

THE 21st CENTURY WORKPLACE

Rapid payback, incentives make green technologies a no-brainer in office buildings

By Bruce Nagy

Large office buildings have always presented challenges for plumbing and HVAC and the 21st century demands more sophistication than ever before. It's no longer enough to supply hot and cold water to every kitchen and bathroom, and balance heat and humidity in each area.

Today mechanical contractors must participate in the creation of a healthy environment, a good corporate citizen, a planet-friendly organism, and a place to work that is simultaneously high-tech, comfortable and fun. In some markets office buildings are competing for good corporate and government tenants who need to minimize employee turnover and attract the best people they can find.

The Corus building

When Corus Entertainment decided to consolidate its Toronto operations, it needed a new, highly sophisticated head office and studio building. An attractive, contemporary complex has been created on Toronto's eastern waterfront. It will also serve as head office for the Toronto 2015 Pan Am Games.

Corus grew from Shaw Communications and today includes 15 TV properties, 48 radio stations, Nelvana animation production and Kids Can Press book/media publishing. It employs some very talented people, creating broadcast product in totally soundproof room-within-a-room studios, which feature floating floors, walls and isolated ceilings.

Noise from mechanical systems cannot be permitted to intrude, any more than the shouts and roughhousing of noisy school groups, who tour past the studio windows.

The 500,000 square foot LEED Gold facility offers a living wall HVAC system, green roof, high reflectivity ceiling and double-glazed argon windows. A grey water collection system supplies its low flow toilets (4.8 lpf) urinals (1.9 lpf) and landscape irrigation. Mechanical engineer Dan Curley of Smith & Anderson, Toronto, says these upgrades alone account for 28 percent energy savings over a conventional building. Michelle Hur, a project manager with Enermodel Engineering, Kitchener, Ont., expects energy savings will eventually reach 39 percent once all of the energy saving aspects of the building are fully functional. Enermodel did LEED design consulting for the building.

The eastern port area in Toronto is being completely redeveloped, partly for the Games. A new district heating and cooling plant will be created; a modern version of highly successful existing systems in the south central part of the city. Centralized deep water cooling is currently provided to about 100 office towers and steam heat to many more.

For now, natural gas powers four large rooftop units for Corus, plus a fifth one that supports bio-filtration and phytoremediation through a Living Wall in the four-storey atrium. The system draws air through tropical plants, roots and root material into perforated ducts.



A living wall plays a key role in the building's indoor air quality.



Engineers aimed for LEED Gold status with the new Corus building.



Behind mechanical engineer Dan Curley is what has to be one of the world's largest enthalpy wheels.

This means less outside fresh make-up air is needed as inside air becomes purified and is simply directed into the HVAC system and released back into the space. In addition, the building features one of the largest enthalpy wheel heat recovery ventilators (HRVs) found anywhere. The building's automation system adjusts outside air intake according to the indoor body count, determined by means of CO2 sensors.

Modern building envelope

Energy is also saved by the very latest in office building envelope designs. Air leakage through a curtain wall system from Sota Glazing, Brampton, Ont., is less than .06 CFM per square foot of fixed wall area at a positive

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and negative test pressure differential of 6.24 psf. In winter it prevents condensation on the indoor face of the framing system, maintaining a temperature of 21°C indoors with 50 per cent relative humidity, while the ambient outside air temperature is as low as -21°C with a wind at 24 km-h. A saw tooth frit pattern has been etched into the skylight glass to decrease light penetration (ceramic baked on second or third face inside the assembly) to allow precisely differing amounts of light and heat to penetrate from outside and from inside.

For amusement at work the building also features a massive television screen in the common area, some wacky art installations and a three-storey slide. Adults use the slide for fun, to get from the fourth to the first floor faster than the elevator and, okay, to conserve some energy.

Government incentives

While indoor air quality, fun at work and greenhouse gas emissions matter to the media urbanites who work at Corus, the senior management and building owners care about the considerable savings that come with a 30 or 40 percent energy use reduction. They also care about government incentives and planning support.

Successful mechanical contractors are heavily involved in partnership retrofit projects that qualify for government and utility green energy funding. In one case a 2.8 million square foot office was retrofitted at a cost of \$155,000, less an incentive grant of \$62,000. Annual energy savings are almost \$120,000, so the payback is remarkably quick.

In another case just \$5400 (after the grant) was spent on a 172,000 square foot building that saves more than \$26,000 in energy costs each year. These are two of 22 HVAC examples that can be reviewed at

www.bomacdm.com/CaseStudies.aspx. Nine of the 22 received an incentive between 30 and 40 percent of the cost; the rest ranged from eight to 26 percent.

Effective controls

For years control systems and software have helped to eliminate guesswork in larger buildings. They also accommodate measuring before and after retrofits and new builds, and proper commissioning. We've all become familiar with the concept of a building as one system. How about the city or region as a system?

Government consultant David Katz of Sustainable Environmental Solutions Inc., Toronto, says energy utility and corporate facilities "nerds" are now creating a smart grid of intelligent buildings using sophisticated software, smart meters and building automation systems.

Like residential smart meters, they reduce strain on the grid at peak times and eliminate the peak billing penalties for building owners, by automatically dialing back cooling loads in whole regions when necessary. They say a couple of degrees usually results in few complaints, creates big savings and can prevent rolling brownouts.

Welcome to the 21st century! +



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