

Energy Efficiency—Jobs and Investments

2.2 million energy efficiency jobs are just the start



ELENA CHRIMAT, ARIZONA When Elena Chrimat could not get a buildings job in the recession of 2008 in Arizona, she cofounded a small business, working out of her 1989 Land Cruiser, to save energy in homes. Ideal Energy LLC now employs 10 people in Tempe. They did 1,179 jobs last year, including energy audits, installing efficient air conditioners and insulation, and sealing air leaks. With efficiency, she says, she “didn’t just want a job to make a buck [but] to do something more impactful.”

Jobs

AT LEAST 2.2 MILLION PEOPLE WORK IN ENERGY EFFICIENCY IN THE UNITED STATES

Millions of people throughout the United States work on products and projects that cut energy waste. A recent survey and analysis by BW Research Partnerships¹ found that 2.2 million people work in whole or in part on energy efficiency as of 2016. Of these employees, over one million spend more than half their time on energy efficiency, and ACEEE estimates these are equivalent to over one million full-time jobs. The full- and part-time employment grew by 7% in 2016, and the surveyed businesses expect further 9% growth in 2017. For comparison, the same analysis also found that 0.4 million people work on solar power, 0.1 million work in wind power, and a total of 1.9 million work to produce electricity, coal, natural gas, and gasoline.

THE JOBS ARE SPREAD AMONG THOUSANDS OF COMPANIES IN ALL 50 STATES

People work to save energy in all kinds of businesses throughout the United States.

There are efficiency jobs in all 50 states, from Washington (62,000 jobs) to Ohio (79,000) to Georgia (57,000). The study finds more people work on energy efficiency than coal in Kentucky (24,000) or than solar power in Arizona (41,000). Almost as many work on efficiency as in oil drilling and refining in Texas (147,000).

Of the efficiency jobs, about half (48%) are related to heating and cooling equipment. One-fifth are related to lighting and appliances (22%) and another fifth to building materials (20%). By industry, two-thirds (63%) of the jobs are in construction. The study estimates 165,000 companies employ people in energy



JOHNSON CONTROLS, OHIO More than 500 people work at the Johnson Controls plant in Toledo, Ohio, making advanced batteries that can be used with Start-Stop technology in cars and trucks such as the Ford F-150 and Chevy Malibu. Start-stop turns off the engine when you step on the brakes at a signal or in a traffic jam but keeps the air conditioning and electronics running. It reduces gasoline use in the car by about 5%.

efficiency, of which 71% are small businesses with 1-10 employees.

ENERGY EFFICIENCY CREATES EVEN MORE JOBS

In addition to the jobs described above, the analysis separately found 0.7 million jobs related to increasing fuel economy and hybrid and electric vehicles. It found 3 million people work in retail trades that sell appliances and building materials (including efficient products). These jobs, and others in industrial process efficiency and combined heat and power, are not included in the study's finding of 2.2 million efficiency jobs.

The above discussion is about people who make, distribute, or install efficient products. But their work also requires supporting jobs, such as jobs in the supply chains that provide parts and materials for efficient products. All these workers support other jobs, such as in restaurants and shops where the workers spend their earnings.

Energy efficiency creates jobs in still another way. Efficiency reduces energy use and thus energy bills.

Notes 1BW Research Partnership, in separate reports for the Department of Energy (DOE) and for E2 and E4TheFuture, surveyed tens of thousands of businesses and combined the results with Bureau of Labor Statistics data to estimate numbers of energy-related jobs (the same methodology used by the Department of Labor for other studies). BW narrowly defined efficiency as ENERGY STAR® products and products installed per ENERGY STAR guidelines. They included manufacturing; wholesale trade, distribution, and transportation; and installation, but excluded retail jobs. The E2 report uses 2015 data (with results at the county or congressional district level) and the

Customers spend or invest the money they save somewhere else in the economy. Since producing energy takes fewer workers than construction, sales or almost any other economic activity, that shift of spending from energy to other things creates more jobs. Typically, the savings from energy efficiency yield even more jobs than the efficiency work itself.

Taking all of this into account, the total number of jobs due to energy efficiency is probably at least three times the number of jobs reported above.

OTHER STUDIES ALSO FIND A LOT OF JOBS

Other studies have found large numbers of jobs related to energy efficiency. Booz Allen Hamilton estimated full-time equivalent jobs due to green construction spending: 0.7 million direct jobs in green construction in 2014 and a total of 2 million direct and supported jobs. Much of this is in building efficiency. The Brookings Institution estimated 2010 employment at companies it identified as part of the clean economy, and found 0.8 million jobs in energy and resource efficiency. Almost half of these jobs were in transportation.²

second DOE report uses 2016 data, with some changes in methodology.

²The Booz Allen Hamilton report for the US Green Building Council used the 2015 Dodge Construction Outlook to estimate green construction investments and economic modeling using the IMPLAN model to estimate the number of resulting full-time equivalent jobs. Brookings, along with Battelle's Technology Partnership Practice, identified clean economy companies based on public information, likely missing many small businesses and multipurpose businesses.



TOM HUGHES, VIRGINIA Hughes, 31, worked in the auto industry for a decade, repairing cars and helping run dealerships. He didn't find the work gratifying so a little more than two years ago, he switched careers. Following somewhat in the footsteps of his dad, a building inspector, he learned how to inspect homes for energy efficiency. He joined PEG, a Virginia-based engineering and consulting firm, as a HERS (Home Energy Rating System) rater. "I didn't want to do a desk job," he says. He enjoys doing blower door and duct testing in the field, and if a home doesn't meet code or ENERGY STAR standards, figuring out why. "It's the best job I've ever had," he says, adding that people appreciate when you help them save money on their utility bills. Recently promoted, Hughes is now training others in the field.

Investments

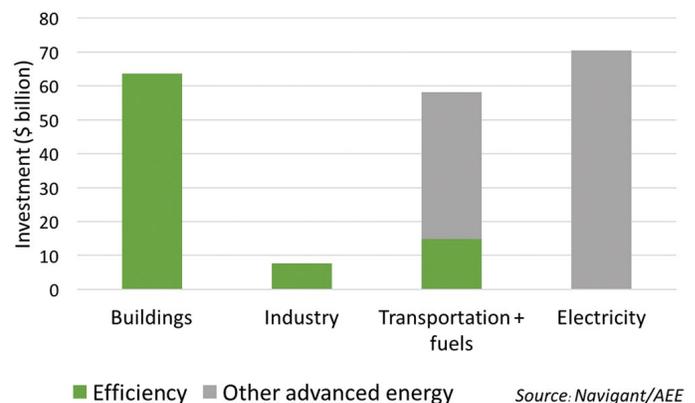
US ENERGY EFFICIENCY INVESTMENT IS AT LEAST \$86 BILLION A YEAR

Energy efficiency attracts billions of dollars in investments each year. Navigant Research³ estimated \$86 billion in US investments in 2015 that are clearly in energy efficiency. This includes \$64 billion in building efficiency (building design, building shell, heating and cooling, lighting and equipment, and information technology), \$8 billion in industrial efficiency (energy management and combined heat and power), and \$15 billion in hybrid and electric vehicles. For comparison, \$86 billion is larger than the annual sales of home appliances, cosmetics, or smartphones in the United States (and approaches sales of beer).

The investments increased by a combined 6% from 2014, and by over 50% from 2011. Global investment in the same areas totaled \$358 billion in 2015 according to Navigant.

OTHER STUDIES ALSO SHOW A LARGE INDUSTRY

Other studies have made large investment estimates. The International Energy Agency estimates worldwide energy efficiency investment of \$221 billion in 2015.



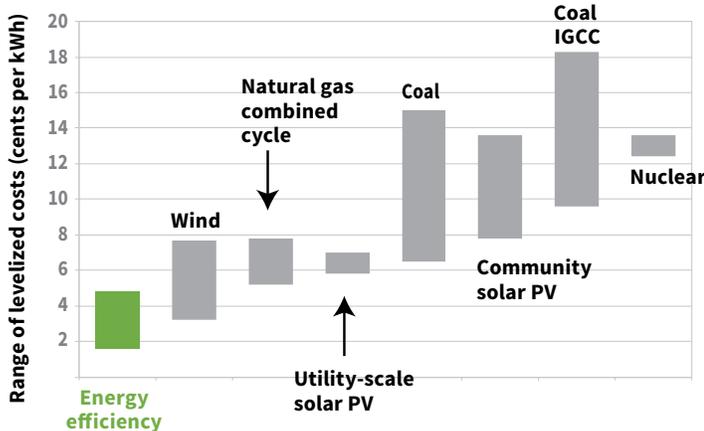
They do not provide complete US figures, but for building efficiency, they estimate US investment of \$28 billion (24% of \$118 billion globally). This includes only the incremental cost of energy-efficient products above base costs. The Booz Allen Hamilton study mentioned above also models the net economic impact of green building, estimating \$53 billion in direct impacts and \$174 billion in total impacts in 2014. An earlier study by ACEEE estimated \$72-101 billion in US energy efficiency investments in 2010 (and in 2010 dollars), mostly in buildings and ENERGY STAR products.



Rich Podrez (far left), a back tender at Flambeau River Papers, works to secure a large roll of paper before moving it to the shipping or converting facility. Image by Mike De Sisti, USA, 2012.

FLAMBEAU RIVER PAPERS, WISCONSIN

In 2006, the paper mill that was the heart of the economy in Park Falls, Wisconsin, shut down. But new owners led by Butch Johnson bought the mill, rehired about 300 employees, and invested in energy efficiency improvements including in the steam system, pumps, lighting, heat recovery, and process improvements. More than \$10 million in savings in the first few years made the plant more competitive. Johnson said that without state assistance on energy efficiency, “our mill would be less competitive, less green and less energy efficient, and we may not be in business today.”



EFFICIENCY INVESTMENTS EARN STRONG RETURNS

Energy efficiency typically returns at least double its investment, according to ACEEE’s 2016 report, *The Greatest Energy Story You Haven’t Heard*. For example, programs that help families and businesses reduce their energy use save them money directly on their utility bills and save all customers money by allowing utilities to spend less on adding electricity and natural gas supply. Utility energy efficiency programs cost about 2 to 5 cents per kilowatt-hour, which is much less than the cost of new power plants. The average dollar invested in these programs produces

more than \$2 in benefits for all customers. Energy efficiency policies save a typical US family hundreds of dollars each year and particularly benefit low-income households, which spend a larger share of their income on energy bills.

Energy efficiency investments result in additional returns in the form of benefits to public health, clean air, and community resilience. Reducing energy waste reduces air pollution (including sulfur dioxide and nitrogen oxides), which contributes to four of the leading causes of death in the United States: cancer, chronic lower respiratory diseases, heart disease, and stroke. In addition, high efficiency buildings, microgrids, and combined heat and power systems help communities withstand power outages during severe weather events.

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Note ³Navigant compiled dozens of its own market-size studies of specific advanced energy technology industry segments for the business coalition Advanced Energy Economy; we selected those in energy efficiency. These numbers only include market revenue for technologies they track, and do not include exports. For most, Navigant estimated revenue based on the total installed cost of the technology, e.g., installed heating and cooling system cost in commercial energy retrofits and in high-efficiency homes.