INDOOR HEALTH

Ventilation

If you're alive, you're breathing – it's a fundamental function of the human body, delivering oxygen to our organs and removing carbon dioxide. Humans draw more than 17,000 breaths per day. For such a vital physical process, the quality of the air we breathe is of utmost importance. When measuring quality of life in a city or region, air quality is always a key indicator. The quality of the air indoors is equally significant, and can be achieved through adequate ventilation strategies: eliminating exposure to contaminants, utilizing sufficient filtration, controlling rate of air changes and improving access to fresh outdoor air. The effects of indoor air quality can range from adverse health (see sick building syndrome) to positive impacts such as improved productivity, mood and overall health.

Sick Building Syndrome

Sick building syndrome describes health conditions associated with the interior environmental quality of an individual's workplace or residence. Symptoms can include: irritation of the eyes, nose and throat; neurotoxic or general health problems; skin irritation; and odour and taste sensations. The syndrome is related to poor indoor air quality, often caused by flaws in the HVAC system or from off-gassing of building materials that contain volatile organic compounds, moulds, improper exhaust ventilation of ozone (a byproduct of office machinery), the use of chemicals, location of the fresh-air intake or lack of adequate air filtration.

Designers at the Olympic Village eliminated the potential for sick building syndrome by specifying ventilation systems with high rates of fresh air exchange with the outdoors, and installing operable windows. The choice of interior materials and finishes also contributed to healthy indoor air (see 'Interior Design'). By specifying environmentally benign products, the interior design consultants were able to mitigate the presence of volatile organic compounds and conditions that encourage the growth of allergens and mould.

Daylighting, views and air quality are some of the key indoor features that contribute to the well-being of the residents.

TOBACCO SMOKE CONTROL

Blower Door Testing

To ensure that buildings achieve baseline indoor air quality levels, LEED™ requires that all buildings meet environmental tobacco smoke control requirements. In residential buildings, this means reducing air leakage between smoking and non-smoking areas in order to minimize occupants' exposure to tobacco smoke.

To achieve the LEED™ requirement, walls, floors, ceilings and doorways must be sealed to protect from air leakage between residential units. Next, LEED™ requires a blower door test to demonstrate the effectiveness of the leak protection measures. A blower door test is a diagnostic tool designed to measure the air-tightness of buildings or rooms and spaces within a building. All buildings at the Olympic Village had to undergo this testing procedure.

To run the test, a blower door fan is sealed into an exterior doorway. The fan draws air out of the suite, creating a pressure difference between inside and outside. This pressure difference forces air through all holes and penetrations in the building enclosure. Airflow and pressure differential are measured using gauges on the blower door, and are then used to determine the leakage rate of the unit.

Challenges and Implications

Protecting occupants from exposure to tobacco smoke is generally recognized as a key measure in ensuring healthy indoor environments. Despite widespread acceptance of the concept, implementation can present a challenge, as industry is relatively unfamiliar with LEED™'s testing procedures.

"We are talking about changing common practices out there," says Jason Packer, Sustainability Consultant at Recollective Consulting. "While it is understood that the whole point of LEED™ is to transform the market, there is significant push-back from owners, developers and builders, particularly when so much money is at stake."

"It is difficult to fix (air leakage) problems once construction is underway," says Packer. To avoid this costly predicament, Packer recommends "having an air leakage consultant do a presentation with the design team so that air leakage testing requirements are considered early on in the design process. Also, it would be useful to require the relevant sub-trades to witness air leakage tests and feel the air flowing with their own hands. These guys are genuinely interested in doing this properly, but they don't have experience with this testing procedure."

"It's important to take advantage of synergies," he continues. "For example, some aspects of fire-stopping regulations provide an opportunity to simultaneously address tobacco smoke control. And there are other benefits – an airtight building can have positive implications for energy efficiency, comfort and even durability." Despite the challenges, the buildings all passed the test, meeting LEED™'s tobacco smoke control requirement.

"We are talking about changing common practices." Jason Packer, Recollective Consulting