Blair McCarry – An Energy Challenge to Building Professionals

If you're in the building industry, it's time to start looking ahead if you want to serve your clients well. To date, Canadian jurisdictions have been slow to adopt energy codes, so a lot of building professionals haven't had to pay attention to energy efficiency. But there's big change on the horizon.

Two key factors in energy standards are changing: energy-efficiency goals are increasing and the way we assess efficiency is shifting.

Most energy codes are based on ASHRAE [American Society of Heating, Refrigerating and Air-Conditioning Engineers] standards. Basically, they set insulation levels, amounts of glazing, equipment performance levels, etc. Either you follow this thick rule book or you have to do some energy modelling to prove your building is energy efficient. The Province of BC, which does have an energy code, bases its code on ASHRAE 2004 standards; the City of Vancouver, which has been a leader in this area, has a code based on ASHRAE 2007. It all sounds good, but generally, good construction would have met these standards anyway.

Since 1989, the ASHRAE standards have slowly improved by about 18%. But the next standard, due in 2010, is going to be a 30% increase in efficiency over the 2004 code. That's going to hit some people like an Exocet missile – those who haven't been paying attention and aren't ready for it.

Meanwhile, the City of Vancouver has indicated that they're headed towards a performance-based code. That means energy intensity, the energy use per square metre, will be measured. This is how many European countries already do it. They don't dictate 92 pages of building specifications – they say, "do what you want, but this is all the energy you get." They're controlling what they want to control: energy consumption. A lot of jurisdictions are looking even further ahead – starting to target Net Zero energy and Net Zero greenhouse gases. And some cities – such as New York – are mandating building energy retrofits, not just looking at new construction.

Building professionals need to get on this, fast. Building to code is like making the worst building you can without getting sued. If you're doing a good job for your client, especially if they want to do any environmental flag-waving, you instead have to aim ahead of today's standards, because by the time that project is actually designed and built, it could be lagging behind.

This is an exciting time, a time of really big change. We're doing catch-up in Canada, but we're getting carried along on the wave.

Blair McCarry
PEng, PE, LEED AP, ASHRAE Fellow

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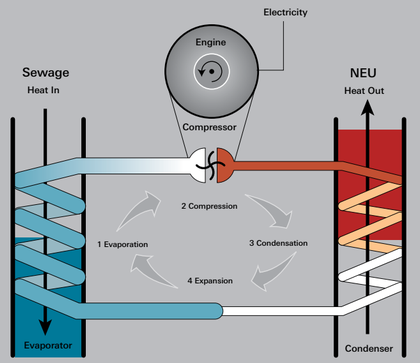
Heat = Energy

We're accustomed to thinking of heat in terms of what it does in our daily lives. We purchase energy to heat our food and warm our homes. We don't often think of heat as a form of energy that can be captured and transferred, replacing the need to purchase other forms of energy. That concept, however, is at the heart of this chapter – the reduction of fossil fuels by capturing heat that already exists.

Heat is caused by the movement of molecules – the infinitesimally small particles that make up ourselves and the things around us. Molecules are in constant motion, spinning and bouncing against one another as they move through space. What we call temperature simply describes how fast these molecules are moving. In a fresh cup of coffee, the water molecules are moving fast, and we feel this thermal motion as heat radiating from the cup when we hold it. Like billiard balls striking each other, fast-moving water molecules bounce against the slower-moving (cooler) molecules of the mug, warming the cup (and cooling the coffee). The transfer of heat is a transfer of energy.

At the False Creek Neighbourhood Energy Utility (NEU), circulating coolant (water) is warmed as it moves through a heat exchanger past municipal sewage (never mixing with it). An engine adds pressure to the warmed coolant, intensifying its low-level heat. It then moves through a heat exchanger with the water that circulates throughout the Village. It loses pressure as it goes, which releases energy – transferred as heat. The hot water goes to the Village where it will transfer its heat (energy) to each building's separate system (and come back cooler). The coolant, having released its heat, travels back to the sewage heat exchanger and starts its warming cycle again. The heat in sewage is a source of renewable energy, augmented by natural gas when the Village's energy demand is high.



A heat pump is a machine that moves heat from one location to another using mechanical work. Most often, the technology is designed to move heat from a low temperature heat source to a higher temperature heat sink. Common examples are food refrigerators and freezers, air conditioners, and reversible-cycle heat pumps that provide thermal comfort.

PROFILE

Olympic International

Experts in heating, ventilation, air conditioning and automation control equipment since 1963, Olympic International was central to the design and installation of heating and cooling systems at the Olympic Village. President Mike Mahannah says working on the Olympic Village was an opportunity to implement ideas he has learned elsewhere in the world.

"In Germany, there's such a different paradigm in construction," says Mahannah. "For example, everyone working in an office must sit within six or seven metres of a window, to have access to daylight. Their building shapes are different because of that one law.

"They also build buildings to last 350 years, unlike our throwaway mentality in North America, where we consider buildings old when they're 30. It's a different mindset in terms of quality."

Olympic International tackled many challenges that arose as new technology was implemented at Olympic Village. The company trained installers, developed detailed ceiling designs and helped a specialty manufacturer scale up to handle production of the energy transfer centres for each suite.

"Part of our vision as a company is to bring world-leading products to the local marketplace," says Mahannah. "Our work on the Olympic Village was a part of that vision."