



Building
Green with
Wood

MODULE 1

Key Elements of Green Design

What is Green Design?

“Green building is the practice of increasing the efficiency with which buildings use resources - energy, water, and materials - while reducing building impacts on human health and the environment during the building’s lifecycle, through better siting, design, construction, operation, maintenance, and removal.”¹

The ultimate goal of a green design is to achieve true sustainability and open up new opportunities to design and build structures that use less energy, water and materials, and minimize impacts on human health and the environment.

Green design incorporates environmental considerations into every stage of a building’s life – from the earliest planning through site development, design, construction, operation and maintenance and, eventually, removal and reuse. It involves countless decisions about materials, systems and methods.

¹ Frej, Anne B., editor. *Green Office Buildings: A Practical Guide to Development*. Washington, D.C.: ULI–The Urban Land Institute, 2005. Pp 4-8.

Green design embodies a holistic, integrated and multidisciplinary approach in which every decision is evaluated against multiple criteria to find the best solution. As the understanding of green design

has increased in sophistication over the last two decades, the strategies adopted have evolved, and the quantitative performance of buildings has improved.



Basics of Sustainable Development

Green design fits within the overarching objective of global sustainable development, as defined by the 1992 World Commission on Environment and Development (the Brundtland commission):

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

To achieve this objective, it is necessary to practise environmental stewardship and manage renewable resources responsibly to meet the growing needs of the planet. Sometimes this means using less, and often it means choosing naturally renewable products that have a lighter carbon footprint and come from responsible and sustainable sources.

Also fundamental to sustainable development is the consideration and evaluation of all the impacts of buildings, whether economic, social or environmental.

- Planning
- Site development
- Design
- Construction
- Maintenance
- Removal and reuse

The Role of Green Design

Constructing and operating buildings has an immense environmental impact. Globally, buildings are responsible for 20 per cent of all water consumption, 25 to 40 per cent of all energy use, 30 to 40 per cent of greenhouse gas emissions and 30 to 40 per cent of solid water generation.²

The extraction and processing of materials for use in buildings is also a significant cause of environmental degradation, and these materials can be a major source of the environmental contaminants that contribute to health problems for building occupants.

Building professionals can reduce impacts on the environment and human health in key areas, including:

- **Site design:** Green design encourages the use of building sites that maximize passive solar heating and cooling, conserve natural resources such as trees and wildlife habitat, and minimize soil disturbance and erosion. Both location and design can encourage the use of alternate transportation methods such as transit, cycling and walking.
- **Water quality, conservation and efficiency:** Green design uses on-site mechanisms such as rainwater harvesting, water-conserving fixtures, waste water treatment and recycling, green roofs and controlled storm water discharge. This ensures water is used efficiently, and reduces the burden on municipal or other infrastructure to supply potable water, collect and discharge storm water, and treat and dispose of waste water.
- **Energy efficiency and renewable energy:** Green design addresses building massing and orientation, and may incorporate high levels of insulation, capture of heating and cooling energy from geothermal or other natural sources, renewable energy installations (such as photovoltaics, wind turbines or solar hot water heating systems), energy-efficient equipment and appliances, careful envelope design to harvest daylight, and the use of solar shading devices, daylight and occupancy sensors.
- **Conservation of materials and resources:** Green design considers the environmental impacts of materials and products across their entire life cycle. It gives preference to those with low environmental impact and embodied energy in their extraction or manufacture; that are self finished, non-toxic, multi-functional, durable, and easily salvaged and recycled at the end of a building's service life.
- **Indoor environmental quality:** Green design aims for high levels of natural ventilation and daylight in all occupied areas of the building. It also strives for high indoor air quality through construction protocols aimed at eliminating dust, airborne toxins and other contaminants, and through the specification of materials that contain no chemicals or compounds harmful to human health.

² United Nations Environment Programme, Sustainable Consumption and Production Branch. www.unep.fr/scp/bc/.



Pocono Environmental Education Center in Digmans Ferry, Pennsylvania, designed by Bohlin Cywinski Jackson, boasts many sustainable properties such as passive solar heating, natural ventilation methods, energy-efficient insulation, day-lighting, and the use of recycled and non-toxic materials for construction, including glue-laminated timbers.



Left and Cover Page:
*Ballard Library and
 Neighborhood Center,
 Seattle, Washington
 Architect: Bohlin Cywinski
 Jackson*

The library features building components selected for durability and their ability to be recycled or reused. The glulam roof structure was erected with bolted connections, allowing for easy disassembly. Connectors and timbers could easily be salvaged for future use. The wood and galvanized metal siding are fastened with screws, allowing for disassembly and reuse.

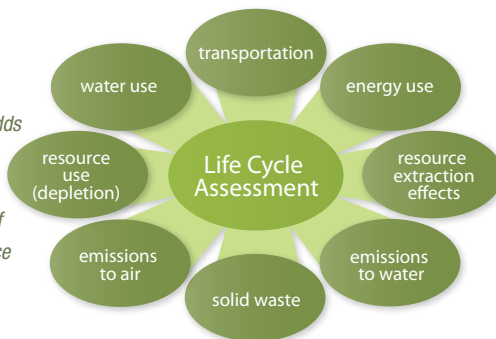
Life Cycle Assessment

Construction and design issues are complex, and the decision-making processes of green design are often hampered by a lack of hard data on the products, processes and materials under consideration.

The best way to understand the full environmental impact of any product is through life cycle assessment, which looks quantitatively at all environmental impacts, not just one single attribute, and provides an effective basis for comparing alternate designs. Module 2 has more information about life cycle assessment.

Understanding the full environmental impact

Life cycle assessment adds up all the environmental effects of decisions and processes over the life of a product – from resource extraction to disposal or reuse.



Green buildings

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