving Poor", as opposed to the "Undeserving Poor", this is how our safety net really works, hence the various categories from social services, IE: Expected To Work, \$610.00, PPMB (Or Level 1) \$667.00 and PWD \$906.00 per month. These are the real numbers for a month. I would like to see this entire ministry do a complete overhaul of it's own policies etc. I can also tell you this, I will not be voting for the BC Liberals in the next election. In my case a graduated program worked really well. Could we not try this out in the future. We would have a much much smaller homeless population and a lot of people could take there own lives back?





# After the Fact: The City of Vancouver passes a motion on modular housing, July 2010

## MOTION ON NOTICE

### **2. Modular Housing**

**MOVER: Councillor Kerry Jang**

**SECONDER: Councillor Raymond Louie**

#### **WHEREAS:**

- 1. The March 2010 City of Vancouver homelessness count demonstrated a growing number of homeless individuals (9% increase over the last 2 years);**
- 2. The March 2010 count also demonstrated that despite the increase in homeless individuals, there was a 50% decrease since March 2008 in the number of homeless individuals actually sleeping rough in the street, attributable to the additional shelter capacity associated with the HEAT and 2010 COV Winter Strategy initiatives**
- 3. The Mayor's stated goal is to end street homelessness by 2015;**
- 4. The city is strategizing with its partners to optimize and expedite the availability of both permanent and immediate housing options to move as quickly as possible on this goal;**
- 5. In addition to street homelessness there is also insufficient affordable rental housing in the City, with 39% of renters paying more than 30% of their income on housing;**
- 6. There are a number of organizations who have approached the City to offer the opportunity of piloting modular housing opportunities to enable expedited and flexible housing alternatives on city land while new permanent stock is being built;**

#### **THEREFORE BE IT RESOLVED THAT**

- 1. Council direct the City Manager to undertake an expression of interest (EOI) to ascertain the range of possibilities and partnerships available to pursue an initiative involving modular housing options, using city and private resources as an enabler, to address unmet housing need while sufficient permanent housing stock is being built.**
- 2. The City Manager return to Council with a report on the results of the EOI, and with further direction from Council, proceed with a formal RFP for a modular housing initiative.**

\*\*\*\*\*

The following motion was passed during the City Council meeting on July 20, 2010. More information is available at <http://vancouver.ca/tyclerk/cclerk/20100720/regu20100720ag.htm>

# Five Myths About Green Building

*Green doesn't have to mean expensive, exotic or uncomfortable.*

This series was originally published on January 6, 2011, on TheTye.ca. The electronic version of the story is available at <http://thetye.ca/News/2011/01/06/GreenBuildingMyths/>



**G**reen buildings have earned a reputation for being large, complicated and absurdly expensive. This is particularly true in Vancouver, where taxpayers are still forking out millions of dollars a month in interest payments on the world's first LEED Platinum neighbourhood -- the 2010 Olympic Village.

But this reputation is increasingly at odds with the next-generation of green homes, schools and workplaces. These green buildings -- most of which are certified by organizations such as the Canada Green Building Council or Built Green -- tend to be small, simple, and surprisingly affordable.

What's more, these green buildings represent the fastest growing sector within the North American con-

struction industry, one that McGraw-Hill Construction estimated to be worth \$60 billion last year.

During the next several weeks, The Tye Solutions Society will explore trends within green building -- call it Green Building 2.0 -- with an eye for ideas that could pay off by helping create sustainable jobs in British Columbia, lower energy bills and make a real dent in emissions causing costly climate change.

Today: A look at five common misperceptions about green building.

## **Myth #1: Green buildings cost more.**

It's easy to see what spawned this idea.

The Vancouver Convention and Exhibition Centre is the world's first LEED Platinum conference hall. It boasts an artificial reef as well as a five-acre living roof. And it cost B.C. taxpayers more than double the promised price.

Likewise, the Olympic Village and Southeast False Creek neighbourhood were also awarded Platinum status by the Canada Green Building Council's LEED (Leadership in Energy and Environmental Design) program. The 32 hectare reclaimed industrial site features an innovative district heating system as well as one of Canada's first net zero buildings (designed to produce as much energy as it consumes). But the

project bankrupted its developer and left Vancouver taxpayers on the hook for hundreds of millions of dollars.

These high-profile megaprojects appear to confirm the widely held opinion that green design costs more. Indeed, respondents to a survey by the World Business Council for Sustainable Development were found to believe that green buildings cost an average of 17 per cent more than conventional buildings.

But there's another question to be asked: Did Vancouver's signature green projects run over budget because of sustainable design? Or did costs skyrocket because these megaprojects were spec'd by ambitious politicians, built by loosely supervised public-private partnerships and rushed to completion at the peak of a record-smashing real estate bubble?

There's evidence that green design does not influence construction cost. A study that compared 221 new buildings found no difference in cost between 83 LEED buildings and 138 similar conventional buildings.

"There is no significant difference in average costs for green buildings as compared to non-green buildings," concluded Davis Langdon, the firm that conducted the 2006 study, *Cost of Green Revisited*.

The Davis Langdon study compared LEED libraries to non-LEED libraries, LEED community centres to non-LEED community centres, LEED laboratories to non-LEED laboratories, and so forth. The study found "no significant statistical difference" between the average costs per square foot for LEED versus conventional buildings.

Developers who persist in thinking about green building the same way they think about Sub Zero kitchens -- as something to be "added" on to a conventionally designed building -- will incur higher costs, the study warned.

"We continue to see project teams conceiving of sustainable design as a separate feature. This leads to the notion that green design is something that gets added to a project -- therefore they must add cost," the Davis Langdon study concluded. "Until design teams understand that green design is not additive, it will

be difficult to overcome the notion that green design costs more."

### **Myth #2: Green building materials must be imported.**

This notion appears to combine the misunderstanding that green design is an additive feature with the misimpression that the preferred additions include elements such as European plumbing, exotic plants and tropical materials such as cork or bamboo.

The truth is that none of the major green building certification systems require exotic materials, and several actively discourage the use of such products.

Granted, as recently as a decade ago, it was still difficult to obtain green fixtures such as efficient lights or low-flow toilets. But that's no longer the case. High-efficiency fixtures of all types are now available at competitive prices in nearly every hardware store in North America.

Likewise, some first generation green roofs did experiment with exotic plants. But LEED and other certification systems now reward the selection of native and locally adapted plants, as well as the use of building products manufactured within 500 miles of the construction site.

Where forest products must be shipped from afar, most green building certification systems reward the use of wood that is grown and harvested in certified forests. These policies create a competitive advantage for Canadian wood products because Canada boasts more hectares of certified forest than any other nation.

### **Myth #3: Green buildings' energy savings are more hype than reality.**

Buildings account for up to half of energy use and consume up to 72 per cent of electricity, according to statistics compiled by the U.S. Energy Information Administration.

Reducing the amount of energy used in buildings is widely regarded as the cheapest and easiest way to lower dependency on fossil fuels and reduce emissions of associated greenhouse gasses. (Green building may also be among the few carbon reduction

strategies that create jobs in both the short and long terms.)

But misperceptions and misleading claims about green building have left many with the impression that green buildings are not energy efficient.

Since the 1970s, many green technology promoters installed expensive solar photovoltaic arrays or geothermal heat pumps on existing buildings as a way of demonstrating their products. In so doing, they created facilities that generate carbon-free power, then squander that energy in drafty and poorly insulated buildings. Such kluge-like constructions are the antithesis of green design, but it's understandable that passersby could confuse them for green buildings.

Likewise, the prototypical Vancouver condo building -- towers of (poorly insulated) glass separated by (heat radiating) concrete balconies -- provides about a tenth of the insulation value that a wood-frame home does. Yet, through the addition of a few energy efficient appliances, unscrupulous (or merely ignorant) marketers have succeeded in labeling condo towers as "green" buildings.

The truth is that mainstream green building certification systems such as LEED, Built Green Canada, and Green Globes all reward strategies that lower energy demand, while next-generation standards such as PassivHaus and Living Buildings are whittling building energy use very close to zero.

Research has confirmed that certified green buildings save energy and money. A study by the New Buildings Institute found energy use in green buildings to be 24 per cent lower than in conventional buildings. And a survey by the US General Services Administration found that the first dozen LEED buildings in its portfolio consumed 26 per cent less energy and produced 33 per cent lower carbon dioxide emissions than comparable government-owned buildings.

#### **Myth #4: Green buildings are less comfortable.**

This idea may be rooted in a Victorian perception of "comfort," which cherishes plush drapes and thick carpets and lavish wallcoverings.

The Victorian approach to interior decorating made good sense in an era when homes were exceedingly drafty and everything was made from natural materials.

But buildings changed. By the 1970s, curtain walls had led to office buildings with controlled ventilation. And by the 1990s, better quality windows and doors had made many homes relatively air-tight.

So did furnishings. By the late 20th century, the use of toxic chemicals had become commonplace in the manufacture of paint, carpet and furniture. Many of those chemicals, such as formaldehyde and vinyl, continue off-gassing for years. For a time, consumers were persuaded that the resulting "new car smell" was a benefit. But as buildings became tighter, people started to get sick.

Studies by the U.S. Environmental Protection Agency found that, on average, Americans spend 90 per cent of their time indoors, where they are exposed to concentrations of chemical pollutants that are 100 times greater than outdoors.

Green design aims to improve indoor air quality by eliminating toxic building materials. Many first-generation green buildings eliminated carpet and drapes altogether. These were replaced with nontoxic -- but hard -- surfaces such as wood or concrete. Some people found the hard surfaces within these first-generation green structures to be cold, uninviting and acoustically annoying.

In the past decade, the supply of non-toxic finishings and furnishings has caught up with the demands of air-tight green buildings. Nontoxic paints and carpets are now commonplace. And the choice of interior finishings is once again a matter of taste rather than toxicity.

#### **Myth #5: Green building is a fad.**

As was the case with the previous myths, past is prologue.

Alternative building exploded in the 1970s. Backyard inventors pioneered ideas about solar design and natural material selection that have evolved into today's green building standards. But an awful lot of those

do-it-yourself homes were, in a word, awful. A few buildings survived, but the movement did not.

Having watched that fad come and go, construction industry veterans should be forgiven for believing that this green building boom will do the same. Many are quick to point out that few of those early alternative buildings held value relative to conventional properties.

But there is evidence that in addition to spawning a \$60 billion-a-year industry, this generation of certified green buildings is fetching a premium in the marketplace.

A University of California study compared the rents at 694 certified green office buildings with 7,489 conventional office buildings. All of the comparison properties were located within a quarter mile of the green building.

The study found that, on average, certified green building rent for two per cent more than comparable buildings. After adjusting for factors including age and occupancy levels, the University of California researchers figured that green certification added an average of \$5 million to the market value of each green office building.

## Excerpts from the Ensuing Discussion in the *Tyee's* Comment Section:

### **Industrial practices in materials production.**

*posted by "Chernoe Znamia" on January 10, 2011*

First, thanx for the great article. It has been many years of greenwash in the building trades, focusing on energy savings rather than curing the sickness of industrial production and shipping of green, or any other building materials that we use to build with...

...Every community in B.C is surrounded by wood, stone, clay, almost everything needed to build with local materials. I think its a mistake to try to build green like the rest of the world. A world lacking the abundance of NATURAL resources that B.C enjoys. Wood is the obvious answer and if it is kept dry and out of the sun will last indefinitely.

Here in B.C the option to step away from the industrialization of the planet and embrace from harvest to installation without industrial practice. We can be industrious without industry and bring back skills instead of division of labour and assembly line hell.

### **future topic**

*posted by "icare\_dou" on January 10, 2011*

I'd love to see more coverage on the negative impact on indoor air quality in green and energy efficient homes. During the first energy crisis we sealed up commercial buildings and people got sick. We subsequently required commercial buildings to have fresh air ventilation. We are still in the phase of sealing up homes without requiring adequate fresh air. Researchers have already documented that 'green' or energy efficient homes have higher concentrations of pollutants than traditional homes built at the same time.

### **As a residential builder**

*posted by "cynic" on January 10, 2011*

As a residential builder, I like to stay abreast of the latest building science and I feel fairly well-versed. I can think of a point or two that are worth keeping in mind.

First, the greenest thing you can do is not build. Construction materials contain so much embodied energy that the green choice is to buy an existing building and renovate. Obviously there are many considerations in that scenario.

That said, over the life of a building, heating is by far the largest cost. The two main factors for achieving a low energy use home are good insulation and a properly detailed air barrier.

I think that achieving a green certification like R2000 or LEED can be too costly for individuals and might even be unnecessary. We're lucky here in our marine coastal area where temperature and humidity fluctuations are relatively flat. Imo, (and starting with a waterproof envelope), good insulation, a meticulously detailed air barrier, and a heating system that mechanically controls air changes will produce a comfortable, energy efficient home without costing the earth.

### **Right on Chernoe Znamia!**

*posted by "Stayweird" on January 10, 2011*

What a clear statement of a building ethic I have tried to live out in the real world, mostly in isolation. I was fortunate to acquire raw land in a district without an enforced building code. It seems to me no real change can happen without radical land reform. Is it not a human right to occupy some small piece of the planet we were born on without huge mortgages or rent to a landlord? Owner built housing is a luxury very few can achieve. The average logging slash pile contains enough materials to build a small home and heat it for two winters (I've done it). Our greatest resource here is land and no way to occupy it without oppression.

# Green Homes For Less

*Three affordable homes that could change that way you think about green building.*

This series was originally published on January 7, 2011, on TheTye.ca. The electronic version of the story is available at <http://thetyee.ca/News/2011/01/07/GreenHomesForLess/>



**I**n New Orleans, on the very spot where Hurricane Katrina breached a levee, more than 50 LEED Platinum homes have been built for an average cost of about \$150,000 each.

In Philadelphia, on an inner-city infill site deemed worthless by mainstream developers, a two-storey LEED Platinum home has been built for only \$100,000.

And on Lopez Island, just east of Victoria, B.C., a group of families have built their own net-zero homes for a net cost of just \$112,000 apiece.

While megaprojects such as the Olympic Village helped introduce green building to the public, small homes like these may come to define green building in the next decade.

In New Orleans, a green neighbourhood rises

Hurricanes Katrina and Rita destroyed more than 350,000 homes. Another 146,000 suffered major damage. Five years later, much of New Orleans remains a ghost town.

The Make It Right foundation was created to help rebuild a 16-block area within the city's Lower Ninth Ward. Its founder, actor Brad Pitt, sought not only to rebuild one of New Orleans poorest districts but to transform it into a neighbourhood of green homes that cost less to operate, provide better indoor air quality, and are built to survive the next hurricane.

Make It Right has built 50 LEED Platinum homes housing 179 people. A hundred more homes are under construction.

Property owners are able to choose from more than a dozen green home designs. Some of the designs incorporate elements of the neighbourhood's architecturally distinct "steamboat houses." Others are distinctly modern.

The first 50 homes cost about \$150,000 each to build. Make It Right hopes to build the next group for even less.

Though inexpensive, these homes aren't cheap. The list of features is impressive. Metal roofs absorb less heat and reduce the need for air conditioning. Photovoltaic panels, tankless water heaters and Energy Star appliances slash monthly power bills. Bluwood framing, spray foam insulation and mold-resistant

drywall reduce moisture problems. Zero-VOC paint, formaldehyde-free cabinets and green carpet improve indoor air quality.

And the Make It Right homes -- the first of which was built on the very spot where the Industrial Canal levee breached on Aug. 29, 2005 -- are designed to withstand the next hurricane.

They are built with advanced framing techniques designed to withstand winds of more than 130 miles per hour. They are elevated beyond U.S. government requirements to ensure they will stand above the next flood. They are landscaped with pervious concrete sidewalks and driveways that allow stormwater to drain freely. And they include roof hatches, just in case.

The new houses have been estimated to be 10 times more sustainable than the homes they replace. And the Lower Ninth Ward now boasts the largest community of LEED Platinum homes in the world.

### **In Philadelphia, a LEED home for \$100K**

Proof that one does not need to build 50 homes at a time in order to lower the cost of building green is provided by Philadelphia developer Postgreen, which built a 1,150 square foot LEED Platinum row house for a construction cost of only \$100,000.

“The 100K House was conceived as an attempt to prove that green construction can be affordable if properly designed and executed,” said Postgreen president Chad Ludeman.

The two-storey row house demonstrates how the modern construction methods (such as structural insulated panels) can update a familiar urban floor plan: two bedrooms separated by a bathroom upstairs, a living room and kitchen downstairs.

The 100K house’s roof uses solar energy to heat the house’s hot water, and collects rainwater for use in the garden. Its walls are constructed from prefabricated panels of rigid foam insulation sandwiched between sheets of oriented strand board (called “SIPs”) and fitted with high-performance casement windows to create a tightly sealed envelope.

The home is cooled through a ductless (mini-split) air conditioner, heated via a radiant in-floor system, and tempered year-round with a small energy recovery ventilator. The interior features low- or no-VOC finishes, while the small yard is landscaped with drought-tolerant plants and 100 per cent permeable walkways.

In addition to being certified LEED Platinum, the 100K House won a LEED for Homes Project of the Year award from the U.S. Green Building Council.

“Wherever possible we reduced complexity and finish level until we had a very clean, modern, simple home. Then we focused on those areas of green building where we saw the most value... location, site and energy efficiency,” Postgreen wrote in accepting the award.

Postgreen’s post-100K experience also proves there’s money to be made in small green homes. The company sold the 100K House for more than twice what it cost to build, and is now developing a PassivHaus and other projects in the Fishtown, Kensington and Northern Liberties neighborhoods of Philadelphia.

### **On Lopez Island, a net zero co-op**

By pooling their resources and providing much of their own labour, a group of Washington State families have succeeded in building 11 net-zero homes for a net cost of just \$112,000 apiece.

Lopez Island lies due east of Victoria, B.C., in what the Americans call the San Juan Islands. As is the case on the Canadian Gulf Islands such as Mayne or Salt Spring, home prices in the San Juans have spiraled beyond reach of working families. According to a government report, “Working people and people who grew up in the islands have a hard time finding permanent housing in the county at prices local wages can support.”

The Lopez Community Land Trust was created to address this problem. And Common Ground, a cooperative project of 11 family homes, is Lopez’ newest development.

The project has functioned like a green building workshop since its inception. Residents were involved



in the design and construction, and remain responsible for efforts to maximize ongoing performance. Dozens of volunteers, professionals and interns also participated.

Though the site is only seven-tenths of an acre, the project's design takes advantage of its strengths. These include solar gain for heating water, prevailing winds for ventilation, rain fall to offset potable water demand, and a climate suitable for gardening. Passive design strategies enable the project to minimize heating and cooling demand.

Lopez Common Ground uses 60 per cent less energy and 30 per cent less water than similar buildings. A solar photovoltaic system -- funded through a grant and a rebate program provided by the utility -- provides much of what power is required.

The total price per unit (including land, construction and soft costs) was \$236,000. But after deducting grants and incentives such as those for the solar power panels, the net cost per household came to about \$112,000 -- plus a lot of labour.

The Lopez homes were designed to produce as much energy as they consume, and data collected in the past year show that several have achieved net zero energy consumption.

Though the Common Ground project did not pursue any certification, the cooperative used the LEED for Homes, Built Green, and Energy Star programs as guidelines.

And last fall, the Home Depot Foundation awarded Common Ground its Award of Excellence for Affordable Housing Built Responsibly. The award came with \$75,000 to help the Lopez Community Land Trust get started on its next project.

### **'Polishing the turd'**

Consider what these three projects have in common with one another, as well as how they differ from the sea of (unsold) new housing built in the past few years.

Here's what you'll find in each of these affordable green homes: A high-performance building envelope.

Each of these homes have walls that are almost twice the thickness of the minimum that code requires. Each of those walls contain high-performance insulation. (None of these builders use fiberglass batts.) The doors and windows in each of these homes are not only double-glazed but also tightly sealed. And each of the gaps between doors, windows, junction boxes and the high-performance walls are foamed, taped or otherwise sealed to prevent air leakage.

Here's what you won't find in any of these homes: Italian marble countertops, European faucets or Sub-Zero kitchen appliances.

In other words, these builders invested in the parts of a house that last for 100 years or more, rather than squandering money on fixtures that are typically replaced every 10 to 20 years.

Postgreen partner Nic Darling put it this way:

"Why do production home builders and established developers, people who have been building homes for many years, have to spend 15 per cent more to get to LEED Platinum while us rookies are getting there at a discount?" Darling asked.

"Most of the builders and developers reporting high premiums for pursuing LEED are still trying to build the exact same home they have always built. They are simply adding features to make that same house energy efficient, healthy and sustainable," Darling continued.

"So, they polish the turd. Rather than redesign the house that has been successful for them in the past, they add solar panels, geothermal systems, high-end interior fixtures, extra insulation and other green features. The house gets greener. It gets certified, but it also increases significantly in cost. Since the features are add-ons and extras, the price rises as each one is tacked on."

## Excerpts from the Ensuing Discussion in the *Tyee's* Comment Section:

### **Neighbourhoods won't accept 'polished turds'**

*posted by "Tommy Boy" on January 10, 2011*

Good stuff, Monte. It's not a matter of if, but when this type of housing will be the norm. I'm impressed by the cost savings in construction. These type of homes are ideal for our relatively moderate climate, and the Philadelphia model shows that they are also practical and viable in the the harsher climates as well.

However, land prices in New Orleans and Philadelphia are not though the roof. As well, most Lower Mainland neighborhoods would not accept a polished turd, a golden turd or a titanium one. The rallying cry is that we must preserve the 'character' of the neighborhood (a character that most of them had nothing to do with creating). If NIMBY attitudes and neighborhood vehemence against any change persists, you won't be able to build a bird house, never mind having a sustainable society. People who live in towers against people living in more towers. What a world! Looking forward to the series and hope more young folks read it.

### **Wood frame construction**

*posted by "mcik prince" on January 11, 2011*

I believe the use of more wood within the construction of new homes and commercial buildings will reduce the amount of gravel.

This would also reduce the massive use of cement that tilt up buildings use and save our environment from the gravel producers.

### **Photovoltaic panels?**

*posted by "Sask Resident" on January 11, 2011*

Except for the inclusion of the uneconomic photovoltaic panels, most of these building make a lot a sense. The knock against fibreglass was unwarranted since the life cycle of fibreglass is well known while the blown foam is still relatively new. The keys to any building is, in order of priority, the foundation, the building structure, the envelope then the basic hard wear (the electrical wiring, the water and sewer piping, any heating system), then everything else. I liked

the focus on not spending lots on short-term fixtures and more on the building itself.

### **The cheapest energy?**

*posted by "Countrytype" on January 12, 2011*

Is the energy that isn't used. Passivhaus is the way to go. Biogas from humanure is another engineering frontier that has been crossed in Asia but not in Canada yet. But, can we afford to ignore one of our only growing and free resources?

### **Great to read about the green and affordable**

*posted by "Countrytype" on January 12, 2011*

My folks built a passive solar and wood furnace house in Ontario at the end of the 1970s alt building boom. We were squarely in the centre or slightly lower of the middle class, without inheritances, and with one 9-5 breadearner and one housewife. Labour costs were kept down by my dad and friends supplying much of the labour of framing, laying floors, drywalling, and such on weekends and in summer, and by hiring student labourers.

Thick walls and ceilings, and thermally broken windows, doors and foundation were the secret to holding indoor temperatures at comfortable levels. Large windows were a big cost, but in winter let in heat, while in summer they let in breezes. Overhangs provided shade and cooling in summer, and protection from rain on the walls in winter. A lot of wood was used in siding, as it was more insulating than vinyl. The house I live in in Vancouver now has such thin and poorly insulated walls that they feel chilly even when the furnace has been on for an hour.

With a little design help (to avoid the awkward look of my parents home), the energy savings available to dwellers in better insulated buildings would be very attractive. No sick home there, it was not an office building or full of foams and glues.

# How Do They Decide a Building is 'Green'?

*The Tyee Guide to green building certification systems in Canada.*

This series was originally published on April 14, 2010, on TheTyee.ca. The electronic version of the story is available at <http://thetyee.ca/News/2011/01/11/GreenCertification/>



LEED. Built Green. BOMA BEST. Green Globes. Passivhaus. Living Building. Got it?

Of course not. No worries, though. You've found The Tyee Guide to green building certification systems in Canada. Give us 10 minutes, and we'll teach you enough about green building certification to fake your way through a cocktail party with the arrogant architect of your choosing.

## **Leadership in Energy and Environmental Design**

LEED, as this mouthful of awkward acronym is more easily described, is the leading green building rating system in the U.S. and Canada. There are now more than 32,000 projects registered in the LEED program, plus 7,748 projects already certified.

The LEED standard is set -- and repeatedly rewritten -- by the non-profit U.S. Green Building Council, and administered by the Green Building Certification Institute.

The Canada Green Building Council is one of 16 international green building councils that maintain a mirror-like standard that preserves the structure and intents of the American version, while adapting minor details for domestic conditions and building codes. Through such affiliations, LEED is now in more than 90 countries.

The U.S. Green Building Council (USGBC) and its many sisters are on a mission to change the (built) world. Setting green building standards is only the beginning of an agenda that includes rewriting building codes, transforming the marketplace and educating the public. The USGBC warns that buildings are responsible for 39 per cent of American CO<sub>2</sub> emissions, and promises that a commitment to green building can meet 85 per cent of that nation's future demand for energy while generating 2.5 million new jobs.

LEED was drafted through a consensus-based process in the late 1990s, and the first rating tool, LEED for New Construction, was launched in 2000. The LEED standards are continually revised by a sprawling network of committees.

There are now six LEED Canada rating systems, including LEED for Commercial Interiors, LEED for Core and Shell, LEED for Existing Buildings, LEED for Homes and LEED for Neighbourhood Developments.

All LEED certification systems are structured around six core categories: sustainable sites (using urban brownfields good, ripping up prime farmland bad), water efficiency (both indoor and landscaping), energy and atmosphere (extra points for reducing carbon emissions) materials and resources (the 500 Mile Diet), indoor environmental quality (no New Car Smell) and innovation in design.

LEED rating systems are points-based. A candidate project must meet a slate of minimum standards in order to be eligible. Once those prerequisites are met, candidate projects earn points by documenting that they have met or exceeded additional green building criteria. Projects that earn 40 per cent or more of available points are deemed LEED Certified. Projects that get 50 per cent earn LEED Silver rating, 60 per cent earn LEED Gold, and 80 per cent earn LEED Platinum.

Such a multifaceted rating system is neither simple nor inexpensive to administer. In order to make it work, the Green Building Certification Institute has certified more than 157,000 professionals to navigate the LEED maze. (About 10,000 of whom are in Canada.) The USGBC also offers training at its annual Greenbuild conference. (The next is in Toronto.)

LEED's complex and continually evolving nature is also the source of much criticism. Large developers gripe about the cost of hiring LEED professionals and the time it takes to receive certification, while many small builders avoid LEED altogether.

### **Built Green Canada**

Built Green Canada, which has enrolled more than 15,000 homes, is everything that LEED is not.

Whereas LEED has been applied primarily on large projects, Built Green Canada was created for single-family homes and small multi-unit residences.

Whereas LEED often requires the use of paid consultants, Built Green Canada posts its online checklist atop the front page of its web site and encourages all comers to give it a spin.

Whereas LEED was imported from the states, Built Green Canada is a made-in-Alberta program.

And whereas the Canadian Green Building Council is on a mission to gradually upgrade laws and building codes, the Built Green Canada is committed to a "non-regulatory market-driven approach to optimize the use of innovative industry-based solutions to potential environmental problems."

Built Green began as a discussion among some Alberta homebuilders, and evolved into a project of the Canadian Home Builders' Association (CHBA). Its founders examined several Built Green programs in the United States, as well as the U.S. National Association of Home Builders green home building guidelines. Built Green Canada was launched in Alberta in 2003, nationwide the following year. (Click here for B.C.)

The Built Green program is pointedly simple: (1.) The builder must complete a two-day Built Green Builder Training course and become a Built Green Certified Builder; (2.) The certified builder submits an enrollment form, the completed checklist and a standardized assessment of the home's energy efficiency; (3.) A third party energy auditor conducts a blower door test and confirms the energy assessment. Upon completion and inspection, the builder receives an EnerGuide for New Houses rating label and a Built Green seal for the home. Both are affixed to the furnace.

The EnerGuide for New Houses rating and labeling system is the mandatory requirement at the heart of the Built Green program. EnerGuide is not unique to Built Green, but is a Canadian government program. It is based on a 100-point scale, with zero being the least energy efficient and 100 being the most. In 2005, the average Canadian home rated 66 on the EnerGuide scale.

A Built Green home must achieve an EnerGuide for New Houses rating of at least 72 to be certified. An EnerGuide rating of 75 is required to earn a silver rating, 77 earns a gold, and 82 earns a platinum.

In addition, the online checklist offers variety of green features from which the builder selects a minimum number to meet a chosen achievement level. The checklist is revised annually.

Advocates of the accessible and transparent Built Green Canada program note that it has educated

hundreds of builders and improved the energy performance of 15,000 homes, very few of which would have participated in the much more rigorous LEED system.

Critics complain that Built Green requires little in the way of site selection, water savings or material selection. They further note the EnerGuide R-2000 standard -- which forms the basis for both the training of Built Green builders and the bar above which Built Green platinum homes must rise -- was drafted 30 years ago by the federal government, and represents a narrow and outdated definition of green building.

### **BOMA BESt (aka Go Green, aka Green Globes, aka BREEAM-Canada)**

Just to spice up this alphabet soup of acronyms, the other major Canadian green building certification system has operated under several different names.

More than 800 commercial buildings have been certified under the system now known as BOMA BESt.

BOMA BESt shares a common ancestry with LEED. Both evolved from the United Kingdom's BRE Environmental Assessment Method (BREEAM), which in 1990 was first to offer an environmental label for buildings.

The Canadian Standards Association published BREEAM-Canada as a guideline (but not a rating system) for existing buildings in 1996. The American authors of the first LEED standard have acknowledged borrowing ideas from BREEAM and BREEAM-Canada.

A program called Green Globes was created in 2000 as an assessment and rating tool based on the BREEAM-Canada guidelines. And in 2004, the Building Owners and Manufacturers Association of Canada (BOMA) adopted a version of the BREEAM-Canada/Green Globe standard for existing buildings, and rebranded it Go Green.

BOMA subsequently renamed its program BOMA BESt (for Existing Buildings). BOMA BESt features four levels of certification and a simplified (online)

application procedure. Participants assess their own facilities, then hire a third-party verifier to achieve certification.

Major commercial real estate firms such as Cadillac Fairview, Bentall Real Estate, SNC Lavalin Profac and GWL Realty Advisors use BOMA BESt, which claims its certified buildings use 11 per cent less energy and 18 per cent less water than the industry standard.

Complicating the brand a bit further, an American group called the Green Building Initiative was created in 2004 to launch an industry-led version of Green Globes in the states. That system is based on a 1,000-point scale divided into categories similar to LEED: site, energy, water, resources and materials, emissions and effluents and project management. As is the case with LEED, roughly a third of the total points are allotted in the energy category.

A University of Minnesota team published a detailed comparison of the American LEED and Green Globe systems. The 2006 study found "the Green Globes system appears to be doing a fairly good job in improving upon the delivery mechanisms employed by LEED which are so often criticized. The online approach to assessment not only improves efficiency and reduces costs, but also provides opportunities to influence the design and planning processes of the project through immediate feedback not available from a primarily paper-based system."

### **Next-generation rating systems**

While Built Green and Green Globes serve the green building industry by providing less complicated alternatives to LEED, a new pair of labels have challenged LEED's dominance by offering even more stringent standards.

Passivhaus is a European standard focused solely on energy use. Passivhaus certified buildings must consume no more than 15 kilowatt hours of energy per square metre per year. In order to achieve this rigid requirement, Passivhaus structures are super-insulated and astonishingly airtight. Many are built without furnaces, even in northern countries.

There are an estimated 25,000 Passivhouse buildings in Europe, but only a handful in North America. One is in Whistler.

Living Buildings, on the other hand, produce their own energy, capture and process their own water and release minimal toxins. The Living Building Challenge describes itself as “a philosophy, advocacy platform and certification program” that aims to be the most stringent in the world. (More about Living Buildings later in this series.)

A project of the Cascadia Region Green Building Council -- the only multinational chapter of the U.S. and Canada green building councils -- the International Living Building Institute will convene its fifth annual unconference in Vancouver this April.

## Excerpts from the Ensuing Discussion in the *Tyee's* Comment Section:

### **Tough Question, Monte**

*posted by "VivianLea Doubt" on January 12, 2011*

But after a little reflection, I think transportation has to come first among elements. In the face of peak oil and water shortages that have hit many Canadian municipalities, this may seem, gosh almost frivolous... In thinking about the best community I ever lived in, it was actually also the poorest. What this meant was that people walked, took the bus, rode their bikes - obviously because they had to - and the corollary was that anywhere one went there were opportunities to meet ones' neighbours.

On any given day then, I had brief, friendly conversations - or even simply exchanges of greetings, as I moved about my neighbourhood. The impact of this on obesity, or traffic jams, or a myriad of other factors probably cannot be overstated. Certainly, its' impact on social relationships cannot be overstated; here was a place where school children walked to school, and neighbours looked out for them, where elders were looked out for, too, where we felt mostly confident and safe in our place. This is in stark contrast to the sterile subdivision where I now reluctantly reside - where everyone has a car and no one talks to each other because they never see each other.

Maybe, just maybe, if we had neighbourhoods where people walked to the store, the coffee shop, the bus - maybe this might be the catalyst for the other deep changes that need to be made.

### **Why the need to prioritize?**

*posted by "stevesatow" on January 13, 2011*

Monte, firstly I want to say that I have enjoyed reading this series of articles on green building. Thank you.

That being said, I question the premise that there is a need to artificially prioritise ANY element in favour of others when drafting a certification programme.

I currently am involved in the research, design and (eventual) construction of a Living Building regis-

tered project just outside Victoria and, for me, the priority is to try to BALANCE all the elements in order to create a building that sits comfortably in its environment.

That being said, sometimes the elements are self-selecting. For instance; we may not have a choice as to our site, and this could have implications with regards to transportation, etc. that are outside our control (short of not building at all).

I believe we need to have an holistic approach which recognises the conditions that apply and works to maximise the potential of all the elements.