

## DOE Building Technologies

### *Helping American Families and Businesses Save Energy*



One of the Department of Energy's (DOE's) least well known offices may yield the greatest energy benefits. The Building Technologies Office (BTO) in DOE's Office of Energy Efficiency and Renewable Energy has helped slash energy waste in homes and commercial buildings in the United States, benefitting consumers, workers, and businesses.

#### SAVES CONSUMERS MONEY

The average American family **saves almost \$500 each year** because home appliances, equipment, and lighting have become more efficient, due in large part to BTO research, education, and policies. New homes and new commercial buildings save another 30% on heating and cooling bills because of better windows, insulation, and sealing.

BTO helps run ENERGY STAR®, the most successful voluntary energy efficiency program in the world. ENERGY STAR helps consumers and businesses **save over \$30 billion each year** by marking energy-saving products, homes, and commercial buildings. BTO has also developed the Home Energy Score, a tool to score the efficiency of existing homes and show how they can save.

#### CREATES JOBS

Home energy upgrades under Home Performance with ENERGY STAR create local work in construction, HVAC installation, and energy evaluation. The upgrades create additional jobs making insulation and windows, almost always in the United States, as well as making appliances and heating and cooling systems. And the over 500,000 upgrades to date are still creating jobs as homeowners spend the money they save in lower energy bills.

This is an example of why there are **2.2 million full- and part-time jobs** related to energy efficiency in buildings in every state of the country, more than in electric generation from all fuels combined.

#### FOSTERS INNOVATION

The buildings industry is fractured, with about 50,000 home builders alone, keeping investment in efficiency research low. Thus BTO and the national labs it supports have been critical to developing new energy efficiency technologies. Just three early BTO research projects, on electronic ballasts for fluorescent lamps, low-e glass for windows, and advanced

compressors for refrigerators, resulted in **over \$30 billion in energy savings** at a total program cost of \$12 million.

More recently Building America has worked with teams of builders to find cost-effective ways of achieving 30% and then 50% savings in new homes in different climate regions. It recently adopted a new goal of 60% savings by 2020.

### **MAKES BUSINESSES MORE COMPETITIVE**

BTO partners with and helps both businesses that manufacture and businesses that use efficiency technologies. Initiatives including the Advanced RTU Campaign for commercial air conditioners and the Interior Lighting Campaign for commercial lighting have spurred new, more efficient products and helped building owners save millions of dollars. BTO recently helped develop and commercialize a refrigerant for supermarket display cases that saves energy without using hydrofluorocarbons (HFCs), and has done independent testing of other refrigerants.

BTO is also making efficiency information more available to businesses. Through a recent partnership with BTO, CoStar will include energy performance information in its commercial real estate listings. And BTO is helping over 300 building owners and managers **save over \$1 billion a year** by meeting an energy efficiency challenge to reduce energy use 20% over 10 years.

### **HELPS STATES AND LOCAL GOVERNMENTS**

BTO provides tools that help state and local governments manage building energy use to help them provide reliable and cost-effective energy to all their citizens. ResCHECK and ComCHECK make it easier for builders to show their homes and buildings meet state and local energy codes and to use the codes' flexibility. The Building Performance Database helps local governments manage the energy data from local buildings.

### **NOTES**

Saves almost \$500 each year: <https://appliance-standards.org/document/white-paper-overview>

ENERGY STAR...save over \$30 billion: <https://www.energystar.gov/buildings/about-us/facts-and-stats>

2.2 million... jobs: <https://energy.gov/downloads/2017-us-energy-and-employment-report>

Over \$30 billion in energy savings: <https://www.nap.edu/read/10165/chapter/1>

Save over \$1 billion a year: <https://betterbuildingsolutioncenter.energy.gov/sites/default/files/news/attachments/2016%20Better%20Buildings%20Progress%20Update.pdf>

LED light bulbs: <https://energy.gov/energysaver/led-lighting>

Habitat for Humanity: [https://energy.gov/sites/prod/files/2014/01/f6/2\\_1b\\_ba\\_innov\\_affordablehousingfh\\_011713.pdf](https://energy.gov/sites/prod/files/2014/01/f6/2_1b_ba_innov_affordablehousingfh_011713.pdf), <http://www.nrel.gov/docs/fy08osti/43188.pdf>

Aeroseal: <https://energy.gov/eere/success-stories/articles/eere-success-story-aeroseal-and-lawrence-berkeley-national-laboratory>

### **LED BULBS**

LED light bulbs can give light like that of a traditional incandescent bulb, but they can use as little as one-seventh the electricity and last up to 25 times as long. Developing them has taken a lot of work. BTO worked with major lighting companies and small startups for years to improve the lights, lower costs, and expand the applications of LEDs, primarily with competitive grants. The L Prize fostered innovation through a competition to design a better light bulb (Philips won). Light bulb standards and labels, set in bipartisan legislation, opened the way for mass market LEDs by enabling manufacturers to compete on both performance and purchase price. Because of US leadership, there are now thousands of LED research and manufacturing jobs across the country, including North Carolina, California, Ohio, and soon New York. BTO and manufacturers continue to research new technologies such as organic LEDs.



### **HABITAT FOR HUMANITY, DENVER, CO**

In 2005, Habitat for Humanity of Metro Denver teamed with the National Renewable Energy Laboratory in Golden, Colorado, to build a three-bedroom home that is also a small power plant. Solar rooftop cells make more electricity each year than the home uses. Under DOE's Building America program, the team used efficient heating and lighting and a tight shell to halve energy use. That home is part of an ongoing partnership. After Hurricane Katrina, BTO provided construction standards for Habitat affiliates, first for rebuilding on the Gulf Coast and then nationwide. Oak Ridge National Lab assisted with five Habitat near-zero energy homes in Lenoir City, Tennessee. More recently, Habitat homes in North Carolina, Florida, and Michigan have been certified as Zero Energy Ready Homes.



### **AEROSEAL, CENTREVILLE, OH**

A large portion of the energy used to heat and cool homes and commercial buildings is wasted as the air escapes through leaks in the ducts. Mark Modera at Lawrence Berkeley National Lab developed a novel way to seal those leaks by blowing in particles through the ducts that plug the holes as the air leaks through. When the lab could not find a company to market the technology, he founded Aeroseal. This small business makes the equipment and sealant in Centerville, Ohio. Aeroseal's system is now used by 600 franchises across the United States and in much of the world.

