



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



*Surrey Memorial Hospital, Surrey, B.C.
Architects: CEI Architecture and
Parkin Architects
Photo courtesy of: CEI Architecture and
Parkin Architects*

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 mould and mildew.

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.

For many years, research has shown the human health benefits of forests. The benefits of time spent in forests include reduced stress, lower blood pressure, and improved mood. Medical research shows exposure to forests can boost our immune system and may even correlate to lower cancer rates. The benefits of forests are strongly recognized in some cultures. In Japan, the term “forest bathing” refers to time spent in the forest atmosphere and is encouraged by public policy. New research is beginning to show that the visible use of wood in buildings provides human health benefits as well.

A recent study at the University of British Columbia and FPInnovations identified a link between the use of wood and human health. The study compared the stress levels of participants in different office environments with and without wood finishings.

The results found that “Stress, as measured by sympathetic nervous system (SNS) activation, was lower in the wood room in all periods of the study.” Studies have shown that SNS activation increases

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blood pressure and heart rate while inhibiting digestion, recovery, and repair functions in the body. People that spend a lot of time in a state of SNS activation can demonstrate evidence of physiological and psychological impact. The use of visual wood surface can reduce SNS activation and promote health in building occupants.

The Critical Care Tower (CCT) at Surrey Memorial Hospital provides strong evidence that Canada's healthcare sector now recognizes the important role that can be played by wood in the creation of healing environments. "Sustainable design goes hand-in-hand with healthcare design," says Bill Locking, senior partner with CEI Architecture and partner

in charge on the project. In January 2015, Surrey Memorial Hospital achieved LEED Gold certification.

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

The growing knowledge of the health benefits of building with visual wood surfaces is being incorporated into healthcare environmental to support patient recovery, school environments to support student learning, and offices to support employee health.

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) 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.¹ 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.



Central City, Surrey, B.C.

Architect: Bing Thom Architects

Photo: Tae Ik Hwang

¹ 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.



Green buildings

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

*Left Image:
Canadian Cancer Society Kordyban Lodge,
Prince George, B.C.*

The lodge's hybrid structure consists of engineered glulam timber frame, conventional light wood framing and prefabricated wall panels. On the exterior the predominant material is Western red cedar siding.

*Architect: NSDA Architects
Photographer: Derek Lepper Photography*

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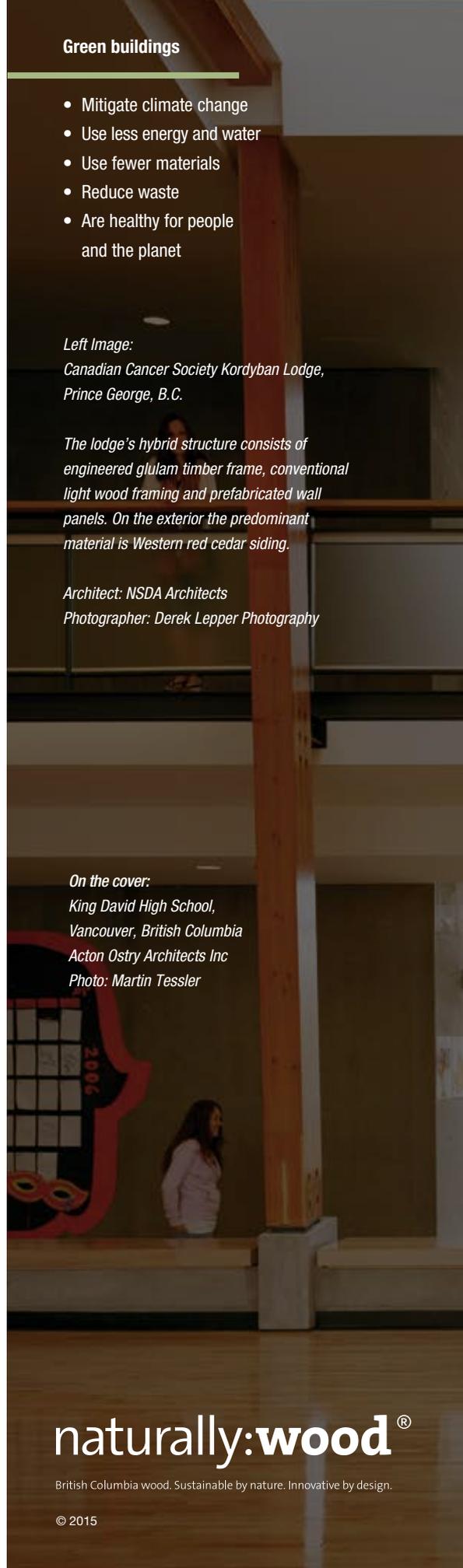
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