Office of Energy Efficiency and Renewable Energy

FY 2016 Budget Overview

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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Major Administration Energy Goals

- Reduce GHG emissions by 17% by 2020, 26-28% by 2025 and 83% by 2050 from 2005 baseline
- By 2035, generate 80% of electricity from a diverse set of clean energy resources
- Double energy productivity by 2030
- Reduce net oil imports by half by 2020 from a 2008 baseline
- Reduce CO_2 emissions by 3 billion metric tons cumulatively by 2030 through efficiency standards set between 2009 and 2016

Office of Energy Efficiency and Renewable Energy

EERE Mission:
To create and sustain American leadership in the global transition to a clean energy economy

- **High-Impact Research, Development, and Demonstration to Make Clean Energy as Affordable and Convenient as Traditional Forms of Energy**

- **Breaking Down Market Barriers**

EERE's Guiding Principles

The 5 EERE Core Questions

1. **HIGH IMPACT:** Is this a high impact problem?
2. **ADDITIONALITY:** Will the EERE funding make a large difference relative to what the private sector (or other funding entities) is already doing?
3. **OPENNESS:** Have we made sure to focus on the broad problem we are trying to solve and be open to new ideas, new approaches, and new performers?
4. **ENDURING U.S. ECONOMIC BENEFIT:** How will this EERE funding result in enduring economic benefit to the United States?
5. **PROPER ROLE OF GOVERNMENT:** Why is what we are doing a proper high impact role of government versus something best left to the private sector to address on its own?

Select Recent EERE Accomplishments

Sustainable TRANSPORTATION

- $289/kWh Modeled Li-Ion Battery Cost Achieved in 2014
- SuperTruck – 5 year program exceeded goal of 50% improvement in freight efficiency a year ahead of schedule in 2014
- 3 Pioneering Commercial Cellulosic Ethanol Plants have come online
- Fuel cells - 50% cost reduction, 5 x platinum reduction since 2006

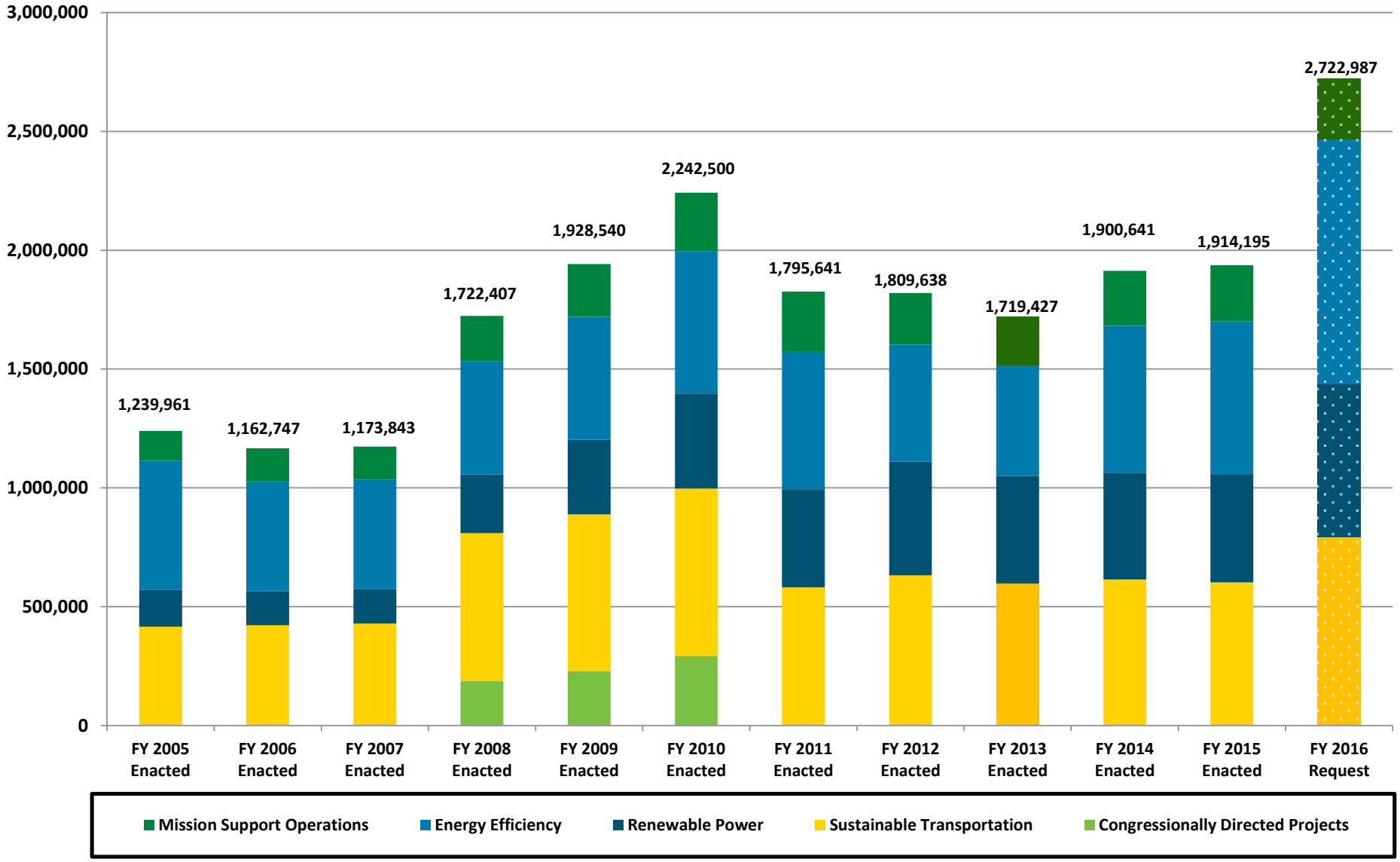
Renewable ELECTRICITY GENERATION

- Achieved more than 60% progress toward SunShot solar PV cost reduction in just first 4 years of 10 year initiative
- Cost of U.S. wind energy decreased by more than one-third in last 5 years to 4.6c/kWh
- First grid connected tidal power plant in US
- First grid connected near-field EGS plant increased power output of nearby operating geothermal field by nearly 38%

Energy Saving HOMES, BUILDINGS, & MANUFACTURING

- Standards enacted since 2009 are projected to avoid a cumulative total of 2.2 billion metric tons of carbon emissions by 2030
- More than 250 DOE partners through the Better Buildings Challenge on track to achieve average energy savings of 2.5% annually and saving 36 TBtus and $300 million since the Better Buildings Challenge began
- LED cost reduction – 90% since 2008

EERE Budget Trends: FY 2004 – FY 2016, ($K)



U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

FY 2016 Budget Summary Table

Dollars in Thousands	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs FY 2015
Transportation	**614,955**	**602,000**	**793,000**	**+191,000**
- Vehicle Technologies	289,737	280,000	444,000	+164,000
- Bioenergy Technologies	232,290	225,000	246,000	+21,000
- Hydrogen and Fuel Cell Technologies	92,928	97,000	103,000	+6,000
Renewable Electricity	**449,524**	**456,000**	**645,200**	**+189,200**
- Solar Energy	257,058	233,000	336,700	+103,700
- Wind Energy	88,126	107,000	145,500	+38,500
- Water Power	58,565	61,000	67,000	+6,000
- Geothermal Technologies	45,775	55,000	96,000	+41,000
End-Use Efficiency	**617,449**	**642,000**	**1,029,587**	**+387,587**
- Advanced Manufacturing	180,471	200,000	404,000	+204,000
- Building Technologies	177,868	172,000	264,000	+92,000
- Federal Energy Management Program	28,248	27,000	43,088	+16,088
- Weatherization and Intergovernmental Activities	230,862	243,000	318,499	+75,499
Corporate Support Programs	**231,513**	**237,000**	**255,200**	**+18,200**
Subtotal, Energy Efficiency and Renewable Energy	**1,913,441**	**1,937,000**	**2,722,987**	**+785,987**
- Use of Prior Year Balances	-2,382	0	0	0
- Rescission of Prior Year Balances	-10,418	-22,805	0	NA
Total, Energy Efficiency and Renewable Energy	**1,900,641**	**1,914,195**	**2,722,987**	**+808,792**

Sustainable
TRANSPORTATION

Renewable
ELECTRICITY GENERATION

Energy Saving
HOMES, BUILDINGS, & MANUFACTURING

Mission-Critical Support
OPERATIONS

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Energy Saving
HOMES, BUILDINGS, & MANUFACTURING

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Building Technologies - Overview

Motivation/Focus

- Combined, our homes and buildings cost the country more than $430 billion a year to power, consume more than 73 percent of the nation's electricity, and contribute to 40 percent of the nation's greenhouse gas emissions. Energy efficiency is a low-cost way to save money, reduce pollution, and improve the competitiveness of U.S. businesses.

Achievements

Emerging Technology

- The Philips Lumileds LUXEON TX advanced LED prototype achieved 150 lumens per dollar (modeled cost).
- Hillphoenix and ORNL designed a low-emission, high-efficiency supermarket refrigeration system with 25 percent lower energy consumption than existing systems, and 78% lower GHG emissions.

Commercial and Residential Buildings Integration

- The Lighting Energy Efficiency in Parking (LEEP) Campaign recruited nearly half a billion square feet in commitments. The energy savings seen by partners—sometimes up to 90%—inspired a proposed change to ASHRAE's 90.1 code, which is estimated to save 0.241 quads annually.
- The SEED Platform launched and is in use by major cities with disclosure laws, savings communities on program implementation costs and driving consistency in building energy data nationally.
- Upgraded 450,000 homes through the Better Buildings Residential Program and Home Performance with ENERGY STAR Program, providing homeowners up to 25% savings on energy bills across the 7 major climate zones and 43 states.

Equipment and Building Standards

- Since June 25, 2013 BTO has delivered 12 final rules toward CAP goal of 3 billion tons CO2 savings by 2030; Energy efficiency standards finalized through 2013 will save the U.S. a total energy savings of 124 quads, CO2 savings of 6.7 billion metric.
- Standards for Electric Motors will save over $50 billion in electricity bills over 30 years.
- Standards for Walk-in Coolers and Freezers will save over $30 billion in electricity bills over 30 years.
- Current model energy codes provide a 30 percent savings opportunity compared to codes adopted by many U.S. states.

Building Technologies – FY 2016 Budget Request

Goals/Metrics

- The program will develop and promote the adoption of technologies and practices, that when fully deployed, would reduce U.S. building-related energy use by 50 percent by 2040 from the 2010 Annual Energy Outlook baseline.
- Achieving this goal would decrease annual energy use by approximately 20 quads, which is equivalent to approximately 1 billion metric tons of CO2, and save consumers and businesses roughly $200 billion in annual energy.

(Dollars in Thousands)	FY 2014 Current	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Emerging Technologies (ET)	54,513	55,740	112,500	+56,760
Commercial Buildings Integration (CBI)	30,438	27,643	32,000	+4,357
Penn State Consortium for Building Energy Innovation	9,866	10,000	0	-10,000
Residential Buildings Integration (RBI)	21,974	22,758	48,000	+25,242
Equipment and Buildings Standards	55,840	53,359	69,000	+15,641
NREL Site-Wide Facility Support	1,000	2,500	2,500	0
Total, Building Technologies	173,631	172,000	264,000	+92,000

Building Technologies – FY 2016 Budget Highlights

- **Advanced Building Energy Materials FOA ($30M):** Supports DOE's Clean Energy Manufacturing Initiative and Administration's Materials Genome Initiative. FOA capitalizes on advances in high-performance computing and high-throughput experimental techniques to rapidly design new and improved materials for (1) non-vapor-compression refrigeration systems, and (2) high-performance envelope materials.
- **Buildings Energy Efficiency Frontier and Innovation Technologies (BENEFIT) FOA ($23M):** An Emerging Technologies FOA will focus water heating, controls, commercial roofing, air-sealing, dynamic windows/window films and daylighting topics, advanced building controls and include an open topic to address off roadmap technology R&D.
- **Building America ($26M**): Focus on development and demonstration of technology solutions for the three highest priority challenges facing market adoption of energy efficient solutions : (1) high performance building envelopes (wall, foundation, roof) that work in all climates, (2) comfort solutions for high latency load homes (e.g., home in humid climates), and (3) efficient ventilation and indoor air quality solutions.
- **Small- and Medium-Sized Commercial Building FOA ($10M):** Select market partners who can integrate DOE technical resources and previous successful pilots and replicate it at a national scale, with the goal that this program will be financially sustainable in less than three years.
- **Commercial Energy Codes FOA ($10M):** Develop reliable, repeatable methodologies that can be applied by different states to objectively assess the cost and benefits of increasing code compliances.

Advanced Manufacturing – Overview

Motivation/Focus

- The Advanced Manufacturing Office (AMO) partners with industry, small business, universities, and other stakeholders to identify and invest in emerging technologies with the potential to create high-quality U.S. manufacturing jobs, enhance global competitiveness, and reduce energy use by encouraging a culture of continuous improvement in corporate energy management.

Achievements

- Advanced Manufacturing R&D Projects
  - Microlution (a small company outside of Chicago) has successfully developed a femtosecond laser drilling system to reduce manufacturing cycle times by 80% and energy consumption by 30% compared to currently available processing methods. Originally developed for direct fuel injection manufacturing (with Delphi), the femtosecond laser drilling system is being investigated as a potential technology for a range of high aspect ratio, small hole drilling problems.
- Advanced Manufacturing R&D Facilities
  - Spearheaded the Department's contribution to the establishment of the **National Network for Manufacturing Innovation (NNMI),** including the Institute for Advanced Composites Manufacturing Innovation that includes more than 100 industry, SME, and academic partners and members. PowerAmerica, also called the Next Generation Power Electronics Manufacturing Innovation Institute was successfully launched. PowerAmerica, with the support of the new Director, retired General Nick Justice, will make wide bandgap semiconductor technologies cost-competitive with the silicon-based power electronics that are currently used.
  - In its first year of operation, **Critical Materials Institute (CMI)** researchers have already filed seven patent disclosures. Led by Ames Laboratories, the CMI is a five-year investment of up to $120 million to improve supply, efficient use and recycling to reduce dependence on foreign supplies, such as rare earths, for clean energy applications.
- Industrial Technical Assistance
  - Grew the Better Building, **Better Plants Program** to more than 140 Program Partners, representing close to 2,300 plants and close to 11% of the total U.S. manufacturing energy footprint. Partners have committed to reduce their energy intensity by 25% over 10 years and, as of October 2014, have saved around 320 trillion Btu and $1.7 billion.
  - **DOE CHP TAPs** (and their predecessors) provided technical support to over 580 CHP projects (between FY 2009 and 2013). Of those projects, more than 180 are currently under development or online with a combined capacity of 1.53 GW.

Advanced Manufacturing – FY 2016 Budget Request

Goals/Metrics

- Develop industry-specific and cross-cutting foundational manufacturing technologies to assist U.S. industry reduce its energy intensity by 2.5% per year (EPACT 2005).
- Reduce life-cycle energy use by 50% in manufacturing processes and products through technology RD&D.
- Develop, demonstrate, and assist industry with adoption of cost-competitive combined heat and power technologies (supporting EO 13624) towards a national goal of 40 GW of new CHP by 2020.
- Demonstrate technical and economic viability of energy management approaches building off of ISO 50001.
- Establish a total of at least 5 Clean Energy Manufacturing Institutes as the DOE-led component of the NNMI.

(Dollars in Thousands)	FY 2014 Current	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Advanced Manufacturing R&D Projects	74,508	84,000	133,000	+49,000
Advanced Manufacturing R&D Facilities	78,892	92,500	241,000	+148,500
Industrial Technical Assistance	22,000	23,500	30,000	+6,500
Total, Advanced Manufacturing	175,400	200,000	404,000	+204,000

Advanced Manufacturing – FY 2016 Budget Highlights

- **High-Impact Foundational Advanced Materials and Process Technology R&D Program ($133M):** Invest in high-impact foundational advanced materials and process technologies to drive energy productivity and domestic manufacturing competitiveness such as chemical process intensification, sustainable and smart manufacturing, and next generation electric machines with broad impacts on manufacturing energy efficiency and the performance and cost of multiple clean energy technologies.
- **Clean Energy Manufacturing Innovation Institutes ($196M):**
  - Support four existing Institutes ($56M) for Power Electronics/ WBG, Advanced Composites, Smart Manufacturing, and a to-be-announced Institute from FY 2015 FOA.
  - Establish and fully fund two new Institutes ($140M) in FY 2016 from FOA technology topics such as high efficiency modular chemical processing, advanced materials manufacturing, and grid integration.
- **Critical Materials Institute ($25M):** Continue to focus on technologies that will enable American manufacturers to make better use of the critical materials to which they have access, as well as to reduce or eliminate the need for materials that are subject to supply disruptions. FY 2016 is the fifth year of EERE funding commitment for the Critical Materials Institute.

Federal Energy Management Program– Overview

Motivation/Focus

- As America's largest energy consumer, the Federal Government has a tremendous opportunity to lead by example. FEMP assists and enables Federal agencies to meet energy-related and other sustainability goals and to provide Federal energy leadership.

Achievements

- **Accelerating Federal Government Use of Performance-Based Contracts to Meet President's $4B Goal:**
  - Launched the eProject Builder National ESPC database - a cutting-edge tool for Federal and non-Federal entities to standardize the collection, calculation, and reporting of performance data for all ESPCs.
  - Agencies have identified projects (in the pipeline or awarded) with an estimated $4.298B investment value - 108% of $4B.
- **Focusing Federal Government Towards Goals through:**
  - Federal Energy Efficiency Fund (FEEF) In FY 2014, FEMP awarded $5 million to 9 energy projects worth a total investment of $120M. Many of the projects are first time projects for particular agencies.
- **Reaching Out to Enhance Agency and Private-Public Engagement through**:
  - Better Buildings Data Center Challenge: Spearhead the Better Buildings Data Center Initiative, a voluntary leadership challenge to improve Federal data center efficiency, a significant source of Federal energy use – as well as public and private sector data center energy efficiency more broadly.
  - Veterans Intern Program: Provided nine veteran interns to agencies to assist with agency energy management projects.
- **Creating World-Class Training**:
  - FEMP received the prestigious authorized provider status from the International Association for Continuing Education and Training (IACET).
- **Recognizing and Encouraging Success:**
  - Federal Energy and Water Award winners saved over 4.2 trillion Btus of energy, during the 2013 fiscal year. The energy savings alone are equivalent to removing 56,800 cars from the road.
  - FEMP was recently recognized with a Presidential Award for the "Green Dream Team," a collaboration and partnership between the Department of Transportation and the Federal Energy Management Program.

Federal Energy Management Program – FY 2016 Budget Request

Goals/Metrics

- Reduce energy intensity by 30% by FY 2015, relative to FY 2003 (EISA 2007).
- Reduce scope 1 and 2 GHG emissions by 28% in FY 2020 compared to FY 2008 (E.O.13514).
- Ensure that at least 7.5% of electricity is from renewable sources in FY 2014 and 20% by 2020 (EPAct 2005, President's Climate Action Plan).
- Reduce water consumption intensity 26% by FY 2020 relative to FY 2007 (E.O. 13514).
- Reduce fleet vehicle petroleum consumption 2% annually by FY 2020, compared to 2005 (E.O. 13514).

(Dollars in Thousands)	FY 2014 Current	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Federal Energy Management	0	0	27,288	+27,288
Federal Energy Efficiency Fund/AFFECT	3,000	2,850	15,000	+12,150
DOE Specific Investments	2,509	2,160	0	-2,160
NREL Site-Wide Facility Support	0	800	800	0
Project Financing	9,558	9,500	0	-9,500
Technical Guidance and Assistance	6,224	6,317	0	-6,317
Planning, Reporting and Evaluation	5,569	4,073	0	-4,073
Federal Fleet	1,388	1,300	0	-1,300
Total, Federal Energy Management Program	28,248	27,000	43,088	+16,088

Federal Energy Management Program – FY 2016 Budget Highlights

- **Federal Energy Efficiency Fund ($15M):** To assist agencies to invest in priority projects for efficiency and renewables with the greatest impact. The increased direct funding will leverage major investments at other Federal agencies for capital improvement projects and other initiatives to increase energy efficiency, conserve water, and increase renewable energy investments and return savings to the Government.
    - FEEF will issue awards to support the best available agency projects.
    - DOE will instill best practices and utilize innovative technologies developed by EERE programs to improve Federal Government efficiency.
- **President's Performance Contracting Challenge ($11.3M):** Support the President's Performance Contracting Challenge by assisting agencies to successfully meet the $4 billion goal for investing in energy efficiency and renewable energy projects to achieve energy savings and lower the cost of future energy bills.
    - As of January 15, 2014, 194 projects have been awarded with an investment value of $1.98B.
    - FEMP will expand on the best practices from the this challenge to partner with non-Federal Government and private sector stakeholders to accelerate the use of performance-based contracting.
- **Technical Support for Agencies ($10.3M):** Continue to lead the DOE Better Buildings Data Center Challenge to improve Federal data center consolidations and efficiency, in addition to data center efficiency more broadly throughout the public and private sectors. Provide assistance focused on agency achievement of the requirement for 20% renewable energy by 2020.

Weatherization and Intergovernmental Programs -- Overview

Motivation/Focus

- Partner with state and local organizations to significantly accelerate the deployment of clean energy (e.g., energy efficiency and renewable energy) technologies and practices by a wide range of government, community, and business stakeholders.

Achievements

- Implemented national certifications and work specifications for residential retrofit worker training, energy audits, and weatherization methods in FY 2014 (WAP).
- Exceeded FY 2014 Performance Goal of 24,600 home retrofits for low income families by 50%.
- SEP leads the public sector (state and local) section in EERE's Better Buildings Challenge and other cooperative initiatives. Between FY 2010 and mid-FY 2014, the program established partnerships with:
  - 90+ public-sector partners committed to reducing their energy intensity by 20 percent or more by 2020; and
  - 29 states to develop replicable approaches for improving public buildings, to include the use of energy savings performance contracts.
- Successfully recruited 15 – 20 public-sector partners per year into Better Building initiatives, including accelerating investments in state and local government use of ESPCs by $2 billion by 2016.
- Established sustainable lending capacity of over $700 million in 40 States and 74 local jurisdictions to support deployment of energy efficiency improvements and renewable energy systems (Recovery Act).

Weatherization and Intergovernmental Programs – FY 2016 Budget Request

Goals/Metrics

- Reduce state government facilities and operations energy use by 2 percent per year by 2020.
- Complete 300,000 residential energy efficiency retrofits for low income families between FY 2013 and FY 2022.
- WAP Performance Measure: Retrofits - Weatherized homes of low income families
  - FY 2014 Target: 24,600 homes weatherized. FY 2014 Result: Exceeded, approximately 38,000 retrofits.
  - FY 2015 Target: 30,000 homes weatherized.
  - FY 2016 Target: 33,000 homes weatherized.
- SEP Performance Measures: 1) Public-Sector Partners Recruited and 2) State and Local Sector ESPC Investments
  - FY 2015 Target: Recruit 15 – 20 public-sector partners per year with commitments in Better Building initiatives.
  - FY 2016 Target: Recruit 15 – 20 public-sector partners per year with commitments in Better Building initiatives. Accelerating investments in state and local government use of ESPCs by $2 billion by 2016.

(Dollars in Thousands)	FY 2014 Current	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Weatherization Grants (formula and competitive grants)	170,898	189,600	223,999	+34,399
Training and Technical Assistance	2,998	3,000	4,000	+1,000
NREL Site-Wide Facility Support	0	400	400	0
Total, Weatherization Assistance Program	**173,896**	**193,000**	**228,399**	**+35,399**
State Energy Program	**49,970**	**50,000**	**70,100**	**+20,100**
Local Energy Program	**0**	**0**	**20,000**	**+20,000**
Tribal Energy Program*	**6,996**	**0**	**0**	**0**
Total, Weatherization and Intergovernmental	**230,862**	**243,000**	**318,499**	**+75,499**

* FY 2015 President's Budget Request included the transfer of the EERE Tribal Energy Program activities and responsibilities to the Office of Indian Energy.

Weatherization and Intergovernmental Programs – FY 2016 Budget Highlights

- **Weatherization Assistance Formula Grants ($209M):** Award and actively manage 59 weatherization formula grants that will support critical infrastructure and a level of operations to provide weatherization retrofits for approximately 33,000 low-income families across the country.
- **Weatherization Assistance Competitive Multi-Family ($15M):** Competitively select and manage more than 20 high-impact projects to develop and test out a number of financing models to support energy-efficiency retrofits in the underserved multi-family sector.
- **State Energy Formula Grants ($45M):** Award and actively manage 56 formula grants to advance deployment of effective energy efficiency and renewable energy policies and technologies by state governments and expand state-led comprehensive clean energy and energy planning capabilities.
- **State Competitive Energy Projects ($15M):** Competitively select and manage 20-30 multi-jurisdictional energy efficiency and clean energy technology projects aimed at creating and/or transforming markets to enable scaled-up adoption of energy efficiency and clean energy technologies and to assist states with comprehensive energy planning.
- **Local Energy Program ($20M):** Through technical assistance and competitive grants this program supports local government energy program and project planning, development, and implementation. DOE anticipates supporting 35-40 replicable, high impact, competitively selected, energy efficiency projects across the country.

Questions?

Submit your questions via the “Questions” window on your GoToWebinar dock.

For Further Information

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Webinar Slides & Fiscal Year 2016 EERE Budget Request Information:

http://energy.gov/eere/eeres-2016-budget

For more information, please contact

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