A WORLD OF DIFFERENCE

From Denmark to Japan, checking out trends in global residential construction

By Mark Wessel
Want to know the socio-economic status and concerns of different cultures around the world? Check out the homes they live in. Just as our varying abodes in Ontario reflect our personal styles, lifestyles and environmental needs, so too do the new condos and houses being constructed around the globe highlight the modern reality of those respective environments. And climate change is guiding many of those designs.

In the wake of 2014, the hottest year on record, global warming is now a reality, and environmentalists are monitoring the carbon footprint of everything from individual countries down to energy output of our homes. According to UK-based analyst firm Ethical Corporation, the energy used to heat and light homes accounts for up to 40% of world energy use and 40% of all solid waste and global gas emissions.

Not surprisingly, there’s growing pressure to build more energy-efficient homes in pursuit of a zero carbon footprint. The Home for Life in Copenhagen, Denmark, takes things one step further, with not only a carbon-neutral home, but a carbon-negative home. “If you look at the power meter,” observes Torben Skovbjerg Larsen, partner with Copenhagen-based AART Architects, which designed the Home for Life, “the gauge actually goes backwards because the home is feeding energy into the grid.” The 2,100 sq. ft. creation is powered by 75 sq. ft. of solar collectors, 538 sq. ft. of solar cells and a solar heat pump, resulting in an energy surplus of 9kWh/m²/year.

Materials used to build the home include timber framing above a concrete floor, an external cladding of slate-fixed battens and mosaic floor tiles made from recycled glass. The window area (vertical windows and roof windows) is equivalent to 40% of the floor area, making the daylight area of the house twice the size of the daylight area of a conventional low-energy home. All roof windows are triple-glazed and fitted with interior decorative blinds and exterior awnings that protect effectively against the summer heat (up to 90%) and winter heat loss. And to ensure a healthy indoor climate, sensors register heat, humidity and CO₂ in all rooms. Further, all roof windows have io-homecontrols, a secure, wireless electronic control system that helps ensure a comfortable indoor climate and minimal energy consumption, such as by closing window blinds at night to help minimize heat loss during the winter months.

Over time, the carbon footprint laid to create the home will potentially be erased. “By our estimates, it will take about 40 years to produce the energy that was used to build the house,” says Larsen.

Just as construction techniques and technology are under constant examination the world over, so too is the basic building material for new homes. While stick-frame construction is still dominant in most parts of Canada and the U.S., American blogger Peter Roberts (who has a Bachelor’s Degree in Masonry Science), predicts global warming will lead to a much greater use of concrete. In fact, Roberts believes a case can be made that
Construction using concrete may actually be more efficient. “The energy required to make concrete can be viewed a number of ways. If the concrete uses recycled material (rubble, waste, fly ash, slag), then the material’s energy consumption is very low because waste material is consumed. The main energy requirement in concrete is for cement production. But cement is the smallest component in concrete.”

In the past, concrete construction has been less common in North America, in part because wood is readily available here as opposed to Europe, where many of the forests are long gone. But, says Roberts, “concrete block has a much longer life-cycle than wood-frame construction. If life-cycle costs are considered, there is no comparison between wood and concrete.”

Roberts says concrete construction has already become commonplace in the southern U.S. due to termites, hurricanes, resale value, fire safety, lower cost (compared to wood), as well as in ‘tornado alley’ areas, where there is a need for stronger buildings and ‘safe rooms.’ Florida-based Montenero Developments actually specializes in building safe solutions for tornadoes, hurricanes and earthquakes. The company uses a patented “machine form” technology to create five-sided monolithic steel-reinforced concrete structures they say are capable of withstanding 350 kph winds. The technology is used to build everything from affordable to mid-priced homes and high-end condominium developments in high-weather-risk markets in the Southeastern U.S. and Caribbean. As an added value, the company claims to save 25% on construction time by using cast concrete modular components.

To get a sense as to what the building and construction industry would look like if the market share for wood were to ever fade here in Canada, you don’t have to look any further than continental Europe, where Berlin-based Tim Skrok, owner of controLED, a home automation company, says that fewer than 1% of homes there are built using stick-frame construction. “Right now about 80% of homes are bricks and mortar with the remaining 20% either concrete block or poured concrete,” says Skrok, who works with builders not only in Berlin, but other parts of Germany, Switzerland, Sweden, Italy and the UK.

The predominance of that style of construction results in the reverse approach to wiring new homes and condos than what North American builders are accustomed to. For people like Skrok, the routing of cables and the location of keypads and control boxes must be predetermined before site construction gets underway, whereas with stick-frame homes, holes are punched through walls to run cables after the fact.

Despite all of the environmental and structural benefits that proponents of concrete construction claim, there are some who still believe wood can be just as environmentally friendly, not to mention being surprising durable as well. In Norway, wood is still readily available as a construction material—so much so, that in the northern town of Stavanger, the Waterfront development (also designed by AART) consists of 128 freehold flats and a variety of communal facilities made almost entirely out of wood. But even here, everything has been built with sustainability in mind. By sourcing the wood locally and minimizing transportation costs, the use of fossil fuels and CO₂ emissions has been significantly reduced. As well, the facade and roofs of these buildings are covered with eco-labelled Moelven ThermoWood, a heat-treated wood (inspired by a similar process used by the Vikings), that is more durable and resistant to decay, reduces thermal conductivity and is preservative- and chemical-free. The development, which is shaped to mimic the mountains on the horizon, incorporates an Integrated Energy Design approach that uses solar power to reduce the demand for energy, and slanting roof surfaces that create optimal lighting conditions, bringing sunlight into the flats and the central community square.

Whereas the Waterfront was built with the emphasis on creating a low-rise community with a larger footprint, a growing number of builders around the world are also contemplating building mid-rise and even high-rise buildings using such structural innovations as cross-laminated timber (CLT). Embracing a “go big or don’t bother to build in the first place” mindset, Australia’s first CLT structure is a nine-storey apartment building in Victoria Harbour, Melbourne, called Forté. Topping out at 32 metres in height, at the time of its completion in 2013 it was billed as the world’s tallest timber building, requiring 485 tons of wood, 759 CLT panels, 34,550 screws and 5,500 angle brackets. Interestingly, proponents of this type of CLT...
Placing your finger on the pulse of the global housing market is a bit like trying to read a punch from an octopus. There are a lot of moving parts, with many countries amassing and reporting their data in different ways. That said, some reports emerged in 2014 that provide a glimpse on how the housing industry is faring when it comes to everything from new home construction to average sale prices.

Surprisingly, only a handful of countries report annualized figures for housing starts, including Canada, the U.S., France, Japan and India. Last year, housing starts in Canada rang in at 189,401 compared to 187,923 in 2013. In the U.S., groundbreaking increased 8.8% to 1.01 million units in 2014, the highest since 2007. In France, the French Builder’s Federation reported 290,000 housing starts last year, compared to 331,000 in 2013 and 346,000 in 2012. And in Japan, housing starts were annualized at 903,876 homes for the month in October, 2014, up 2.7% over September, but down 12.3% compared to a year earlier.

Meanwhile in the world’s largest market, China, the Global Property Guide reported a sharp slowing of “THE ONCE BOOMING PROPERTY MARKET,” with new housing starts down 16.4% and falling house prices in 76 of the 100 cities surveyed. Not that it had much impact on the cost of a home in Hong Kong, with an average cost of $22,814 US per square metre. Only Monaco ($60,111) and London ($34,531) were higher. Expectedly, New York ($18,499) and Paris ($18,415) were also in the top 5. Toronto was ranked Canada’s most expensive city to own a home, coming in 14th on the list at $8,288 US per sq. metre.

The dream of owning a home seems to vary quite a bit from country to country as well. For instance, only 42% of Germans choose to own a home, compared to close to 70% in Canada, 69% in the UK and a slightly lower 65% in the U.S.
structure make a lot of the same claims as those in favour of using concrete, including ease of construction (e.g. conduits are pre-cut), time and labour savings and a lower carbon footprint. For example, builders of the Forté project claim to have saved 1,451 tons of CO\textsubscript{2} (the equivalent of taking 345 cars off the road for a year) during the construction process.

PACKING ‘EM IN
Another global trend which in many respects overlaps with energy consumption and global warming, is an area Ontario builders are more than familiar with: intensification. According to a 2014 UN study entitled World Urbanization Prospects, 54% of the world’s population now lives in urban areas, a figure that will rise to a staggering 66% by 2050. London, England is a prime example of a major metropolis with rapidly developing intensification. With a current population of over 8 million—which is expected to increase 57% in the next 35 years—there is a need to build an additional 52,000 homes annually—all within the existing greenbelt.

One trend emerging in London as a
result of this massive growth is the building of ‘microhouses,’ targeted specifically for young workers who have been priced out of the market—a market where homes sell for almost nine times the average annual wage. According to a story that appeared in the Financial Times late last year, the average microhouse flat is just 15-20 sq. metres (161-215 sq. ft.) including kitchen space. The properties range from bedrooms and studios with shared social areas through to small flats and are designed for professionals in their 20s and early 30s. Prices in most buildings range from £190-250 a week ($465-543 CDN), including all bills, WiFi and council tax. Many have communal facilities such as gyms, common rooms, gardens and private dining rooms. One company actively involved in this market, The Collective, already has 350 tenants in 20 refurbished buildings, with plans to build a 300-unit property in northwest London and a 29-storey tower in Stratford, east London.

A similar philosophy is in evidence in Markethal, a residential community in Rotterdam that incorporates a spectacular horseshoe-shaped arch design whereby the outer walls of the 228 condominium homes encapsulate an indoor market consisting of 100 produce stalls, 15 food shops and eight restaurants—all housed in an area the size of a soccer field. So essentially the residents live above and around a thriving market that is an integral part of the community.

In Orestad, Denmark, 8 House, a 10-storey ‘vertical neighbourhood,’ is a mecca for bike enthusiasts, with a bike path that begins at ground level and takes you all the way to the 10th-floor penthouse. So you can choose to take the stairs, an elevator or ride your bike to the top.

In keeping with the idea of providing more public area to offset the smaller living areas, the 8 House community includes two intimate interior courtyards and more than 5,000 sq. ft. of common facilities. The building also features a 30-foot-wide passage that allows people to easily move from the park area on its western edge to the canals to the east.

“The apartments are placed at the top while the commercial program unfolds at the base of the building,” says Thomas Christoffersen, Partner in Charge, 8 House, BIG. “As a result, the different horizontal layers have achieved a quality of their own: the apartments benefit from the view, sunlight and fresh air, while ground floor commercial space merges with life on the street. This is emphasized by the shape of 8 House, which is literally hoisted up in the northeast corner and pushed down at the southwest corner, allowing light and air to enter the southern courtyard.”

Whether the focus is reduced size or energy savings, the worldwide trend is to build more efficiently. To that end, the developers, builders and architects behind these projects are thinking outside the box. As a consequence, they’re getting very good at anticipating what homeowners want and need, based on a sophisticated understanding of where society is heading, where people want and need to live and how they want to live their lives.