From Sustainable Forests to Sustainable Buildings

How is sustainable development transforming the market for the wood products industry?

Linda McPhee
Manager
Sustainable Building

Sustainable Development

A term used to describe a process towards an improved environment.

It is based on economic viability, environmental protection, and social responsibility.
Sustainable Development

Diverse interpretations exist around the world encompassing a full spectrum of perspectives and opinions.

As tabulated by the United States Massachusetts Institute of Technology, the phrase now has as many as fifty-seven competing definitions.

The Brundtland Commission

First defined in 1987 by the U.N. World Commission on Environment and Development.

“The ability of humanity to ensure that development meets the needs of the present without compromising the ability of future generations to meet their own needs”.
The Hannover Principles

1st published in 1992 and conceived as a guide to the design of the 2000 World’s Fair:

- Insist on the right of humanity and nature to co-exist.
- Recognize interdependence.
- Respect relationships between spirit and matter.
- Accept responsibility for the consequences of design.
- Create safe objects of long-term value.
- Eliminate the concept of waste.
- Rely on natural energy flows.
- Understand the limitations of design.
- Seek constant improvement by the sharing of knowledge.
Earth Summit 1992

The Statement of Principles for the Sustainable Management of Forests, agreed to at the 1992 Earth Summit in Rio de Janeiro, helped guide Canada’s forest management practices in conservation and sustainability.

Sustainable Forestry

The tree cover in Canada is actually as extensive now as it was decades ago and has retained over 90% of its original forest cover.

With approximately 10% of the world’s forests, Canada is now a world leader in the development and implementation of third party forest certification programs.
Sustainable Forestry

Forestry today looks nothing like that of a century ago. The industry must be at the cutting-edge of information and technology, one that involves disciplines such as biology, chemistry, geology, hydrology, engineering, computer science, and silviculture.

Earth Summit 1992


The European Charter on Sustainable Design & Construction preserves the 1st principle: “Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature”.
Treaties Establishing the European Communities

“Environmental Impact” was defined in 1997 by the Treaties establishing the European Communities:

“All effect caused by a given activity on the environment, including human health and safety (and welfare), flora, fauna, soil, air, water, climate, landscape and historical monuments or other physical structures or the interactions among these factors; it also includes effects on cultural heritage or socio-economic conditions resulting from alterations to those factors”.

Sustainable Development and Sustainable Design

What is the relationship between the principles of Sustainable Development and Sustainable Buildings, commonly known as “Green” Buildings?

What meanings do words have and how do they impact on the development of a design concept?
Durability of Wood

The word “sustainable”, suggesting the idea of constant, permanent or continuous, is translated in some languages as “durable”.

Long-enduring wood structures found around the world demonstrate the durability of wood.

Nara, Japan

Todaiji (“Great Eastern Temple”) is one of Japan’s most famous temples and was constructed in 752.

It is the world’s largest wooden building, even though the present reconstruction of 1692 is only two thirds of the original temple’s size.
Borgund, Norway

Borgund stave church is one of the best preserved stave churches in Norway.

A timber church built in the 12th century, it is one of twenty-nine surviving stave churches in Norway.

Kizhi, Russia

Church of the Intersession or ‘winter’ church c. 1764 [left]. The Church of the Transfiguration or ‘summer’ church c. 1713 [centre].
Church of the Transfiguration rises to an overall height of 121 feet. The domes are clad with individually hand carved aspen shingles which have taken a silvery sheen over time. The only surviving multi-domed cathedral built during the reign of Peter the Great, it remained in active use until 1937.

In a Vision of the Future
Few See the Past

Most buildings are replaced not because they wear out but because the type, style and size of a building is no longer suitable.

American preservationist Anthony M. Tung in his recent book “Preserving the World’s Great Cities” estimates that 50% of the significant historical structures that existed in the year 1900 have been destroyed.

A Canadian study documents the ruin of more than 20% of Canada’s heritage buildings in the last three decades due to new development.
Pursuit of Sustainable Development

In 1950, there was just one city with a population greater than ten million – New York City.

In 2015, there will be twenty-one and the number of urban areas with populations between five and ten million will increase from seven to thirty-seven.

The U.N. predict that by the year 2025, sixty percent of humanity will dwell in metropolitan areas.

Pursuit of Sustainable Development

The pursuit of sustainable development brings the built environment and the construction industry into sharp relief.

In the United States there exists 76 million residential buildings and 5 million commercial buildings. Together they use approximately 1/3 of all energy consumed in the United States and 2/3 of all electricity (1996 data).
The relationship between the principles of sustainable development and the construction sector includes some of the same challenges namely:

– energy conservation;
– resource efficiency;
– environmental quality; and
– human health.

Buildings are a major source of the pollution that causes urban air quality problems and pollutants that contribute to climate change.

Efficient use of energy, for cooling, heating, lighting and operation, reduces the need for nonrenewable fossil fuels. Lessening the demand of nonrenewable fossil fuels lessens the air toxicity produced by those plants.
Energy Efficiency

Wood is a natural thermal insulator

R-values of materials

- **Lumber 2x4**
- **Steel 2x4**
- **Concrete Block 6”**

Energy Consumption

- Typical Annual Energy Consumption of a Natural Gas Heated House in Ottawa, Canada (MJ/Year)
Emissions Results from Energy Used in Buildings

In the United States, buildings account for 49% of sulfur dioxide emissions, 25% of nitrous oxide emissions, 10% of particulate emissions.

Buildings produce 35% of the United States’ carbon dioxide emissions, the major contributor to greenhouse gas emissions.

Building Rating Systems

Intended to foster sustainable building design, construction and operations.

Most deal with site selection criteria, efficient use of energy and water resources, waste management during construction, environmental air quality, and transportation.
Building Rating Systems

Energy use, and the reduction of associated greenhouse gas emissions due to the combustion of fossil fuels, is typically considered the most important environmental factor.

In general, there is no clear objective in the case of material selection in green building rating systems.

Life-Cycle Assessment

The challenge must ultimately be met by the integration of life-cycle assessment (LCA) as a support tool for measuring environmental impacts.

LCA is the recognized international approach to assessing the comparative environmental merits of products or processes as set out in the ISO 14000 series of standards.
Life-Cycle Assessment

LCA includes the entire life-cycle of a product, process, or activity, from extracting and processing raw materials to manufacturing, transportation and distribution, use and reuse, maintenance, recycling and final disposal.

LCA includes environmental impacts such as acid rain, air pollution, ecological toxicity, eutrophication, fossil fuel depletion, global warming, habitat alteration, human health, indoor air quality, ozone depletion, smog and water intake (amount used from cradle to grave).

From Sustainable Forests to Sustainable Buildings

Wood is a durable and renewable resource.

Where forests are managed in a sustainable way, the use of wood products contributes to the overall environmental performance of any commercial or residential building.
From Sustainable Forests to Sustainable Buildings

There is little or no waste at the manufacturing stage where wood products manufacturers capture 94% of their wood waste.

Proven to be one of the safest building systems in an earthquake and safe for areas that face a risk from high winds.

Wood is a natural thermal insulator, 400 times better than steel, due to its cellular structure.

Based on LCA and when compared to other major building products, wood products use less energy and are the most environmentally responsible building products for all factors considered.

Wood absorbs carbon dioxide during its growth cycle and the long term use of wood removes carbon from the atmosphere for decades.
Designing for Sustainability

Lillehammer Olympics 1994 [left], 1st to include sustainable design. Sydney 2000 [right].

Sustainability is a cornerstone of Canada’s 2010 Winter Games bid.

http://www.cwc.ca