



Sustainable Solutions

The Impact of the Green Building Movement

Green – or sustainable – building practices help reduce overall energy use and create healthier and more efficient buildings

With rising energy costs, tightening budgets, increasing populations and diminishing resources, an increasing number of businesses are turning to green buildings. Green – or sustainable – building practices help to create healthier and more resource-efficient models of construction, renovation, operation, maintenance and demolition. Research and experience show that designing and operating buildings with lifecycle costs in mind provides significant environmental, economic and social benefits.

ENERGY AND OUR WORLD: PROBLEMS FACING FUTURE GENERATIONS

Global demand for energy has been growing at a rate far above our current production capacity. This differential has resulted in a diminished supply of spare resources and a spike in prices. The problem is not necessarily caused by a lack of resources, but a lack of cost-effective resources. We are nearing depletion of easily accessible oil, and, as a result, will be forced to turn to other, more expensive options. Some of these options include deep-sea drilling, production in areas of political unrest, extraction from tar sands and heavy oil, which is a type of crude oil that is challenging to produce. These options are far more costly to pursue and therefore contribute to energy price increases.

Another option is to turn to other types of fossil fuels: coal and natural gas. However, these alternatives have met with strong public opposition. Coal mining can have detrimental effects on the environment, specifically through methods such as mountain-top removal. Natural gas requires receiving terminals in our ports, which pose the risk of liquefied natural gas fireballs. However, even if we manage to shift our dependency to other fossil fuels, we will start to run out by the end of the century. As energy consumption continues to rise, it is imperative that we find a way to live without a reliance on fossil fuels to protect the planet's climate and preserve the fuels for future generations.

- The commercial office building industry in the U.S. spends approximately \$24 billion annually on energy costs.
- Energy represents the single largest controllable operating expense for office buildings, typically contributing as much as a third of a building's variable expenses.
- A 30% reduction in energy consumption, or \$7.2 billion, is readily achievable by improving building operation standards.

(Source: Green Building SmartMarket Report, 2006, McGraw Hill Construction)

BENEFITS OF GREEN

There are many reasons to build and operate your facilities in an energy-efficient manner. Following are some of the primary benefits that are frequently reported:

- Lower energy use
 - Often the number one motivation, reduced energy costs are a major benefit. Measuring, monitoring, and automating your building systems ensure equipment is only in use when it is needed and that all operations are at peak efficiency.
- Increased productivity
 - The working environment for your staff members can have a significant impact on their productivity. Green buildings offer better day lighting, outdoor views, and indoor air quality. A healthy work environment can help to attract new employees as well as contribute to reduced employee turnover.

- Due to the healthier environment provided by green buildings, you can anticipate less illness and therefore reduced absenteeism.
- Increased property value
 - By reducing a building's operating costs, the net operating income of that building is increased. According to the New Buildings Institute, increasing a building's net operating income increases the building's appraised value by ten times the annual cost savings. Property value may not be the highest priority for public entities' facilities, but they should bear in mind the impact that their property values have on the surrounding community.
- Reduced liability risk
 - Green buildings may reduce the risk of lawsuits over mold and other health issues. Through the use of moisture-control detailing, pollution-and-contamination-rejection strategies, and ventilation tactics, green buildings are healthier for occupants. Americans spend 85%-95% of their time indoors, so the quality of the indoor environment is extremely important.
- Enhanced comfort
 - Green buildings can reduce drafts, minimize floor-to-ceiling temperature stratification, and control noise. Furthermore, many green buildings enable tighter control of individual spaces/offices, thus meeting the diverse needs of occupants. Finally, individuals often benefit psychologically from knowing they have control over their workspace environment.
- Improved learning
 - Green building features such as day-lighting, noise control, and outdoor views increase learning rates. Recent studies have found positive correlation between these features and learning rates.
- Positive public image
 - Operating efficient buildings improves public image through positive media coverage, which can result in increased community support for your organization.
- Reduced demand on municipal services
 - Green buildings typically have lower energy and water usage, reducing both your cost as well as overall demand for these utilities. In areas where these services are at or near capacity, this can be a very significant benefit.
- Reduced erosion and storm water runoff
 - Construction may create significant negative local environmental impacts such as erosion and increased storm water runoff as a result of building more impervious surfaces. Site management, landscaping, and other features of green buildings can dramatically reduce these problems.

Green Makes Sense – Financially and Socially

- Lower Energy
- Increased Productivity
- Increased Property Value
- Reduced Liability
- Enhanced Comfort
- Improved Learning
- Positive Public Image
- Reduced Demand on Municipal Services
- Reduced Erosion
- Contributes to Community

- Creating “community”
 - Green development in your district may encourage other building owners to do the same. When implemented on a community-wide scale, green buildings can help return communities to people-focused neighborhoods. Setting an environmentally conscious example can help you gain support throughout your community.

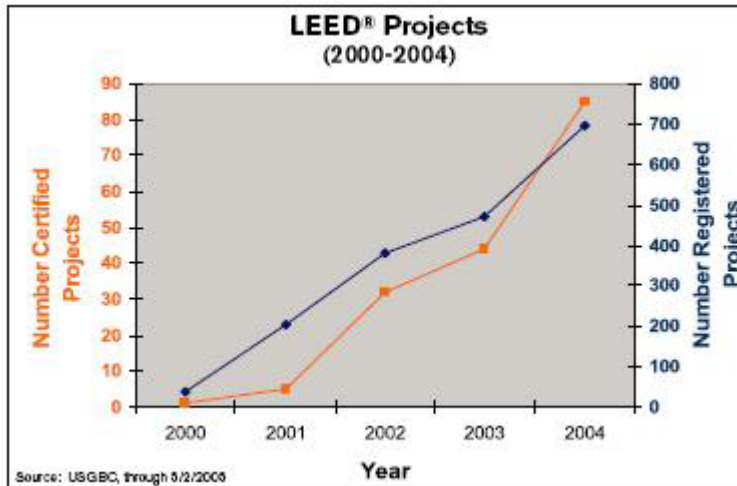
SEVEN SIMPLE WAYS TO REDUCE FACILITY OPERATING COSTS

- Replace fluorescent 40W—T12 lamps with 32W—T8 lamps and electronic ballasts.
 - Not only are T8 lamps with electronic ballasts more energy-efficient than the standard T12 lamps and ballasts, they also provide better quality lighting due to a higher color rendering index.
- Replace incandescent bulbs with energy-efficient compact fluorescent lamps.
 - Compact fluorescent lamps use approximately 1/3 to 1/4 of the wattage of incandescent bulbs while maintaining the same lighting levels. Furthermore, compact fluorescents have a lifetime of up to 10,000 hours compared with 1,000 hours for most incandescent bulbs.
- Replace incandescent or fluorescent exit sign lights with LEDs.
 - The law requires that exit signs run continuously. Light emitting diodes (LEDs) operate on about 2W compared with 40W incandescent bulbs and 10-15W fluorescent lamps.
- Use occupancy sensors in areas where lighting is typically left on when no one is there.
 - Occupancy sensors ensure that the lights are turned off when an area is not occupied. The energy savings from occupancy sensors depends on the total hours that the lights are normally on and the percentage of hours that they can be turned off.
- Install programmable thermostats.
 - Programmable thermostats can be used to schedule the use of your heating, ventilating, and air-conditioning (HVAC) equipment. They set up or set back temperatures when the facility is not being used. A reasonable and often-used estimate of savings is 1 percent savings for each degree of an eight-hour setback.
- As motors burn out, replace them with energy-efficient ones.
 - Standard motors use a lot of energy to operate and, by increasing efficiency just a few percentage points, you can save a significant amount of money in the course of a year, especially if the motor operates for long durations of time.
- Instead of rewinding existing motors, replace them with energy-efficient ones.
 - Rewinding motors can lower efficiency and increase operating costs. They also may not last as long as newer motors. Therefore, when the motor is less than 25 hp, it is generally better to replace the motor with a high-efficiency equivalent rather than rewind it.

OVERVIEW OF WORLDWIDE ENVIRONMENTAL AGENCIES AND CERTIFICATIONS

THE U.S. GREEN BUILDING COUNCIL

The U.S. Green Building Council is a national, non-profit organization that works to “promote the design and construction of buildings that are environmentally responsible, profitable and healthy places to live and work” (USGBC Mission Statement). The USGBC created the Leadership in Energy & Environmental Design® (LEED) Green Building Rating System. LEED was fashioned to provide a standard of measurement for defining a “green” building. It takes a whole-building



approach that encourages and guides a collaborative, integrated design and construction process. The program evaluates and recognizes performance of your buildings in accepted green design categories—Energy & Atmosphere, Water Efficiency, Materials & Resources, Indoor Environmental Quality and Sustainable Sites.

Buildings are given a certification rating based on the number of points they receive in their evaluation. The four levels of

LEED certification include: Certified Level, Silver Level, Gold Level, and Platinum Level. By becoming certified, building owners are given third-party validation of their contribution to the environment; qualify for various state and local government incentives; contribute to the growing knowledge base; receive a LEED certification plaque and official certificate; and receive marketing exposure through the USGBC website, case studies, and media announcements. LEED certification is a great way to show your community the steps you are taking to conserve energy and preserve our natural resources.

www.usgbc.org

ENERGY STAR PROGRAM

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.

Results are already adding up. Americans, with the help of ENERGY STAR, saved enough energy in 2005 alone to avoid greenhouse gas emissions equivalent to those from 23 million cars — all the while saving \$12 billion on their utility bills.

Because a strategic approach to energy management can produce twice the savings — for the bottom line and the environment — as typical approaches, the EPA's ENERGY STAR partnership offers a proven energy management strategy that helps in measuring current energy performance, setting goals, tracking savings, and rewarding improvements.

The EPA provides an innovative energy performance rating system which businesses have already used for more than 26,000 buildings across the country. The EPA also recognizes top performing buildings with the ENERGY STAR.

www.energystar.gov

BREEAM Assessment Areas

- *Management*: overall management policy, commissioning site management and procedural issues
- *Energy use*: operational energy and carbon dioxide (CO2) issues
- *Health and well-being*: indoor and external issues affecting health and well-being
- *Pollution*: air and water pollution issues
- *Transport*: transport-related CO2 and location-related factors
- *Land use*: greenfield and brownfield sites
- *Ecology*: ecological value of conservation and site enhancement
- *Materials*: environmental impact of building materials, including life-cycle impacts
- *Water*: consumption and water efficiency

BUILDING RESEARCH ESTABLISHMENT, LTD.

Created by Building Research Establishment Ltd. in the United Kingdom, the Building Research Establishment Environmental Assessment Method (BREEAM) provides a methodology to assess office, home, industrial, retail and school buildings. Criteria is divided into nine performance areas; management, energy use, pollution, health, transport, land use, ecology, materials and water. BREEAM provides four ratings, from "Pass" to "Excellent."

www.breeam.org

JAPAN SUSTAINABLE BUILDING CONSORTIUM

The Japan Sustainable Building Consortium provides the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE). Started in 2002, the program focuses on four categories: energy efficiency, resource efficiency, local environment and indoor environment. It calculates Building

Environmental Efficiency (BEE) by dividing building environmental quality and performance by building loadings and grants five ratings, C, B, B+, A and S (excellent). Areas of evaluation are pre-design, new construction, existing building and renovation.

www.ibec.or.jp/casbee/english

GREEN BUILDING COUNCIL AUSTRALIA

Launched in 2003 by the Green Building Council Australia, the Green Star rating scale is based on six stars, with a rating of four through six providing official certification. The program includes rating tools for office design, office as-builts, office interiors and a pilot tool for office assets. There are nine categories including, management, indoor environment quality, energy, transport, water, materials, land use, site selection and ecology, emissions and innovation.

www.gbcaus.org

Green Star Projects

Green Star Projects = 17

6 Star Green Star Projects = 2

Ratings in Process = 64

PARTNERING FOR A SOLUTION

Many firms are committed to energy efficiency and sustainable building design and operations, but find the regulations to be complex, the technology complicated and implementation costly. One of the most effective solutions is to work with a company that has the expertise to assess your needs and help you create an overall plan. However, even locating the right company to work may seem overwhelming as you will find multiple options available.

There are many options, including energy consulting firms, Energy Services Companies (ESCOs), building automation providers, system integrators, etc.

As you assess potential candidates, you may want to use the following criteria as a starting point to help you evaluate their capabilities:

- Proven **track-record of results** available through customer references.
- Qualified staff with **experience within your industry** ensures that your provider will easily grasp your business needs and align strategies accordingly.
- Expertise with a **variety of energy and green strategies**, including the ability to provide **Performance Contracting** or other ESCO services.
- **Comprehensive products portfolio** that will ensure you receive a solution that best meets your needs, not just the only one in the provider's portfolio.
- A tangible **commitment to open technologies** that will protect your capital investment.
- Demonstrated **integration expertise**, required to implement overall building measurement, monitoring and reporting requirements.

ABOUT TAC

TAC is a leading expert in energy services, with customers in 75 countries and more than 500 offices around the world. As a company of Schneider-Electric, TAC brings the resources of a \$14 billion parent company with 92,000 employees to help meet the requirements energy and control needs. To learn more about how TAC can help you achieve your business goals and apply green building strategies, visit www.tac.com.

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