



# Impacts of Buildings on Human Health

Green building objectives are broader than just environmental effects, and have come to embrace human health issues as well, including performance. In the developed world where people spend much of their time inside buildings, the design of the indoor environment is of critical importance to human health.

Within the context of green design, measures frequently explored for a better indoor environment include:

- monitoring of carbon dioxide levels
- ventilation effectiveness
- management of dust and contaminants during construction
- control of indoor chemical and pollutant sources
- personal control of environmental systems
- provision of daylight and views.

*Thunder Bay Regional Health  
Sciences Centre, Ontario  
Farrow Partnership Architects  
Inc.*

## Designing for Human Well-being

Health and well-being embraces both physical health, and the psychological aspects of human performance.

Over time, physical issues have been dealt with incrementally through legislation that has banned the use of toxic or otherwise dangerous substances in buildings. In addition, new standards have been introduced to ensure adequate ventilation, reduce condensation and inhibit the growth of moulds and mildews.

Designers are also interested in potential psychological and related physiological benefits of

environmental design factors. For example, intuition tells us that a connection to nature improves our sense of well-being when indoors. This can be achieved through access to daylight or views, or by providing a visual or tactile connection with natural materials such as wood and stone.

An October 2005 article by Douglas MacLeod in Canadian Architect stated: "Some architects are pioneering the idea of evidence-based design as a means of rigorously examining past buildings in order to build better new ones. Evidence-based design borrows from work done in evidence-based medicine to carefully observe, quantify and analyze the way people use buildings."

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Canadian architectural firms working in this area include Toronto's Farrow Partnership. The company's experience suggests there are tangible benefits to be accrued from a more human-centred approach to building design. For this reason, wood has begun to emerge as a material of preference in its recent designs of health care facilities. In writing about the Carlo Fidani Peel Regional Cancer Centre in Mississauga, Ontario, Sean Stanwick of The Farrow partnership stated: "Wood was selected for its inherent emotive qualities, and for its ability to connect to our inner selves by evoking images, feelings and sentiment."

The 315-bed Thunder Bay Regional Health Sciences Centre was the first hospital in Canada to gain approval for the use of wood as a primary structural element in its main public area. Architect Tye Farrow says the wood not only resonates as an aesthetic element, but is comforting as well.

Architect Bing Thom said he chose wood for key structural components in the retail and commercial development at Surrey Central City, BC "to provide a warm and tactile contrast to the smooth synthetic environment of the modern high-tech work space."



*Central City, Surrey,  
British Columbia  
Bing Thom Architects*

## Wood and Interior Air Quality

### Dust and Particulates

Solid wood products, particularly flooring, are often specified in environments where the occupants are known to have allergies to dust or other particulates. Wood itself is considered to be hypo-allergenic; its smooth surfaces are easy to clean and prevent the buildup of particles that are common in soft finishes like carpet.

### Off-gassing

Interior wood panel products, such as particleboard, medium density fibreboard (MDF), and hardboard,

were once identified as having a negative impact on indoor air quality because of their use of urea-formaldehyde (UF) glues. The concern was that, if panels were left unsealed, volatile organic compounds would be released into the air.

In 2004, the Composite Panel Association (CPA) ([www.pbmdf.com](http://www.pbmdf.com)) introduced an Environmentally Preferable Product (EPP) Certification Program to lower formaldehyde emissions from wood-based panels intended for interior use. EPP-designated products have since been third-party certified as complying with the environmental criteria referenced in the U.S. Environmental Protection Agency's Guidelines for Environmentally Preferable Purchasing.<sup>1</sup> Compliance requires rigorous quarterly audits at the manufacturing site and independent third-party product emission testing.

The Composite Panel Association's EPP Certification Program is the first EPP certification program accredited by the American National Standards Institute (ANSI).

Some manufacturers also produce formaldehyde-free panel products, made with an urethane-type (MDI) resin. Once cured, MDI-based wood panel products are very stable, without measurable off-gassing.

### Humidity Control

The use of wood products can also improve indoor air quality by moderating humidity. Acting like a sponge, the wood absorbs or releases moisture in order to maintain equilibrium with the adjacent air. This has the effect of raising humidity when the air is dry, and lowering it when the air is moist – the humidity equivalent of the thermal flywheel effect.

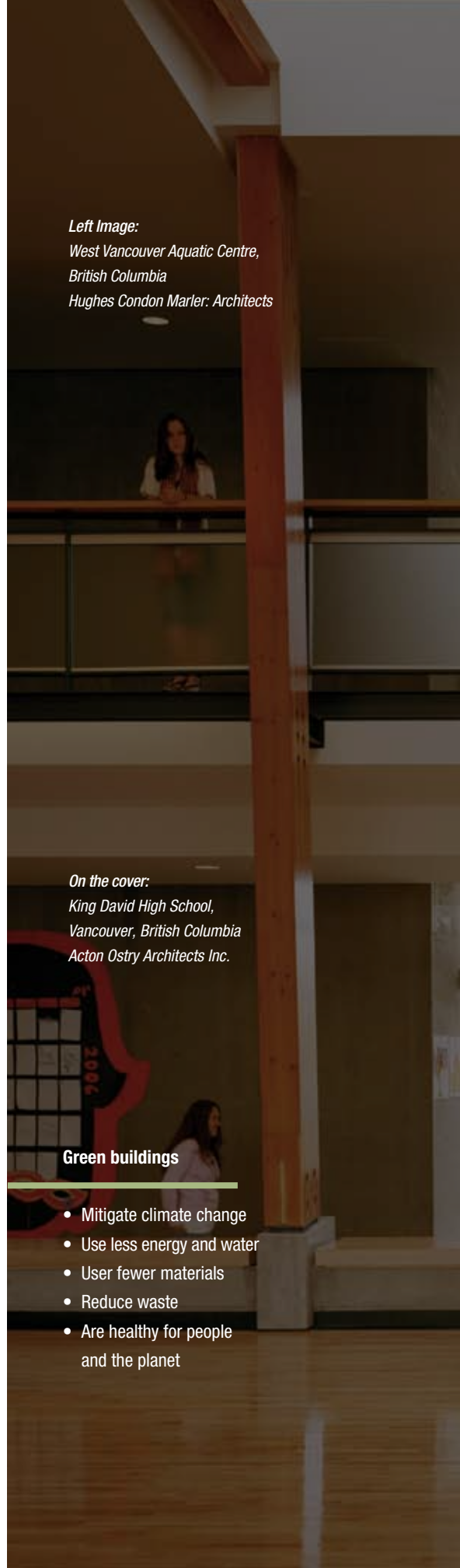
<sup>1</sup> Wood panels certified to CPA's EPP Certification Program must demonstrate that they are made from 100% recycled or recovered fibre and meet emissions of maximum 0.2 parts per million of formaldehyde.



*Carlo Fidani Peel Regional Cancer Centre, Mississauga, Ontario  
Farrow Partnership Architects Inc.*



*Left Image:*  
*West Vancouver Aquatic Centre,*  
*British Columbia*  
*Hughes Condon Marler: Architects*



*On the cover:*  
*King David High School,*  
*Vancouver, British Columbia*  
*Acton Ostry Architects Inc.*

### **Green buildings**

- Mitigate climate change
- Use less energy and water
- User fewer materials
- Reduce waste
- Are healthy for people and the planet