ENERGY STAR

BY PETER D'ANTONIO
PE, CEM, LEED ACCREDITED PROFESSIONAL

ENVIRONMENTAL INITIATIVES SHIFT THINKING ABOUT ENERGY AND RESOURCE CONSUMPTION AND INDOOR ENVIRONMENTAL QUALITY IN BUILDINGS

Above: ENERGY STAR labeled Zach Elementary in Fort Collins, Colo., is a showcase for many innovative energy-efficiency features including daylighting design and controls, super insulation, CO_2 sensors for ventilation, and thermal ice storage. The design process included commissioning from the beginning.

Far Right: Twin Peaks Charter Academy (TPCA) in Longmont, Colo., is a 66,000-square-foot school constructed in 1925 that has earned the ENERGY STAR building label. St. Vrain Valley Schools partnered with PCD Engineering Services, Inc., an ENERGY STAR Partner, to provide the indoor environment assessment of TPCA. The academy features a digital control system and benefits from a highly effective, district-wide, energy management program. Recent HVAC system upgrades include new, high-efficiency units and improved ventilation.

In recent years several energy and environmental initiatives have come into focus and are helping set in motion a shift in thinking about energy and resource consumption and indoor environmental quality in buildings. ENERGY STAR is one prominent initiative that targets energy use and promotes energy efficiency in commercial buildings.

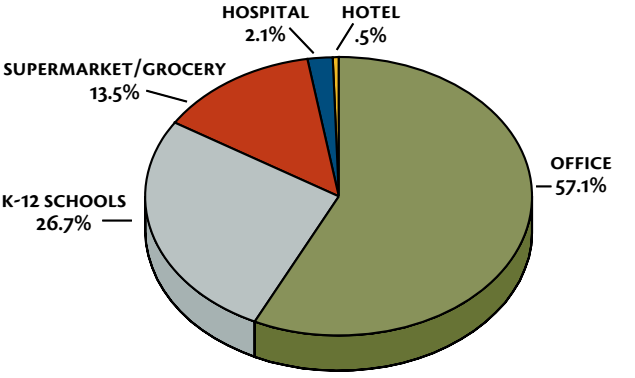
ENERGY STAR is perhaps the best-known national energy and environmental initiative. It is estimated approximately 40 percent of the American public recognize the symbol. The U.S. Environmental Protection Agency describes it as a voluntary partnership between organizations, businesses, consumers and government, united with the goal of protecting our environment by changing to energy-efficient products and practices. ENERGY STAR was introduced by the EPA in 1992 as a voluntary labeling program designed to identify and promote energy-efficient computers. ENERGY STAR has since expanded to cover new homes, most of the buildings sector, and 35 product categories including residential heating and cooling equipment, major appliances, office equipment, lighting and consumer electronics. Since the program's inception, Americans have purchased more than 1 billion ENERGY STAR qualified products, according to the EPA's August 2003 report. More than 100,000 families live in new homes that have earned the ENERGY STAR.

The ENERGY STAR Label for Buildings, making its debut in 1999, is a set of performance standards that evaluates energy efficiency and conformance to current industry standards for energy efficiency and indoor environment. These standards cover temperature and humidity, illumina-

ENERGY STAR IN LEED

THE U.S. GREEN BUILDING COUNCIL'S LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) GREEN BUILDING RATING SYSTEM HAS RECOGNIZED THE IMPORTANCE OF ENERGY STAR BY INCORPORATING ELEMENTS OF ENERGY STAR INTO ITS RATING SYSTEMS. COMPLIANCE WITH EPA RULES AND REGULATIONS IS REQUIRED TO SATISFY ONE LEED PREREQUISITE AND ACHIEVE FIVE LEED CREDITS IN THE SUSTAINABLE SITES AND INDOOR ENVIRONMENTAL QUALITY CATEGORIES. ENERGY STAR INVOLVEMENT IN LEED IS LIMITED TO THE OPTION OF USING ENERGY STAR LABELED ROOFING PRODUCTS UNDER LEED SUSTAINABLE SITES CREDIT 7.2, EXTERIOR DESIGN TO REDUCE HEAT ISLANDS. THE ENERGY STAR LABEL FOR BUILDINGS IS INCORPORATED INTO LEED-EB (FOR EXISTING BUILDINGS) SCORING SYSTEM AS AN OPTION FOR SATISFYING LEED ENERGY AND ATMOSPHERE CREDIT 1, OPTIMIZE ENERGY PERFORMANCE.

FIGURE 1



tion, outside air ventilation and control of indoor air pollutants. ENERGY STAR is performance based using the benchmarking technique of statistical analysis that compares energy use intensities of buildings against the Energy Information Administration's "1999 Commercial Buildings Energy Consumption Survey" data set.

Roughly 20,000 existing buildings across the nation have been "benchmarked" using the EPA's web-based tool called Portfolio Manager. Benchmarking involves entering energy and operational data for each building or site in Portfolio Manager. The Energy Star Label is awarded to buildings that earn a score of at least 75 out of 100 (on a scale of 0-100), and are outstanding buildings that sustain a healthy, productive indoor environment. To-date, roughly 1,400 buildings have earned the award. A break-down of awards by building market sector is presented in Figure 1. Buildings that have earned the award are nearly 40 percent more energy efficient than average buildings.

STRATEGIES FOR SUCCESS

There is no single path to ENERGY STAR certification, but results from a 2001 EPA study indicate some common characteristics of ENERGY STAR buildings. These are a combination of energy efficient technologies and sound operating practices. Of the first 729 buildings achieving ENERGY STAR certification, 85 percent utilize an energy management control system and 50 percent use motion sensors for lighting systems. A whopping 99 percent perform regular operations and maintenance. A strong organizational commitment to energy efficiency is also a hallmark of ENERGY STAR buildings.

EPA estimates the potential savings from an integrated approach to energy-efficient upgrades can be 35 percent or greater. Use the ENERGY STAR benchmarking tool to track the success of facility improvements, energy management programs, and preventative maintenance programs over time.

EPA has expanded its experience in energy performance for existing buildings to the new buildings arena. ENERGY STAR provides guidance for design teams and building owners on new building design strategies to enhance energy performance. The New Building Design Guidance initiative is Web-based and consists of a series of recommended actions at each stage of the design process. The recommendations focus attention on energy issues and encourage an integrated design approach. The process starts with setting goals and ends with achieving the ENERGY STAR label for a building. It also addresses all design phases from pre-design to construction and bid documents. Energy performance is the driving element in the discussion at each phase. It will help you identify or ask the question, "How will this design decision effect the energy performance of the building?"

Target Finder, a Web-based energy performance calculator, is an ENERGY STAR tool that helps set an energy use target early in the new building design process. You can also measure your progress along the way by comparing your simulated energy consumption to your target. The benefit is that energy strategies are incorporated as an integral part of the design and can be compared to industry benchmarks to monitor progress toward reaching your energy performance goals.

PCD Engineering Services has helped certify nearly 10 percent of the nation's K-12 schools earning the award to-date. Our work has proven you don't have to have state-of-the-art efficient systems to have an energy-efficient building as defined by ENERGY STAR. A sound energy management program incorporating an effective energy education program goes a long way in reducing and managing operating expenses. A preventative maintenance program is also a valuable tool in maintaining peak operating performance and efficiency, advancing building air quality and thermal comfort, and reducing maintenance expenditures. It is also important to note a sustainable or green building as defined by the Leadership in Energy and Environmental Design (LEED) Rating System (see sidebar) will not necessarily be a very high-performer with regards to energy-efficiency, and may not even qualify as an ENERGY STAR building. An owner must consciously choose to define energy efficiency as a goal if it is to be realized in a building and it's a duty of the design community to communicate the opportunity and benefits of implementing energy-efficient designs and practices to our customers.

COSTS

General costs associated with applying for the ENERGY STAR Label for Buildings are estimated at 1/2 to 1 cent per square foot including the cost of preparing and submitting the application and cost to hire a professional engineer. The professional is needed to verify the facility meets indoor environmental standards. Cost benefits associated with pursuing energy and environmental efficiency are also important considerations. EPA estimates every dollar invested in an energy-efficient upgrade can produce between $2 and $3 in increased asset value, which can make commercial properties more

FIGURE 2

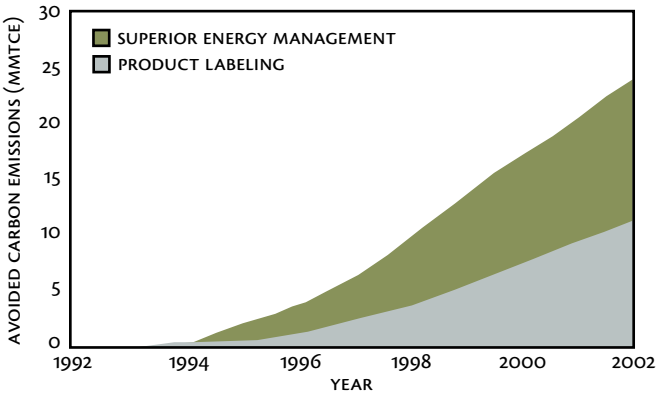
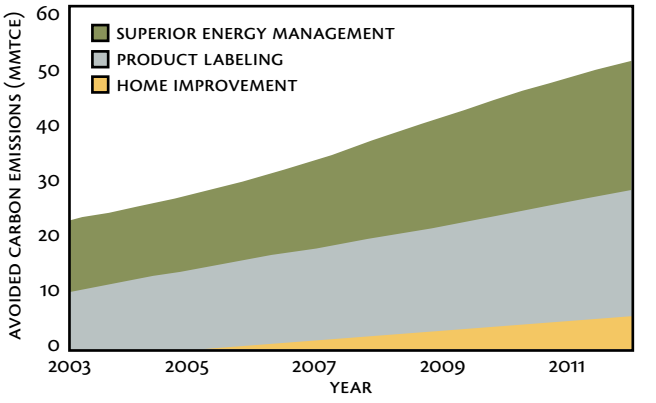


FIGURE 3



attractive to buyers and lenders. The New Building's Institute points out that while it is often economical to retrofit buildings for greater energy efficiency, it is always cheaper to make them more efficient at the time they are designed and constructed. Buildings are long-lived, so built-in energy efficiencies can remain for a lifetime in many cases.

In 2002 the EPA estimates that Americans, with the help of the ENERGY STAR program, saved more than 100 billion kWh of electricity, prevented more than 20 million metric tons of carbon equivalents of greenhouse gas emissions (the emissions equivalent to those from more than 14 million automobiles), and saved more than $7 billion. Roughly half of these benefits are the result of people using ENERGY STAR qualifying products in their homes or at work, and the other half from organizations adopting superior energy management practices across the commercial and industrial sectors (see figure 2). In its second decade, EPA projects these benefits to more than double (see figure 3). ENERGY STAR will continue its design to overcome many of the market barriers to the adoption of cost-effective energy efficiency products and services in a sustained manner and to help unleash the attendant savings for individuals and organizations. Funding will continue to be used to provide businesses and consumers with information and tools that break down major market barriers and alter decision making for the long term. This approach, which helps direct private capital toward energy efficiency investments, provides a large environmental and economic payback for the government investment.

Peter D'Antonio is the founding president of PCD Engineering Services, Inc. headquartered in Longmont, Colo. PCD Engineering Services, Inc. is a leading provider of sustainable mechanical/electrical design, energy management, and integrated building system solutions (www.pcdengineering.com). PCD Engineering is an award winning, Energy Star service provider. D'Antonio has been an innovator in energy and environmentally efficient design and construction since 1989. He holds a B.S. degree in civil engineering from the University of Maryland and a M.S. degree in civil engineering from the University of Colorado. He is a registered professional engineer, LEED Accredited Professional, and certified energy manager. Contact him at peter@pcdengineering.com.