

GREEN BUILDING TECHNIQUES

A Two-Minute Briefing on Key Business Environmental Issues

The Big Picture

Because traditional buildings consume large amounts of energy and other natural resources and can negatively impact the environment around them, there's a swelling interest in building and occupying more eco-sensitive structures. By integrating natural resource, human health, and community concerns into building design and construction, buildings can be cleaner, healthier for occupants and the environment, and deplete fewer resources.

Context

Commercial and residential buildings use one-third of all the energy consumed in the U.S., and two-thirds of all electricity. Buildings produce roughly a third of carbon dioxide emissions and other emissions that harm air quality. Additionally, buildings generate waste during construction and operation; can have poor indoor air quality, affecting worker health; and often don't consider the impact made on the community through increased transportation, sprawl, and cultural and historical impact. Green buildings address a wide range of topics, including:

- water conservation
- waste management
- renewable energy sources
- non-toxic materials
- recycled/reused materials
- energy efficiency
- the environmental impact on the building site
- the wise use of space/reduced building size
- the balance of environmental and economic considerations
- consideration for the cultural and historical factors of a site
- the site's proximity to transportation sources

Getting Down to Business

Some green building practices need to be part of a building from the ground up. Other practices fit nicely into renovation and building upgrades. The varying options mean that most any business can build green. Examples include:

- A **Lockheed Missile and Space** building in Sunnyvale, Calif. was designed to be energy efficient by using daylighting, sloped ceilings (which bring daylight deep into the building), an inner floor-to-ceiling atrium, and exterior "light shelves" on the outside of the south façade of the building, which reflect light onto the interior ceilings. Daylighting has saved Lockheed approximately 75% on its electric bill. The energy-efficient improvements added about \$2 million to the cost of the \$50 million building; energy savings are nearly \$500,000 per year, providing a four-year payback.
- The 540,000 square foot headquarters of the **International Netherlands Group** bank in Amsterdam integrates passive solar heating and ventilation, cogeneration and waste heat capture, daylit office space and interior cores, water-efficient landscaping and rainwater cisterns, and is close to a majority of employees' residences. Benefits realized include 92% reduction in primary energy compared to conventional building of similar size, employee absenteeism reduced by 15, and an estimated energy savings of \$2.9 million.
- **Café Flora**, in Seattle, Wash., recycled an existing on-site building to build its restaurant, using recycled paint and recycled concrete in the retaining wall and as a base course. The café also has window glazing that conserves energy, low-

toxicity paints and finishes, formaldehyde-free fiberboard, and a variety of other energy-efficient measures. The building uses 21% less energy than code requirements. Savings are achieved through heat recovery from the refrigeration system, special lighting installations, daylighting, efficient fans, and efficient space heating.

Key Players

- **Designers and architects** recognize a niche in green building and are quickly gaining expertise in the area.
- **Builders** also are becoming increasingly familiar green building issues, as more and more clients seek more environmentally responsible materials and request that builders conduct onsite recycling of construction and demolition debris.
- **Energy-efficient and environmental product retailers** are developing and selling products that are easier on the environment than traditional products. From low-toxic paints to recycled carpet, most building materials sell products through catalogs, online, and in select retail outlets. This briefing has links to several retailers; architects and builders may have other product source suggestions.

The Upside

- **Financial savings** resulting from energy-efficient and water-saving practices and wiser use of resources. Material costs can be lower if reusing materials. Waste disposal costs also may be lower, both during construction and operation.
- **Tax and other incentives** offered by cities, counties, and states for energy efficiency and green building.
- **Reduced environmental impact** from using fewer resources and producing less waste.
- **Improved worker productivity and health** from more efficient lighting, improved air, less-

toxic chemicals, and improved employee satisfaction and well-being.

- **Higher building value** from lower operating costs, reduced turnover, and increased property value.
- **Increased sales/customers** if the facility is a more pleasant place to shop or if customers choose to do business with an environmentally-conscious company.

Reality Check

Initial capital costs of green building can be higher than for traditional building. A short-term building occupant may not see any payback, as savings generally match the original investment in three to five years. The design and construction process can take longer than in traditional building as the participants become familiar with and implement green building practices.

Action Plan

There are hundreds of specific building techniques and products to integrate into a green building. The most important consideration is balancing economic input with environmental benefit.

Some general steps:

- Gather a multi-disciplinary project team
- Compose a vision statement, focus on goals. Establish a code that builders must follow (non-degradation of site, etc.)
- Set budget and schedule
- Research applicable laws, codes, and regulations governing renovation or building. Also research applicable incentives available for energy saving measures
- Assess building site characteristics (light, water/drainage/soil, air flow, and natural environment)
- Choose materials — investigate the cradle-to-

grave environmental performance of proposed materials.

- Construct with minimum impact and waste
- Have the building commissioned — assesses whether things perform as they should and looks for deficiencies in the building and its systems before and after occupation

Specific green building ideas:

- Choose a building site with access to natural light and shade
- Use daylighting, sloped ceilings, inner windows/atriums, and other passive solar techniques
- Install motion sensitive lights that automatically shut off and task lighting at each desk so individuals can control their own light
- Use native plants for landscaping
- Investigate the local watershed and where runoff/pollution from construction will flow
- Use recycled-content products
- Install energy efficient appliances
- Reduce dependence on air conditioning and heating systems by using natural light and shade as well as building features to store heat and cold
- Install recycling facilities in the building
- Reuse building components, fixtures, and furniture
- Utilize water-conservation practices, such as use of rainwater for irrigation
- Avoid building materials with volatile organic compounds
- Ensure an adequate fresh air supply
- Supply adequate acoustic control, such as white noise generators
- Consider how employees will travel to the site, availability of bike and bus routes
- Pay attention to the culture and history of the community as well as past uses of the building
- Research regulations that facilitate green design and financial incentives.

Leads

- **Center of Excellence for Sustainable Development**, Green Building section (<http://www.sustainable.doe.gov/buildings/gbintro.htm>) is a U.S. Department of Energy program that disseminates information and resources on green building. The Web site details codes and regulations, covers building programs, and provides case studies of successful green buildings. The site also contains the excellent publication Sustainable Building Technical Manual, full of action steps, resources, design suggestions, and additional contacts.
- **Advanced Buildings Technologies and Practices** is a building professional's guide to more than 90 environmentally-appropriate technologies and practices.
<http://www.advancedbuildings.org/>
advancedbuildings@enermodal.com
- **Oikos Green Building Source** (<http://www.oikos.com>) is an online directory of green building products.
- **Environmental Building News** (<http://www.buildinggreen.com>) provides articles, reviews, and news stories on energy-efficient, resource-efficient, and healthy building practices.
- **Center for Resourceful Building Technology** (<http://www.sustainable.doe.gov/buildings/gbintro.shtml>) disseminates resources on green building; also provides design consulting and building services. Its Guide to Resource Efficient Building Elements, a list of recycled and resource efficient building materials. The national directory is updated yearly and lists more than 400 building materials.

- **City of Austin Green Building Program** produces a sourcebook that details green building techniques and materials. <http://www.greenbuilder.com/sourcebook/>
- **U.S. Green Building Council** (110 Sutter St. Ste. 410 San Francisco, CA 94104 415-445-9500; 415-445-9911 (fax); info@usgbc.org; <http://www.usgbc.org>) provides information and services to members on green building and works to promote green building and advance new developments. The council's LEED Green Building Rating System is a voluntary, consensus-based, market-driven building rating system that evaluates environmental performance over a building's life-cycle.
- **American Institute of Architects** (1735 New York Ave. NW Washington, DC 20006; 202-626-7300; <http://www.aiaonline.com>) provides

information for architects on green design and building. Its Web site (<http://www.e-architect.com>) contains technical papers and resources, including the Environmental Resource Guide, offering information on the environmental performance of building materials and products and case studies of green building projects.

Bottom Line

Green buildings typically are healthy buildings, not just environmentally but healthfully. They also often are profitable buildings, boasting reduced energy and maintenance costs. However, constructing or renovating buildings in an environmentally responsible manner requires a great deal of planning, as well as educating and prodding architects and contractors to seek greener materials and construction techniques. While their resistance at times may seem formidable, many companies have worked successfully with construction professionals to reduce the impact of their buildings.