

**ENERGY EFFICIENCY AND RENEWABLE ENERGY**

(Discretionary dollars in thousands)

	FY 2014 Enacted	FY 2014 Current	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015	
					\$	%
<b>Energy Efficiency and Renewable Energy</b>						
<b>Sustainable Transportation</b>						
Vehicle Technologies	289,737	282,201	280,000	444,000	+164,000	+58.6%
Bioenergy Technologies	232,290	182,327	225,000	246,000	+21,000	+9.3%
Hydrogen and Fuel Cell Technologies	92,928	89,518	97,000	103,000	+6,000	+6.2%
<b>Total, Sustainable Transportation</b>	<b>614,955</b>	<b>554,046</b>	<b>602,000</b>	<b>793,000</b>	<b>+191,000</b>	<b>+31.7%</b>
<b>Renewable Energy</b>						
Solar Energy	257,058	254,305	233,000	336,700	+103,700	+44.5%
Wind Energy	88,126	87,035	107,000	145,500	+38,500	+36.0%
Water Power	58,565	57,834	61,000	67,000	+6,000	+9.8%
Geothermal Technologies	45,775	44,802	55,000	96,000	+41,000	+74.5%
<b>Total, Renewable Energy</b>	<b>449,524</b>	<b>443,976</b>	<b>456,000</b>	<b>645,200</b>	<b>+189,200</b>	<b>+41.5%</b>
<b>Energy Efficiency</b>						
Advanced Manufacturing	180,471	175,400	200,000	404,000	+204,000	+102.0%
Federal Energy Management Program	28,248	28,248	27,000	43,088	+16,088	+59.6%
Building Technologies	177,868	173,631	172,000	264,000	+92,000	+53.5%
Weatherization and Intergovernmental Program	230,862	230,862	243,000	318,499	+75,499	+31.1%
<b>Total, Energy Efficiency</b>	<b>617,449</b>	<b>608,141</b>	<b>642,000</b>	<b>1,029,587</b>	<b>+387,587</b>	<b>+60.4%</b>
<b>Corporate Support</b>						
Facilities and Infrastructure	45,973	45,973	56,000	62,000	+6,000	+10.7%
Program Direction	162,000	162,000	160,000	165,330	+5,330	+3.3%
Strategic Programs	23,540	23,540	21,000	27,870	+6,870	+32.7%
<b>Total, Corporate Support</b>	<b>231,513</b>	<b>231,513</b>	<b>237,000</b>	<b>255,200</b>	<b>+18,200</b>	<b>+7.7%</b>
<b>Subtotal, Energy Efficiency and Renewable Energy</b>	<b>1,913,441</b>	<b>1,837,676</b>	<b>1,937,000</b>	<b>2,722,987</b>	<b>+785,987</b>	<b>+40.6%</b>
Use of Prior Year Balances	-2,382	-2,382	0	0	0	N/A
Rescission of Prior Year Balances	-10,418	-10,418	-22,805	0	+22,805	+100.0%
<b>Total, Energy Efficiency and Renewable Energy</b>	<b>1,900,641</b>	<b>1,824,876</b>	<b>1,914,195</b>	<b>2,722,987</b>	<b>+808,792</b>	<b>+42.3%</b>

**Appropriation Overview**

The Office of Energy Efficiency and Renewable Energy (EERE) is the U.S. Government’s primary clean energy technology organization. EERE works with many of America’s best innovators and businesses to support high-impact applied research, development, demonstration, and deployment (RDD&D) activities in sustainable transportation, renewable power, and end-use energy efficiency. EERE implements a range of strategies aimed at reducing U.S. reliance on oil, saving American families and businesses money, creating jobs, and reducing pollution. EERE works to ensure that the clean energy technologies of today and tomorrow are not only invented in America, but also manufactured in America.

**Program Highlights**

Sustainable Transportation

• **Vehicle Technologies**

The FY 2016 Request supports a number of aggressive vehicle technology goals: battery energy storage, electric drive research and development (R&D), and advanced power electronics initiatives in support of the EV Everywhere Grand Challenge; improvements in lightweight materials performance; more efficient combustion engine technologies; a new SuperTruck II initiative to achieve improved freight hauling efficiency goals and alternative fuel vehicle community partner projects, which are new competitively-awarded projects to build strategically-placed, high-impact, community-scale demonstrations of alternative fuel vehicles. Major funding changes are the result of enhanced support for these activities, in particular increased investment in vehicle electrification and grid infrastructure, SuperTruck II, natural gas storage, magnesium sheet, co-optimization of fuels and engines, and partnerships to build high-impact community-scale demonstrations of alternative fuel vehicles.

- **Bioenergy Technologies**

The FY 2016 Request emphasizes development of innovative processes to convert cellulosic and algal-based feedstocks to bio-based gasoline, jet, and diesel fuels at a cost of \$3.00 per gallon gasoline equivalent (gge). In collaboration with the U.S. Departments of Navy and Agriculture, the program will demonstrate commercial-scale biorefineries to produce military-specification fuels. Additionally, the Request will support R&D to advance new technologies from the lab bench to the commercial market.

- **Hydrogen and Fuel Cell Technologies**

The FY 2016 Request supports the goal to reduce the cost and increase the durability of transportation fuel cell systems, with a targeted cost of \$40/kW and durability of 5,000 hours, equivalent to 150,000 miles, by 2020. In addition, the program is working to reduce the cost of hydrogen from renewable resources to less than \$4.00/gge – dispensed and untaxed – by 2020. In FY 2016, Fuel Cell R&D will focus on stack component R&D, stack and component operation and performance, systems and system integration, balance of plant components, testing, technical analysis, and high-throughput combinatorial approaches. Hydrogen Fuel R&D will focus on materials and process development to enable hydrogen production from diverse renewable resources. Funding will also provide resources to rapidly advance the development of quality control tools for the manufacturing of fuel cell components and systems.

**Key FY 2014 Accomplishments**

- ✓ \$300/kWh Modeled Li-Ion Battery Pack Cost Achieved
- ✓ Cost Effective Cellulosic Ethanol Demonstrated at Pilot Scale (\$2.15/gal)
- ✓ Nation's first offshore wind projects selected to achieve operation by 2017
- ✓ Spearheaded DOE's contribution to the establishment of the National Network for Manufacturing Innovation (NNMI)
- ✓ Standards enacted since 2009 are projected to avoid a cumulative total of 2.2 billion metric tons of carbon emissions by 2030
- ✓ More than 200 organizations partnering with DOE through Better Buildings Challenge to achieve 20% energy savings

Renewable Power

- **Solar Energy**

The FY 2016 Request supports the SunShot Initiative goal to make solar power cost-competitive without subsidies by 2020, equivalent to a cost of solar power of \$.06/kWh. This includes solar photovoltaic R&D; activities that enable a 50% reduction in non-hardware "soft costs"; and development and demonstration of innovative solar energy manufacturing technologies to increase U.S. competitiveness, in support of DOE's Clean Energy Manufacturing Initiative. The Request also supports development of advanced thermal storage so that concentrated solar power can achieve base-load grid parity. Major funding changes are the result of increased investments for developing transformative solutions that are critical to enabling high penetration of solar into the grid and new efforts focusing on commercial scale solar to reduce barriers to the deployment of solar energy.

- **Wind Energy**

The FY 2016 Request supports three advanced offshore wind demonstration projects planned for operation by 2017, as well as an Atmosphere to Electrons initiative, to optimize entire wind farm performance and lower the cost of wind energy. The Request also supports DOE's Clean Energy Manufacturing Initiative enabling new designs, materials and manufacturing processes for longer blades to capture greater wind resource, address transportation barriers, and to achieve full market cost competition for wind energy.

- **Water Power**

The FY 2016 Request supports the launch of HydroNEXT, a new EERE initiative that focuses on conducting R&D to enable increased hydropower opportunities at non-powered dams, water conveyance systems, and new stream reach development; development of new low cost modular systems will minimize civil works and environmental impact and maximize design for manufacturing. The Request also supports marine and hydrokinetic activities, including front end engineering and design for a grid-connected open-water test facility.

- **Geothermal Technologies**

The FY 2016 Request supports full implementation of the Subsurface Technology and Engineering RD&D crosscut. The crosscut is a critical effort for advancing innovative RD&D under the Hydrothermal subprogram to reduce the cost and risk of geothermal development, by targeting opportunities to leverage advances in other subsurface sectors. The Request continues moving the Frontier Observatory for Research in Geothermal Energy (FORGE) toward field

operations. FORGE is a dedicated site that enables testing of novel technologies and techniques for Enhanced Geothermal Systems optimization and validation. The Request also accelerates “play fairway” analyses, which provide assessments of exploration risk and the probability of finding new geothermal resources on a regional scale, resulting in maps and studies that reduce the industry’s drilling and development risks.

#### Energy Efficiency

- **Advanced Manufacturing**

The FY 2016 Request fully supports the deployment of two additional Clean Energy Manufacturing Innovation Institutes, along with continued support of four existing institutes, as part of the larger interagency National Network of Manufacturing Institutes, which is aimed at bringing together universities, companies, and the government to jointly invest in solving industry-relevant problems and improving U.S. manufacturing competitiveness. The Request also supports high-impact R&D focused on advanced manufacturing and materials that will enable U.S. manufacturers to realize significant gains in energy productivity, environmental performance, product yield, and economic competitiveness

- **Federal Energy Management Program**

The FY 2016 Request supports major Administration initiatives to better assist all federal agencies in meeting aggressive energy, water, greenhouse gas and other sustainability goals, as well as share solutions, such as best practices, tools, and process improvements, more broadly throughout the economy to provide the greatest impact for its efforts. Major funding changes are a result of a \$15 million investment to assist agencies to invest in priority projects for efficiency and renewables with the greatest impact.

- **Building Technologies**

The FY 2016 Request supports an increased emphasis on emerging technologies R&D in key technology areas such as lighting, heating and cooling and building envelope, needed to support the reduction of the Nation’s energy use by 50%; supports the equipment and appliance standards programs to establish minimum energy efficiency requirements pursuant to federal statutes; and supports building to grid integration activities focused on improving the efficiency and resiliency of the electric grid, including connected buildings and building systems. The Request also supports a new advanced building envelope and refrigerant materials manufacturing R&D effort; assists home owners and builders in adopting energy efficiency solutions; and improves the information, tools, and resources available to the commercial sector with a goal of achieving 20 percent reduction in energy use by 2020.

- **Weatherization and Intergovernmental Program**

The FY 2016 Request supports the Weatherization Assistance Program which provides access to home weatherization services for low-income households across the country, including approximately 33,000 homes in FY 2016. The State Energy Program will continue to disseminate best practices with a goal of helping government facilities and operations reduce annual energy use by 2 percent by 2020 and focus on energy planning and analysis. The Request also establishes a new local program that will provide competitive grants and technical assistance to local governments, creating partnerships to catalyze investments in the advancement of the U.S. clean energy economy.