

## **A Brief Introduction To Sustainable Design And Its Governing Principles**

In the United States, commercial and residential buildings use

- 1/3 of our total energy (36%) and
- 2/3 of our electricity (65%)
- 1/8 of our potable water (12%) and
- 1/3 of our raw materials (30%)

In addition to consumption, buildings produce:

- 30% of greenhouse gas emissions
- 30% of our annual waste output

As we become increasingly aware of how our activities effect the environment, many people are turning to sustainable design to reduce the long term environmental and economic cost of buildings.

### **So what is sustainable design?**

Sustainable design is a **holistic approach** that encompasses the **design, construction, operation, renovation,** and eventual **replacement** of a building.

It is a **multi-phased, ongoing** process to minimize the negative effects of buildings on the environment.

In an effort to qualify and quantify the efficiency of sustainable design systems, the United States Green Building Council (USGBC) developed the Leadership in Energy and Environmental Design rating system for buildings, also known as LEED. Under LEED, new buildings and renovations are rated in 5 categories, accumulating points to earn base, silver, gold or platinum level certification. The five categories of LEED focus are:

1. sustainable sites
2. water efficiency
3. energy and atmosphere
4. materials and resources AND
5. indoor environmental quality.

In general, LEED site criteria encourages building sites that are situated in urban areas where public transit and robust utility infrastructures are already in place. Outside of urban areas, sustainable design practices emphasize the renovations of existing buildings or construction in "brownfield" locations and away from wetlands or farmland. Since site determination is frequently determined by criteria other than sustainability, many projects choose not to try for points in this area.

In addition to the location of the site, LEED may also award points for features that encourage alternative transportation, including bicycles and alternative fuel vehicles. A building also earns LEED credit for flat surfaces such as roofs and parking lots that offer good storm water management and minimize the effect of "heat islands" that create negative micro-climates.

Water consumption is a growing concern in the Northeast as continuing development and seasonal drought conditions diminish freshwater supplies. LEED encourages water efficiency by awarding credit for structures that consume less water through minimized irrigation systems, improved rainwater collection, low flow fixtures and the reuse of "gray water."

The energy efficiency of a building is actually the sum of many integrated systems, including lighting, heating and cooling. LEED encourages innovative design solutions which optimize energy efficiency such as improved insulation and windows, motion sensor and daylighting controls, as well as advanced Heating, Ventilation and Air Conditioning (HVAC) systems and renewable energy sources.

In the area of materials and resources, LEED promotes the incorporation of areas for collection and storage of recyclables, reuse of building systems and recycling of construction waste materials. LEED also rewards and the use of regionally extracted or manufactured materials and the use of certified wood.

Sustainable design is also concerned with the environment inside of a building. In order to improve the interior environment, LEED rewards buildings which provide low emitting materials, operable windows, controllable ventilation, heating and lighting as well as natural light sources.

**But what will all of these sustainable design features add to the overall cost of the building?**

The USGBC estimates that a well-planned sustainable design building may range from a 5 percent increase in total costs to potentially reducing project costs. A reduction in operating costs can offset increased construction costs and paybacks from some strategies can fund the cost of other elements.

For example, the overall improved energy efficiency of a building can downsize the cooling or heating equipment required. Pervious paving and other runoff prevention strategies can reduce the size and cost of more extensive site storm water management initiatives. And an aggressive and well-thought-out design can reduce energy consumption by as much as 50%.

But the improved efficiency of LEED qualified buildings are the result of an integrated design approach which considers all aspects of a buildings energy consumption and waste production. One inappropriate item (such as poorly chosen windows or insufficient insulation) can greatly reduce the effectiveness of the whole system. The choice of skilled design and building teams is critical to the success of green building. Some will argue that this reduces the number competitors for bid and therefore increases the price of a project, but as green building becomes more typical, this argument becomes less valid. Furthermore, by encouraging the market for green

buildings, towns will actually be encouraging more design/build professionals to become knowledgeable about green building.

Finally, LEED certification of a project can be costly and time consuming. LEED registration and certification fees may cost anywhere from a couple thousand dollars to over ten thousand dollars depending on the scope and size of the project. Frequently, projects will opt not to attempt LEED certification if certain project requirements or constraints make certification unlikely. However, even if LEED certification is not an objective, LEED guidelines and goals are worth pursuing.