

DOE ENERGY EFFICIENCY PROGRAMS: BENEFITS TO ARIZONA

SOUTHWEST ENERGY EFFICIENCY PROJECT

The U.S. Department of Energy (DOE) manages energy efficiency programs involving both research and development (R&D) and programs to encourage adoption of energy efficiency technologies and best practices. These programs help Arizona businesses and consumers save energy and money, and they add jobs through businesses that sell, install, and maintain energy efficiency products and services. According to DOE's 2017 U.S. Energy and Employment Report, energy efficiency provides 40,700 jobs in Arizona.

The table below shows the main categories of DOE's energy efficiency programs, and the proposed levels of funding for FY 2018 under both the House and Senate Appropriations bills. How does the DOE directly benefit Arizona businesses and residents? Read on for some of the highlights.

ENERGY EFFICIENCY PROVIDES 40,700 JOBS IN ARIZONA



DOE Energy Efficiency Programs	FY 2017 Budget (thou \$)	2018 White House Request (thou \$)	2018 House Approp. Bill (thou \$)	House % Reduction vs. 2017	2018 Senate Approp. Bill (thou \$)	Senate % Reduction vs. 2017
Advanced Manufacturing	306,959	82,000	125,000	59%	277,988	9%
Building Technologies	257,500	82,000	102,000	60%	252,000	2%
Vehicle Technologies	199,141	67,500	91,406	54%	195,000	2%
Weatherization Assistance	225,000	0	225,000	0%	212,000	6%
Total for EE programs above	988,600	231,500	543,406	45%	936,988	5%

BTO PROGRAMS

The Building Technologies Office (BTO) spearheads several programs including the Building America Program, the Building Energy Codes Program, and Appliance and Equipment Efficiency Standards, Emerging Technologies, and Residential and Commercial Building Integration.

Building America

The Building America Program conducts research on energy efficiency innovations to benefit the residential building industry and the public. The program helps push these innovations into the market through demonstrations, information dissemination, and voluntary residential energy efficiency programs. Through adopting energy efficiency improvements advanced by the Building America program:

- U.S. households save **\$54 billion annually** on their utility bills, with **\$170 of homeowner savings for each \$1** of Building America revenue spent
- Highly efficient new homes generate millions of dollars per year in additional construction revenue and generate thousands of new jobs nationally

Building Energy Codes Program

The DOE Building Energy Codes Program contributes to energy savings in buildings by supporting the implementation of the model building energy codes. The program accomplishes this by: 1) Participating in industry processes to develop and update codes—analyzing energy and cost savings associated with code updates and improvements; 2) providing technical assistance to states and localities—helping them adopt and implement better codes; and 3) supporting energy code compliance through providing training and tools—ensuring that intended savings are realized by U.S. home and business owners. DOE estimates that adopting the latest model energy codes would result in these benefits by 2030:

- Save Arizona businesses and homes at least **\$290 million per year**
- Reduce Arizona's energy consumption in residential and commercial buildings by **29.8 trillion Btu per year** or more (about 4% savings)

Appliance and Equipment Efficiency Standards

The federal government has adopted minimum energy standards for more than 60 products, representing about 90% of home energy use, 60% of commercial building energy use, and 30% of industrial energy use. DOE periodically reviews and updates the standards and test procedures. In Arizona, appliance and equipment standards adopted to date achieve these benefits:

- Arizona businesses save a total of **\$360 million per year**
- A typical Arizona household saves about **\$520 per year** (about 15% of its annual utility bill)

The national energy efficiency standards completed through 2016 will result in the following cumulative savings through 2020 for the U.S.:

- **71 quadrillion Btu** (quads) of energy savings
- **\$1 trillion** of net economic benefits to consumers and businesses

R&D PROGRAMS - ADVANCED MANUFACTURING AND BUILDING TECHNOLOGIES

Both the Advanced Manufacturing Office (AMO) and Building Technologies Office (BTO) support R&D of new energy efficiency technologies, with the main goal of helping to introduce new technologies to the market that will improve energy efficiency in buildings and industry, savings businesses and consumers money on energy costs. In many cases the new technologies are manufactured by entrepreneurial start-up companies, creating new jobs in addition to contributing to energy and cost savings. Here are some examples of Arizona businesses that have benefited through collaborations with the DOE's R&D programs.

Arizona Business and location	Technology	Commercial -ization Date	No. of Employees	DOE Program Collaboration
Materials and Electrochemical Research Corporation (MER) - Tucson	Ceramic composite die for metal casting	2002	NA	AMO

Materials and Electrochemical Research Corporation (MER). MER'S ceramic composite die technology offers an alternative to traditional steel dies used in metal casting. The ceramic composite developed by MER lasts longer than its steel alternative and does not require a coating to protect the steel from molten metals. These coatings can interfere with the ability to repair any damage or faults in the die. The ceramic composite dies also weigh approximately one-third less than tool steel dies and fail less often, reducing waste and the energy required to recycle failed castings. AMO provided a grant to MER to help it develop this technology.

AMO PROGRAMS

The Advanced Manufacturing Office (AMO) runs several programs including the Industrial Assessment Centers and the Combined Heat and Power (CHP) Technical Assistance Partnerships (TAPs). The CHP TAPs provide free assistance to industrial and commercial facilities in evaluating applications of combined heat and power, which can help businesses save money, improve reliability, and reduce their carbon footprint.

Industrial Assessment Centers

Industrial Assessment Centers (IACs) are operated by 28 universities throughout the U.S. The IACs provide free energy assessments to small and medium-size manufacturers, and provide training to engineering students. From 1990 to 2007, the Arizona State University Industrial Assessment Center achieved the following results:

- **26 students** trained
- **433 assessments** completed
- **1.4 trillion Btu** of energy savings from implemented recommendations
- **\$27 million** in cost savings to the industrial facilities

In 2017, DOE is again providing funding to Arizona State University to re-start its Industrial Assessment Center, to perform the important work of training engineering students to identify and evaluate energy efficiency opportunities, and helping manufacturers save energy and reduce costs.

VEHICLE TECHNOLOGIES

The Vehicle Technologies Office (VTO) supports research, development (R&D), and deployment of efficient transportation technologies that improve energy efficiency, improve fuel economy, and reduce petroleum consumption. These technologies include advanced batteries and electric drive systems, lightweight materials, advanced combustion engines, alternative fuels, and energy efficient mobility systems. VTO also supports implementation programs such as Clean Cities that encourage adoption of alternative fuels and vehicles.

Clean Cities

The Clean Cities program supports state and regional actions to reduce petroleum consumption through the use of alternative fuels and improved efficiency. In Arizona there are two Clean Cities coalitions, which have achieved the following results through improved efficiency and through promoting the adoption of alternative-fuel vehicles (mainly natural gas, ethanol, and electricity). In total, vehicle owners in Arizona have cut their gasoline consumption by over **60 million gallons** as a result of the efforts of the Clean Cities program.

Clean Cities Coalition	Petroleum Savings (gallon equivalents)	Avoided CO ₂ Emissions (tons)	Alternative Fuel Stations
Phoenix	59,890,000	360,000	1,082
Tucson	766,000	2,500	226

Many businesses and local governments support the Arizona Clean Cities Coalitions by becoming Members. See a list of Members [here](#).

WEATHERIZATION ASSISTANCE

The DOE's weatherization assistance program provides cost-effective energy savings and health benefits to low-income American families and supports jobs. In Arizona from 2010-2017, the program has achieved the following results:

- **2,000** Arizona homes received energy efficiency upgrades
- **\$850 thousand per year** in energy cost savings to low-income Arizona homes
- **59 billion Btu per year** in energy savings

Here are some highlights of annual benefits at the national level:

- **\$340 million** in energy cost savings
- **\$280** in average cost savings for a single-family home
- **8,500 jobs** supported
- **Benefit-to-cost ratio of 4.1** including energy savings and health and safety benefits
- **Savings-to-investment ratio of 1.4** (\$1.40 in savings for every \$1 spent)

This fact sheet was produced by the Southwest Energy Efficiency Project (SWEEP), a non-profit, nonpartisan organization that promotes greater energy efficiency in AZ, CO, NM, NV, UT, and WY. (See www.swenergy.org.) Please send any questions or comments to Neil Kolwey at nkolwey@swenergy.org; ph: 303-499-0213.