Wood and Green Building

THE ROLE OF LIFE CYCLE ASSESSMENT

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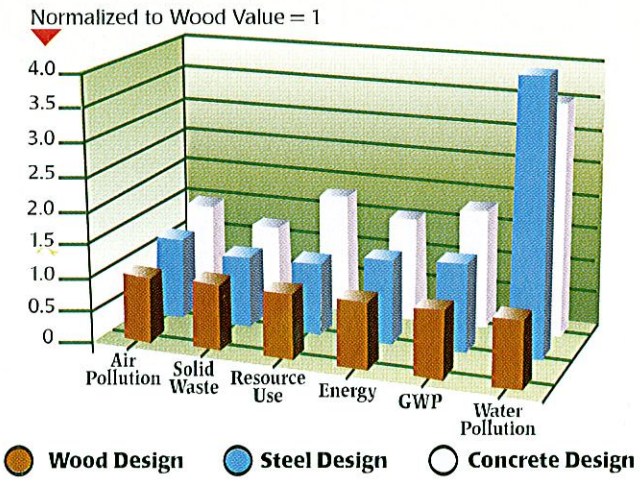
Life cycle assessment (or LCA) is an essential part of green building because it offers an objective and consistent way to measure the environmental impacts of building materials and assemblies.

Every part of a structure—from the foundation and framing materials to windows and cladding—has a unique environmental footprint, which affects the whole. The objective of LCA is to evaluate the various parts in order to minimize the overall environmental impact.

LCA considers materials over the course of their entire lives, from extraction through manufacturing, transportation, installation, use, maintenance and disposal or recycling. The evaluation takes into account the full range of impacts—such as energy use, global warming potential, air pollution, water pollution and solid waste—and provides a common basis for comparing designs.

Without the kind of quantifiable data generated through LCA, choices are often subjective. For example, many people believe that it's better for the environment to use materials produced within 500 miles of the structure being built. On the surface this makes sense—since less energy will be required to transport the materials. But consideration must also be given to factors such as weight, the type of manufacturing process and the mode of transportation, which could easily make a product sourced farther away the smarter choice.

Environmental Impacts of Homes Designed in Wood, Steel and Concrete



A study by the Canadian Wood Council compares the life cycle impacts of three 2,400 square foot homes designed primarily in wood, steel and concrete, over the first 20 years of their lifespans. Relative to the wood design, the steel and concrete designs:

- Release 24% and 47% more air pollution
- Produce 8% and 23% more solid wastes
- Use 11% and 81% more resources
- Require 26% and 57% more energy
- Emit 34% and 81% more greenhouse gases
- Discharge 4 and 3.5 times more water pollution

These differences may seem small until one realizes that only a small portion of the materials in the house (by weight) are involved in framing. The impact can be expected to be many times larger when components made from different materials are compared directly.

How Does Wood Compare?

Study after study in Europe, North America and elsewhere has shown that wood outperforms other products when considered over its complete life cycle.

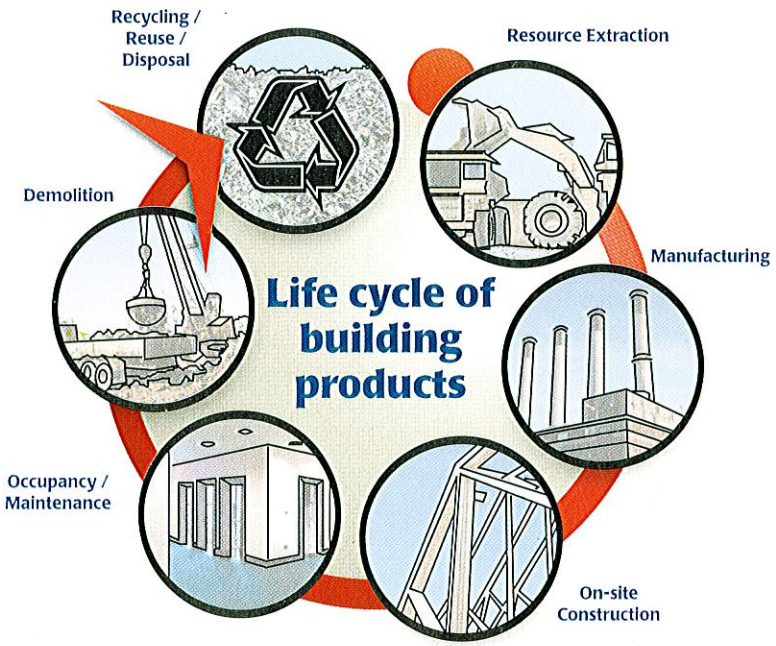
One study, conducted by the Consortium for Research on Renewable Industrial Materials (CORRIM), compared the environmental impacts of homes framed with wood and steel in Minneapolis and with wood and concrete in Atlanta—the framing types most common to each city. According to the report, the homes framed in steel and concrete would require 17 and 16 percent more energy respectively (from extraction through maintenance) than their wood framed counterparts.

"Wood and Green Building" is a series of fact sheets produced by the Wood Promotion Network for the industry and its customers. Copies are available online at www.beconstructive.com.

Researchers also considered emissions of carbon dioxide, methane and nitrous oxide, and the length of time these substances linger in the environment. They concluded that the global warming potential of the hypothetical steel framed home is 26 percent higher and the concrete framed home 31 percent higher than the matching homes framed with wood.

Tools for Assessing Life Cycle Impacts

In North America, the two most common tools for assessing life cycle impacts are the Athena™ Environmental Impact Estimator and the BEES® (Building for Environmental and Economic Sustainability) software.



The Athena software is used to evaluate the environmental footprint of assemblies or complete structures. It is especially useful early in the design process, when material choices have far-reaching implications for the overall environmental impact, and allows designers to experiment with different material mixes to achieve the most effective combination.

The BEES® software is more product-oriented, and combines environmental measures with economic indicators to provide a final rating. Particularly useful at the specification and procurement stage of a project, the software includes data for nearly 200 products (generic and manufacturer brands) such as wall insulation, siding and sheathing.

LCA and Green Building Standards

Although it has existed in various forms since the 1960s, life cycle assessment has only recently been considered in the context of green building standards.

Until now, standards have tended to prescribe specific "green" features as the only way to achieve objectives. (They may reward solar energy, for example, or encourage wind energy by rewarding the purchase of "green power", instead of giving credit for any practice that minimizes the use of non-renewable fossil fuels.) But there is growing support for the idea that rating systems should focus on true environmental performance measures, such as global warming potential or ozone depleting effects, giving designers and builders the flexibility to choose how best to achieve them. LCA is the means to this end.

In North America, the Green Globes™ standard for commercial structures already includes LCA to some degree, awarding up to 40 points for using LCA tools to choose assemblies such as foundation/floors, structural/walls, roofs and other (i.e. cladding and windows). The Green Building Initiative, which oversees Green Globes in the United States, has also begun a project to incorporate LCA data more fully into the system itself–making it easy for users to compare alternate design options in LCA terms.

The US Green Building Council, which oversees the LEED® standard, is also in the process of determining how to incorporate LCA into future LEED products.

Additional information on life cycle assessment and the environmental benefits of wood is available from the Athena Sustainable Materials Institute (www.athenasmi.ca), BEES® – Building for Environmental and Economic Sustainability (http://www.bfrl.nist.gov/oae/software/bees.html), the Consortium for Research on Renewable Industrial Materials (www.corrim.org/reports/) and the Canadian Wood Council (www.cwc.ca).