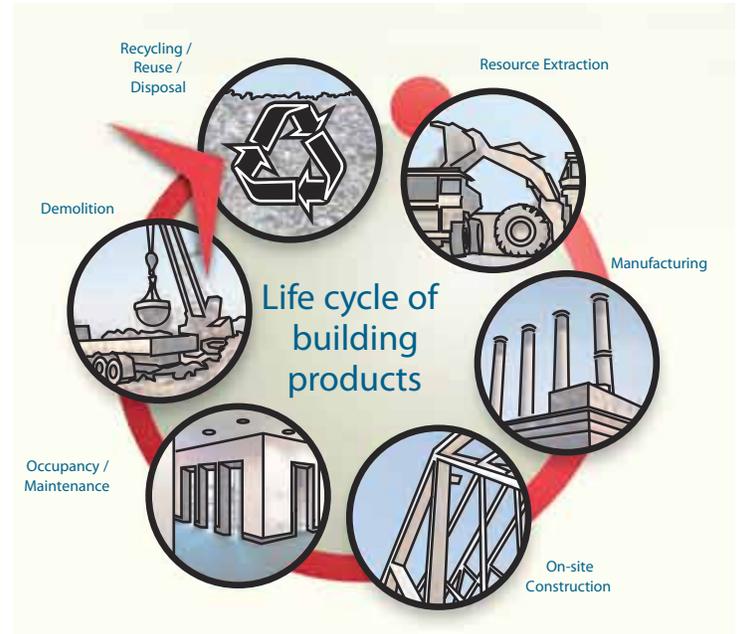


In the past, the green building movement has taken a prescriptive approach to choosing building materials. This approach assumes that certain prescribed practices—such as the use of local materials or products with recycled content—are better for the environment regardless of the product’s manufacturing process or disposal. Fortunately, it is being replaced by the scientific evaluation of actual impacts through life cycle assessment (LCA).

LCA is an internationally recognized method for measuring the environmental impacts of materials, assemblies or whole buildings over their entire lives—from extraction or harvest of raw materials through manufacturing, transportation, installation, use, maintenance and disposal or recycling.

When integrated into green building codes, standards and rating systems, LCA encourages design professionals to compare different building designs based on their environmental impacts and make informed choices about the materials they use.



the basis for many others, including the Leadership in Energy and Environmental Design (LEED) system and Green Globes. The BREEAM modules for offices, multi-family buildings and ecoHomes include calculations based on LCA.³

- In the U.S., LCA is encouraged in the Green Globes rating system, and included in the new American National Standard based on Green Globes, *ANSI/GBI 01-2010: Green Building Assessment Protocol for Commercial Buildings*. It is also included as a pilot credit in LEED.
- LCA is also incorporated in the draft *California Green Building Standards Code*, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) *Standard 189.1, National Green Building Standard (ICC 700)*, and *International Green Construction Code (IGCC)*.

LCA and wood

LCA highlights several environmental benefits of wood in the design of buildings. When viewed over its life cycle, an inherent advantage of wood is that it is renewable and sustainable, and requires less fossil fuel energy to manufacture into products than steel or concrete. Wood buildings are also responsible for fewer carbon emissions, less air pollution and water pollution, and have less embodied energy than buildings made from other materials.⁴

“LCA comprehensively quantifies and interprets the energy and material flows to and from the environment.”

An internationally recognized approach

Defined by the International Organization for Standardization,¹ LCA comprehensively quantifies and interprets the energy and material flows to and from the environment. The analysis includes emissions to air, water and land, as well as the consumption of energy and material resources.

Internationally, the United Nations Environmental Programme has been promoting LCA for a decade.² It is more common in Europe than North America, but the use of LCA is increasing in both markets because of its holistic approach and power as an evaluative tool. For example:

- The UK-based Building Research Establishment’s Environmental Assessment Method (BREEAM) is the world’s most widely used green building rating system and

A study conducted by the Consortium for Research on Renewable Industrial Materials (CORRIM) compared the environmental impacts of wood-frame and steel-frame homes in Minneapolis, and wood-frame and concrete-frame homes in Atlanta (the framing types most common in each city).⁵ In both cases, LCA showed that the wood-frame homes performed substantially better than their non-wood counterparts. According to the report, the homes framed in steel and concrete had 17 and 16 percent more embodied energy,⁶ respectively, than the wood-frame homes. Likewise, the carbon footprint was 26 percent higher for the steel-frame home and 31 percent higher for the concrete-frame home than the homes framed in wood.

Summary

- LCA is a scientific, internationally recognized method for evaluating the environmental impacts of building materials over their entire life cycle—from extraction or harvest of raw materials through manufacturing, transportation, installation, use, maintenance and disposal or recycling.
- The United Nations Environmental Programme has been promoting LCA for a decade, and it is being integrated into green building codes, standards and rating systems in Europe and North America.
- LCA studies show that wood buildings are responsible for fewer carbon emissions, less air pollution and water pollution, and have less embodied energy than buildings made from steel or concrete.

“When viewed over its life cycle, an inherent advantage of wood is that it is renewable and sustainable, and requires less fossil fuel energy to manufacture into products.”

All building materials have some environmental impact. Greater use of LCA will allow building designers to specify a combination of materials that balances the desire to minimize environmental impacts with the need to meet functionality and cost requirements. Wood can play an important role in achieving all of these objectives.

Making LCA accessible

Although, in the past, LCA has been perceived as too complex and time consuming for regular use, it is getting easier with tools such as the ATHENA *EcoCalculator for Assemblies*,⁷ which is free and includes ready-to-use LCA data for hundreds of common building assemblies. As LCA is written into a greater number of green building codes, standards and rating systems, tools like the *EcoCalculator* that make LCA more accessible to mainstream building designers can be expected to increase.

¹ ISO 14040:2006 and ISO 14044:2006

² United Nations Environment Programme, www.unep.org

³ Light House Sustainable Building Centre, 2010

⁴ *A Synthesis of Research on Wood Products & Greenhouse Gas Impacts, 2nd Edition*, Roger Sathre, Jennifer O'Connor, 2010

⁵ *Life Cycle Environmental Performance of Renewable Building Materials in the Context of Building Construction*, Bowyer, J., D. Briggs, B. Lippke, J. Perez-Garcia, J. Wilson, Consortium for Research on Renewable Industrial Materials, 2005

⁶ Embodied energy is the energy required to extract, process, manufacture, transport, construct and maintain a material or product.

⁷ Available from the Athena Sustainable Materials Institute, www.athenasmi.org