

CREATING SUSTAINABLE COMMUNITIES

A GUIDE FOR DEVELOPERS AND COMMUNITIES

ENERGY-EFFICIENT BUILDING DESIGN

On an annual basis, buildings in the United States consume 42% of America's energy and 68% of its electricity; 20% of that energy use occurs during construction while the other 80% is used during building operation. Furthermore, buildings generate 35% of the carbon dioxide (the primary greenhouse gas associated with climate change), 49% of the sulfur dioxide, and 25% of the nitrogen oxides found in the air. Currently, the vast majority of this energy is produced from nonrenewable, fossil fuel resources. With America's concerns for energy supply security increasing (both for general supply and specific needs of facilities), and the impact of greenhouse gases on world climate rising, it is essential to find ways to reduce load, increase efficiency, and utilize renewable fuel resources.

Energy efficient building design identifies and implements opportunities to reduce energy consumption in the building's operation and maintenance. When considering the "green" attributes of a potential investment property, energy efficiency should come first—it should provide the cornerstone of a property's green rating and be of paramount consideration to any investor undertaking a green real estate purchase or development. Energy efficiency is important not only because of the environmental concerns surrounding energy use, but because among all potential environmental facets of a green building it provides by far the most economic return. Cash flow and profitability resulting from building green are largely derived through energy savings. When considered over a building's 40-50 year lifespan, the energy-related environmental impacts of a building's operations dwarf the impact of energy and fossil fuels consumed during its construction.

The design and construction of an energy-efficient building (meeting the various considerations builders and developers face) pose a significant challenge. But, any building can be built with minimum energy requirements for heating and cooling while remaining comfortable and healthy. A variety of design options are available but common to all are the following features: a high R-value, tightly sealed thermal envelope, controlled ventilation; and lower cooling and heating expenses. With improvements in building and construction technology and materials, most modern energy saving ideas could be seamlessly incorporated into any type of building design without loss in health, comfort or aesthetic qualities. Energy-efficient designs need not be extremely expensive.

Many energy-efficiency measures do not require additional first costs. Those measures that do result in higher first costs often create savings realized from lower energy use over the building lifetime, downsized equipment, reduced mechanical space needs, and utility rebates. Payback periods for many off-the-shelf energy efficiency measures are generally short.

With energy-efficient designs, builders can differentiate themselves from their competitors in terms of such benefits as excellent comfort level and reduced costs of operation. These attributes contribute directly to raising real-estate market value.

APPLICABLE NEW JERSEY GOAL

Reduce projected energy use by 20% by 2020 (NJ Energy Master Plan).

Stabilize GHG emissions at 1990 levels by 2020/ Reduce emissions to 80% below 2006 levels by 2050 (E.O. 54; Global Warming Response Act, P.L. 2007, c.112).



SUGGESTED ACTIONS AND STRATEGIES

An effective way to design for energy efficiency is to set an energy target derived from actual building performance data and let that target inform modeling exercises and design choices. Furthermore, the ways in which a building is operated are often greater determinants of energy efficiency. If a building's energy-efficient design relies on operating procedures that are not followed by its operators, the design intent is lost.

Questions to ask about energy performance in buildings¹:

- *If investing in an existing building: Is the building among the most energy efficient in the country?*
- *If investing in a new construction project: Has an energy target been established?*

Energy efficiency goals should be set based on comparisons to actual building energy use. (See: EPA's Target Finder tool for an easy way to develop an energy use target tailored to a specific design project — www.energystar.gov/index.cfm?c=new_bldg_design.bus_target_finder)

- *If investing in a green certified building: What method or system was used to certify the building? Did it earn points for energy efficiency?*

Because of the flexibility of most green building rating systems, a building with poor energy efficiency can be certified as green. Since energy-related points may not be required by a particular green rating system, it is important to evaluate how the property was rated on energy. Additionally, since green recognition is often given to a building prior to it being fully occupied and commissioned, it is important to determine if the fully-commissioned building has achieved its intended efficiency.

- *Are there proper investments in the building envelope, mechanical systems, lighting, and controls systems?*

Energy-efficient buildings have efficient components and systems that are properly designed and sized and are actively managed once occupied. It is important to make sure that these investments are not sacrificed in the name of green design or value engineering.

- *What is the commissioning strategy for the building?*

Commissioning is the process by which the operating systems of a building are tested and adjusted prior to occupancy. Specifying and installing the latest energy saving technologies may make little impact unless these technologies are properly commissioned along with other building systems. New technologies often require more attention during commissioning. Be sure that the project budget includes proper funding for commissioning.

¹ See "Green Buildings and Energy Efficiency: Diligence Pays" (www.energystar.gov/ia/business/guidelines/assess_value/off_the_charts_summer_2006.pdf)



Key Players

- *Energy service companies* provide service packages that typically include financing, installation, and maintenance of energy-saving capital improvements. Services are provided through performance contracts, which guarantee that payments will not exceed energy savings.
- *Suppliers of energy-efficient equipment and services* offer a wide range of options to exchange energy-intensive equipment with more efficient analogs. Many have products certified through a third-party program, such as the U.S. Environmental Protection Agency's Energy Star® label.
- *Utility companies* may work with industrial and commercial consumers to implement on-site energy-efficiency measures, which may decrease usage or shift a portion of it to off-peak hours and rates. The restructuring of the utility industry in many states including NJ allows energy users to choose service providers; many utilities entering the deregulated market offer energy from alternative, renewable sources such as wind, geothermal, and solar.

STATE TECHNICAL/FINANCIAL ASSISTANCE

The NJ Clean Energy Program's (CEP) Energy Star Homes provides incentives to builders/developers to build new homes above minimum energy code to the higher Energy Star level. Program targets Smart Growth areas. Visit www.njcleanenergy.com for details.

NJ Smart Builders Program (a CEP program) - www.njsmartstartbuildings.com/

NJHMFA's Green Homes Office [Improving the environmental performance, energy efficiency, health and durability of housing in New Jersey through a combination of advocacy, education, coordination, technical assistance and program development], Mary Uschak, NJHMFA, 609.278.7408, muschak@njhmfa.state.nj.us

FURTHER INFORMATION

Energy Star — 1200 Pennsylvania Ave. NW Mail Code 6202J, Washington, DC 20460; 888-782-7937
An energy-efficiency and environmental-performance program offered through the U.S. Environmental Protection Agency. Companies agree to a series of industry-specific action plans to improve energy efficiency and receive technical assistance, financial information, and public recognition.

Energy and Environmental Building Association, "Builder Guide" www.eeba.org

NJ Department of Community Affairs, Energy Codes - www.state.nj.us/dca/codes/energycodes/index.shtml

National Renewable Energy Laboratory (NREL) "Energy -10" software/training manual - www.sbicouncil.org

Rebuild America (a program of USDOE's Renewable Energy and Energy Efficiency Program)
www.eere.energy.gov/buildings/program_areas/rebuild.html

Center for Energy Efficiency & Renewable Technologies -
www.greenerbuildings.com/organization_detail.cfm?LinkAdvID=5367

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