

The environmental
social and economic
impacts of building
environmental
sciences ...



Sustainable development is the most vibrant and powerful force to impact the building design and construction field in more than a decade. The green building movement in the U. S. originated from the need and desire for more energy efficient and environmentally friendly construction practices. Nowadays the Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. In this article I want to discuss the environmental and economic benefits of green buildings and whether they are financially viable.

The environmental, social and economic impacts of building

The construction and operation of buildings consume tremendous amounts of natural resources while producing wastes and pollutants that contribute to environmental damage and potentially compromise the health and productivity of building occupants. According to Department of Energy, there are more than 76 million residential buildings and nearly 5 million commercial buildings in the United States today. Collectively, these buildings consume: 37 percent of all energy used in the United States 68 percent of all electricity 12 percent of fresh water supplies and 88 percent of potable water supplies 40 percent of raw materials Collectively, these buildings generate: More than one-third of municipal solid waste streams 36 percent of total emissions of anthropogenic carbon dioxide (CO₂) emissions 46 percent of sulfur dioxide emissions (SO₂)—a precursor to acidic deposition—through the consumption of fossil-fuel-fired electricity 19 percent of nitrogen oxide emissions (NO_x), and 10 percent of fine particulate emissions[1]

What is a " Green" Building

Green building (also known as green construction or sustainable building) refers to a structure and using process that is environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition. This requires close cooperation of the design team, the architects, the engineers, and the client at all project stages. The green building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Design of green buildings often emphasizes taking advantage of renewable resources, e. g., using sunlight through passive solar, active solar, and photovoltaic techniques and using plants and trees through green roofs, rain gardens, and reduction of rainwater run-off. Many other techniques are used, such as using wood as a building material, or using packed gravel or permeable concrete instead of conventional concrete or asphalt to enhance replenishment of ground water. Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by: Efficiently using energy, water, and other resourcesProtecting occupant health and improving employee productivityReducing waste, pollution and environmental degradation[2]

Green Building Costs

The misconception that the costs of green design, construction, and certification are prohibitive stands as one of the greatest barriers to the

adoption of sustainable development. However, numerous studies and reports have demonstrated that though green buildings may incur initial increases (so called "green premium") beyond conventional construction costs, this premium is more than compensated for over the lifetime of the building in concrete financial returns such as savings in utility bills, increased property values and employee productivity gains. The City of Bloomington uses the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) rating system to assess the sustainability of its building projects. A July 2007 report by Davis Langdon, a construction consulting company, compared the costs of LEED seeking buildings to conventionally designed and constructed counterparts. Eighty-three LEED seeking buildings and 138 conventional buildings were chosen for the study a total of 221 academic, laboratory, library, and community center buildings, and health care facilities. The study showed that there is no significant difference in the average costs of LEED seeking and non-LEED seeking buildings. The same is true for library buildings and community centers.

[3]Cost inflation in green buildings is generally attributed to the design and modeling time necessary to incorporate sustainability features into pre-existing projects. Incorporating green design in mid-project can lead to "added costs, due to redesign and additional change orders." [4]The inclusion of green design from the outset or early stage of a project can help avoid higher costs. The investment of an additional 3% of project costs in the design phase can reduce construction costs by 10%. [5]The premium cost per-square-foot of LEED-certified buildings (the initial cost increase per-square-foot attributed to the inclusion of green features), is estimated at \$3 to \$5, an increase of just under 2% above traditional building costs. [6]

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The Pay-back Period of Green Buildings

Though the initial costs of building green may be higher than those of conventionally designed buildings, the savings generated in energy, water, maintenance, operations, and health costs offer quick investment returns, and ultimately revenues." The Costs and Financial Benefits of Green Buildings," report produced by the Massachusetts Technology Collaborative for the State of California Sustainable Building Task force presenting a definitive cost benefit analysis of green building based on a review of LEED-certified buildings, states:" While the environmental and human health benefits of green building have been widely recognized, this comprehensive report confirms that minimal increases in upfront costs of about 2% to support green design would, on average, result in life cycle savings of 20% of total construction costs -- more than ten times the initial investment. For example, an initial upfront investment of up to \$100, 000 to incorporate green building features into a \$5 million project would result in a savings of \$1 million in today's dollars over the life of the building."[7]