



## Building Technologies Program

# Better Buildings, Brighter Future



### Innovative Building Technologies and Practices Save Energy and Money

**M**ore energy is used in buildings than in any other sector of the U.S. economy. Buildings are responsible for over 70% of all electricity demand and over 50% of all natural gas demand. By investing in energy-efficient technologies and practices, building owners, developers, and operators not only realize significant cost savings, but also the benefits of more comfortable, productive, and marketable homes and buildings.

Roughly 15 million new buildings are projected to be built by 2015. This new construction represents a tremendous opportunity to transform how we design, build, and operate new buildings. The U.S. Department of Energy's Building Technologies Program is working to lead this transformation, improving the energy efficiency of our nation's buildings through innovative new technologies and systems engineered building practices, and providing the foundation for application of renewable technologies.

In partnership with states, the building industry, and manufacturers of materials, equipment, and appliances, the Program:

- Advances the research and development of energy-efficient building technologies and practices

- Works with state and local regulatory groups and others to improve building codes, appliance and equipment standards, and guidelines for efficient energy use
- Promotes market transformation by educating homeowners, builders, and developers about the significant returns they can achieve by adopting energy-efficient technologies and practices

### Expanding the Possibilities

The Building Technologies Program (BTP) invests in a portfolio of activities to advance cutting-edge technologies. Innovations in energy-efficient "whole building" design, including daylighting, and in building envelope and window technology, heating and cooling equipment, appliances and lights—combined with advances in renewable energy technology—have the potential to dramatically transform today's buildings. These technologies, when coupled with a whole building approach that optimizes building systems and components, will enable our buildings to use considerably less energy.

For example, improvements in the building envelope reduce heat loss and gain. A reduced heating and cooling load means that the climate control system can be smaller, providing equivalent comfort and

air quality. Smart sensors and controls further maximize savings, turning off lights or adjusting the thermostat in unoccupied spaces. Smaller electrical loads enable renewable applications, such as photovoltaic systems, to be smaller and more cost-effective.

Around the country high performance buildings like the Pennsylvania Department of Environmental Protection's Cambria Office Building and the BigHorn Home Improvement Center in Colorado demonstrate the energy and environmental benefits of advanced building technologies. Homes utilizing best practices from BTP's Building America research program incorporate energy and material-saving technologies and building practices to use 30 percent less energy than comparable homes.

### The Promise of Zero Energy Buildings

Ultimately, DOE R&D investments target a bold goal: net-zero energy buildings by 2025. These buildings will be 60 to 70 percent more efficient than current practice in their energy use, and will utilize renewable energy to meet their remaining energy requirements. BTP supports research in technology integration and other enabling technologies needed to achieve this goal at little cost to the consumer.

## Raising the Bar

Buildings research also lays the groundwork for improved building codes and appliance and equipment standards. The Program works with regulatory groups, product manufacturers, utilities, and other stakeholders to develop test procedures and minimum efficiency standards for residential appliances and commercial equipment. Standards already in place for residential products are expected to save consumers nearly \$93 billion by 2020, and enough energy to operate all U.S. homes for approximately two years.

BTP also supports the development of technical criteria for appliances, lighting, windows, and doors to qualify for ENERGY STAR® status, and then works with manufacturers, retailers, and utilities to promote the manufacture and use of ENERGY STAR products.

In addition, BTP works with national code organizations, state and local jurisdictions, and the building industry to upgrade model energy codes, based on research and emerging technologies. It provides technical and financial assistance to state and local jurisdictions to adopt these model codes, and implement and enforce them to provide a cost-effective baseline for new buildings. Since 1991, the program has produced energy cost savings exceeding \$4.7 billion.

## Promoting Widespread Use

To maximize energy savings and return on DOE R&D investments, BTP works to increase awareness of the energy, economic, and environmental benefits of using efficient building technologies and practices. The Program partners with state, industry, and energy partners on a variety of outreach activities, including:

- **Dissemination of residential building research results, resources, and tools.** Through building industry and university partners, the Program works to educate builders, contractors, and building trades about the benefits of new technologies and techniques. Resources like the Building America Best Practices Guidelines offer climate-specific guidance for building energy-efficient new homes.

- **Education through states, universities, retailers, and others.** In the Gulf Coast region, the Program is working to encourage cost-effective, durable, and efficient building reconstruction. Training workshops for building professionals share information on disaster-resistant, energy-efficient building technologies and practices. For “do-it-yourself” homeowners, DOE, the U.S. Department of Housing and Urban Development (HUD) and The Home Depot are partnering to offer training sessions in Louisiana, Mississippi, and Alabama.
- **Collaboration with ENERGY STAR partners to promote the manufacture and use of ENERGY STAR products.** The ENERGY STAR label helps businesses and consumers easily identify highly efficient products, homes, and buildings that save energy and money. Home Performance with ENERGY STAR, an energy-efficient whole-house retrofit program, helps homeowners improve the comfort and efficiency of their homes through energy audits.
- **Development of building energy software and simulation tools** allows commercial building designers to model the savings potential of various energy options. Since 2001, more than 38,000 copies of DOE’s Energy Plus software have been downloaded.
- **Technical assistance services for existing commercial buildings.** DOE provides technical and institutional assistance to facilitate major energy efficiency or renewable energy improvements.
- **Support of design competitions** such as Lighting for Tomorrow promotes greater awareness of new technologies and their range of applications. BTP also proudly supports the DOE Solar Decathlon organized by the Solar Technologies Program.

## Benefits for Our Homes, Our Businesses, and Our Nation

Energy-efficient buildings use less energy, cost less to operate, and improve comfort, saving money for homeowners and businesses alike. They help the environment by decreasing the need for new power generation and reducing harmful emissions, and they increase our energy security. The Building Technologies Program invests in innovative technologies and practices to create better buildings and a brighter future.



## A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy’s Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



U.S. Department of Energy

## Energy Efficiency and Renewable Energy

Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

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