

The FY 2011 Budget Request

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



February 2010

Cathy Zoi
Assistant Secretary for EERE

Clean Innovative Energy Solutions Securing America's Future



"...energy efficiency and clean energy are the right thing to do for our future - because the nation that leads the clean energy economy will be the nation that leads the global economy. And America must be that nation."

President Obama
State of the Union

January 27, 2010

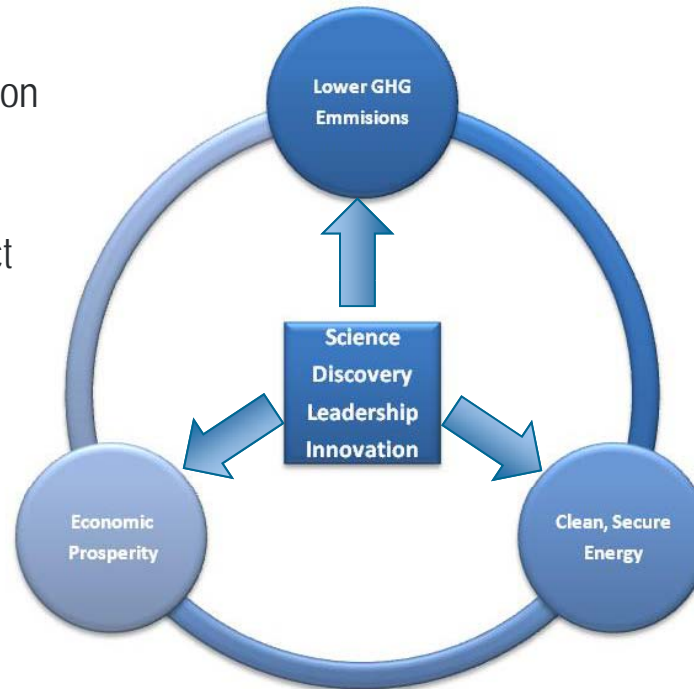
EERE's Overarching Goals

Environmental

- A prosperous economy with sharply declining CO₂ production through energy efficiency and clean electricity and fuels.
- Minimize environmental impact of new energy techn

Economic

- Creating new businesses and new jobs
- Promoting U.S. competitiveness by leading the world in energy efficiency and renewable energy



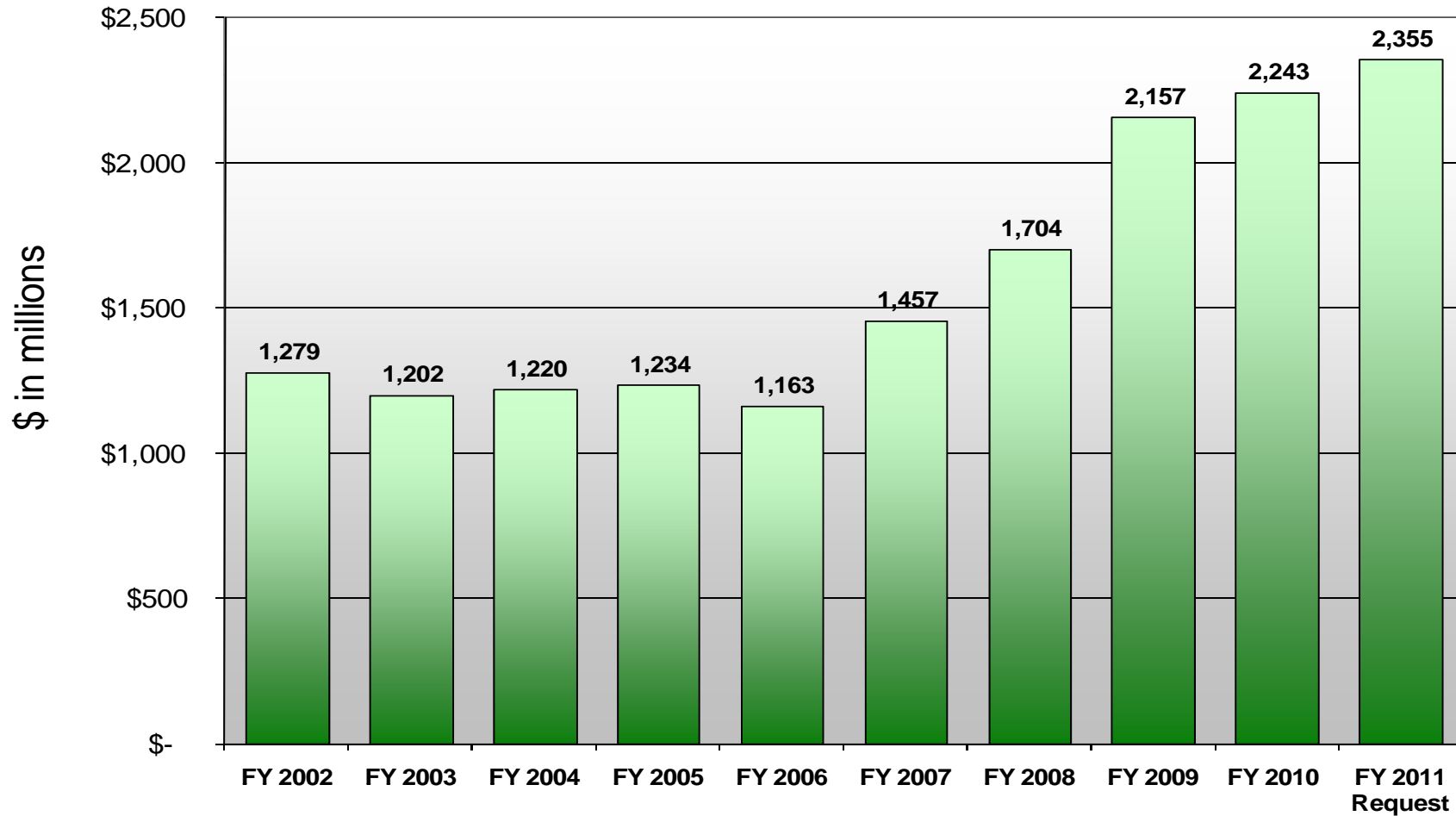
Energy Security

Reducing energy imports with efficient vehicles, factories and renewable transportation fuels and feedstocks

Management: Pursue program and institutional management excellence

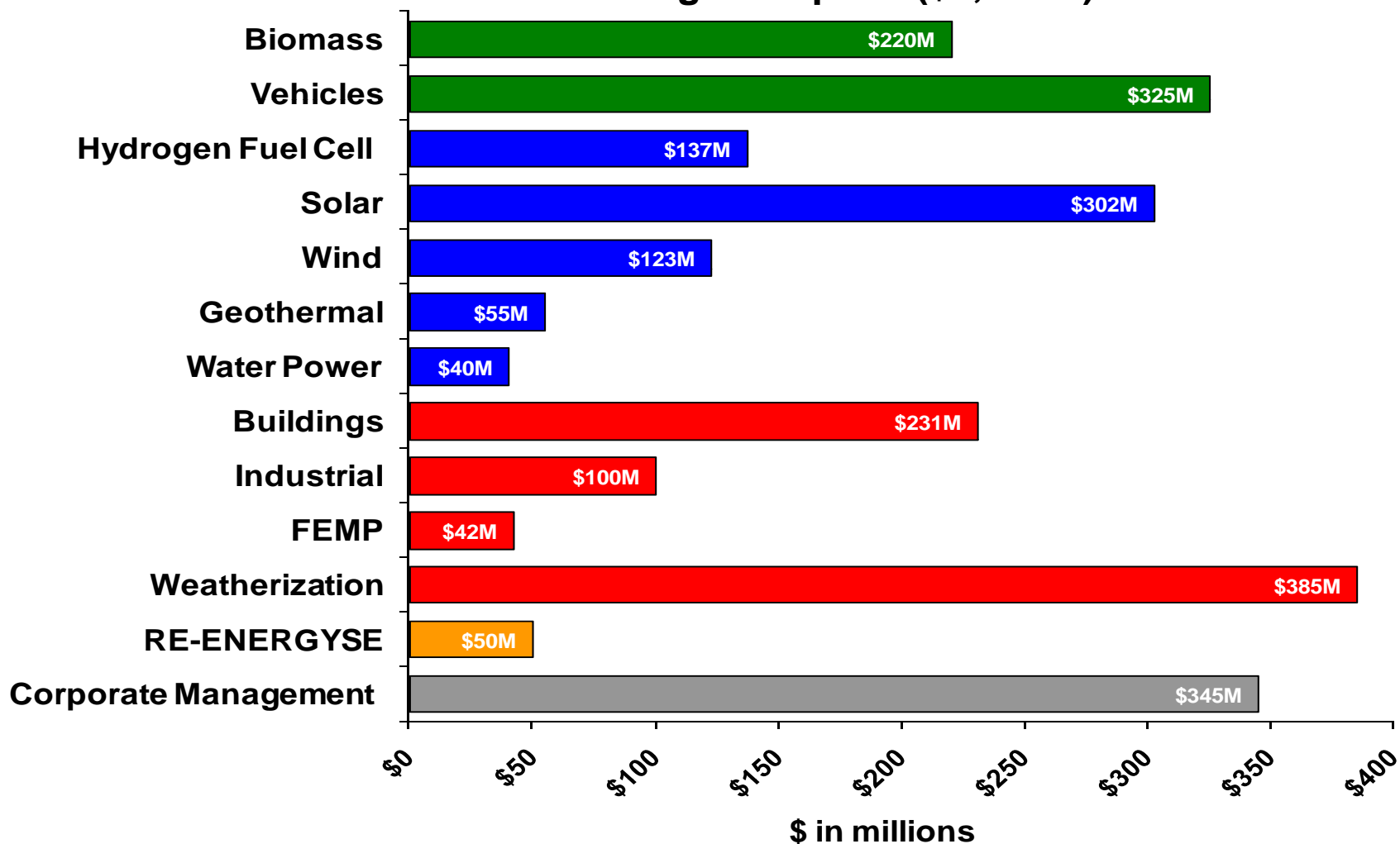
EERE Budget Trend

EERE 10 Year Budget Trend FY 2002 - FY 2011



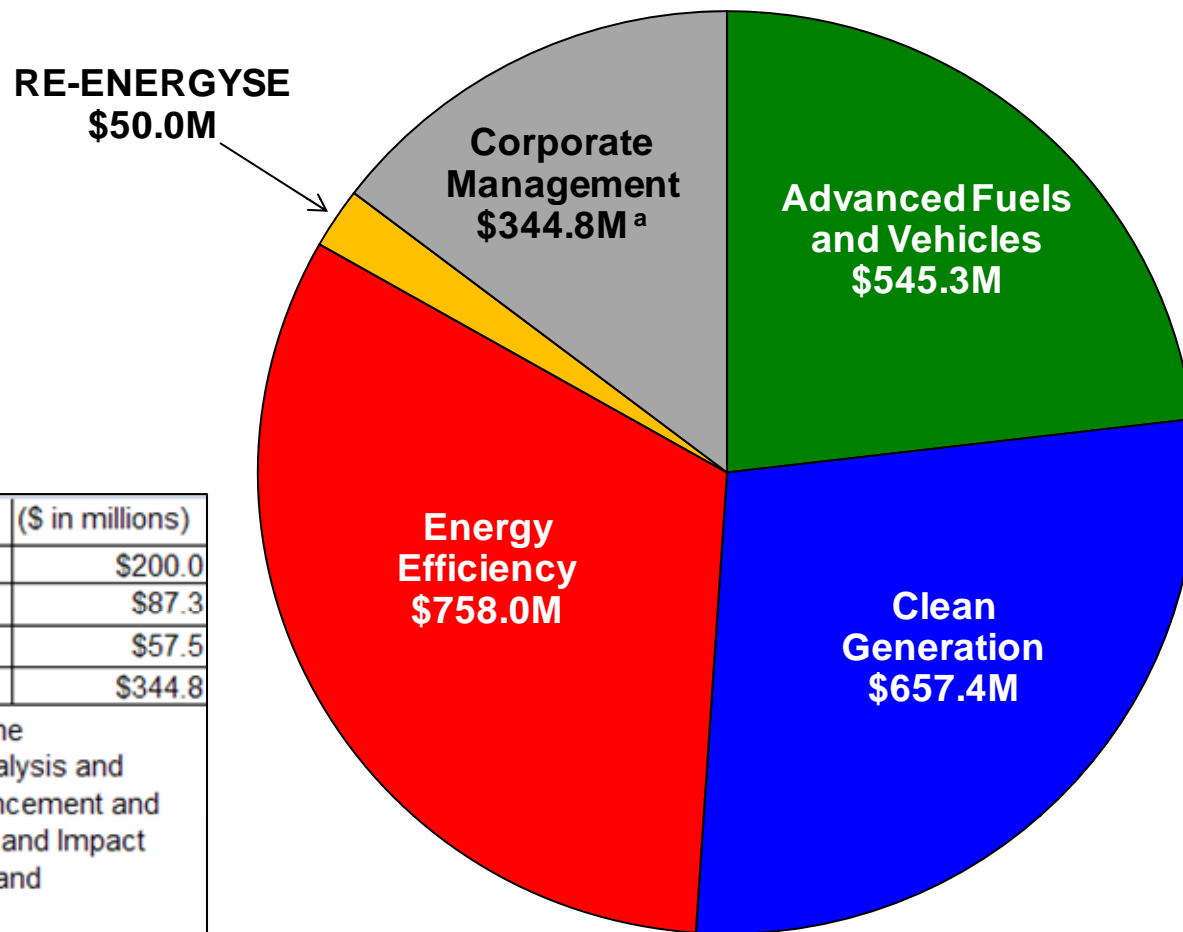
Funding by Program

FY 2011 Budget Request (\$2,355M)



Funding Distribution

FY 2011 Congressional Budget Request (\$2,355M)



Corporate Management ^a	(\$ in millions)
Program Direction	\$200.0
Program Support ^b	\$87.3
Facilities and Infrastructure	\$57.5
Total	\$344.8

^b Program Support includes the subprograms of Planning, Analysis and Evaluation, Technology Advancement and Outreach, Strategic Priorities and Impact Analysis, Commercialization and International

Budget Table

Energy Efficiency and Renewable Energy FY 2009 - FY 2011 Budget Table

Programs	FY 2009		FY 2010	FY 2011	FY11 vs FY10	
	Current Approp.	Current Recovery	Current Approp.	Congressional Request	\$ Change	Percent Change
Biomass and Biorefinery R&D	214,245	777,138	220,000	220,000	0	0%
Vehicles Technologies	267,143	2,795,749	311,365	325,302	+ 13,937	4%
Hydrogen and Fuel Cell Technologies	164,638	42,967	174,000	137,000	- 37,000	-21%
Geothermal Technology	43,322	393,106	44,000	55,000	+ 11,000	25%
Solar Energy	172,414	115,963	247,000	302,398	+ 55,398	22%
Water Power	39,082	31,667	50,000	40,488	- 9,512	-19%
Wind Energy	54,370	106,932	80,000	122,500	+ 42,500	53%
Buildings Technologies (includes Hub)	138,113	319,186	222,000	230,698	+ 8,698	4%
Federal Energy Management Program	22,000	22,388	32,000	42,272	+ 10,272	32%
Industrial Technologies	88,196	261,501	96,000	100,000	+ 4,000	4%
Weatherization & Intergovernmental	516,000	11,544,500	270,000	385,000	+ 115,000	43%
RE-ENERGYSE	0	0	0	50,000	+ 50,000	NA
Program Direction	127,620	80,000	140,000	200,008	+ 60,008	43%
Program Support	18,157	21,890	45,000	87,307	+ 42,307	94%
Facilities and Infrastructure	76,000	258,920	19,000	57,500	+ 38,500	203%
Congressional-Directed Activities	228,803	0	292,135	0	- 292,135	-100%
Use of Prior Year Balances	- 13,238	0	0	0	0	NA
Total, EERE	2,156,865	16,771,907	2,242,500	2,355,473	+ 112,973	5%

Green = Advanced Fuels and Vehicles

Red = Energy Efficiency

Blue = Clean Energy Generation

Orange = Education and Outreach

Grey = Corporate Management

Major Changes from FY2010 budget

Solar Energy Technology: \$302M; \$55M or 22% increase

- Increase for CSP demonstration to accelerate first substantial deployment by 2 to 3 years of up to 1 GW.

Weatherization and Intergovernmental Program: \$385M; \$115M or 43% increase

- Increase of \$90M for Weatherization grants; includes \$30M to continue Innovations in Weatherization.
- Increase of \$25M for State Energy Program for state clean energy and energy efficiency programs.

Wind: \$122.5M; \$43M or 53% increase

- Increase for Offshore Wind to promote and accelerate U.S. commercial offshore wind development through resource and environmental impact assessments and R&D on turbine reliability and components.

Vehicle Technologies: \$325.3M; \$14M or 4.5% increase

- Increases funding for R&D needed for plug-in hybrid electric vehicles (PHEVs) in support of the President's goal of one million PHEVs that get over 150 miles per charge on the road by 2015.

Program Direction: \$200M; \$60M or 43% increase

- Provides 392 additional FTEs, additional site visits, project coordination and project oversight.

Hydrogen and Fuel Cell Technologies (formerly Hydrogen Technologies):

- \$137M; \$37M or 21% decrease from FY2010 appropriated levels

Program Support: \$87.3M; \$42.3M or 94% increase

- Increases funding for Strategic Priorities and Impact Analysis and Commercialization subprograms to provide cross-cutting perspectives on impacts of EERE technologies and barriers to marketing EERE technologies while ending internal program taxes.
- International subcoordination and best practice sharing with nations, including China, program increased by \$15M to increase India, Russia, Brazil, Canada and Argentina.

Key Themes

- Demonstrating large scale, quickly built, barrier busting replicable renewable generation facilities
- Rapidly building on and leveraging Recovery Act investments
- Federal leadership in efficiency and use of renewables meeting the goals of the President's Executive Order.
- Transforming the technology, infrastructure and landscape of the Nation's transportation systems with new vehicles and new fuels
- Making America's manufacturing, construction, and other industries the most innovative and productive in the world
- Support the education and training needed to give Americans with the skills needed by these new businesses – including use of state of the art training technology

Key Innovation Goals

	State of the Art	Goals
Biomass feedstock	\$54/dry ton	\$35/dry ton 2012
Biochemical ethanol (conversion cost)	\$1.62/gallon	\$0.92/gallon 2012
Solid State Lighting	\$130/klumen & 75 lumen/watt	\$28/klumen & 150 lumen/watt by 2015
PEM fuel cells	\$65/kw	\$30/kw by 2015
Installed cost of photovoltaic systems	\$6-7/watt	\$3.50/watt by 2015
Battery for plug in hybrid vehicle	\$1000/kwh	\$300/kwh by 2014
Efficiency of auto engines	25%	40% (ultra clean diesel)

Key Deployment Goals

- Double non-hydro renewable energy production by 2012
- Design an interagency plan to facilitate permitting for renewable energy technologies
- Support EISA RFS volumetric advanced biofuels goals of 21 billion gallons by 2022.
- Support advanced battery manufacturing capacity for production of 500,000 plug in hybrid vehicles per year by 2015
- Facilitate 1-2 million residential retrofits/year
- Facilitate 0.5-1 million commercial retrofits/year
- Facilitate state adoption of energy efficiency policies that yield significant energy savings (eg. 1% or more) in at least 10 states
- Facilitate Federal agencies meeting or exceeding executive order 13514 goal of 28% reduction in federal GHG emissions by 2020
- Final appliance standards for 10 product categories in FY10

Large Scale Demonstration of Key Renewable Technologies

- **Large Scale Biopower (\$50.0M):** Develop up to 500 megawatts of biomass power production capability utilizing advanced technology and/or re-commissioning existing facilities. Projects will demonstrate commercial use of biopower from cellulosic feedstocks at scale and validate the potential of biopower with cost sharing from the private sector.
- **Concentrating Solar Power (CSP) (\$50.0M):** Facilitate the deployment of a cluster of CSP projects that together can add up to 1 gigawatt of electricity capacity. Project aims to accelerate demonstration of advanced technologies – and reduce siting & transmission cycle time – to enable use of substantial private capital resources for build-out of large scale facilities.
- **Offshore Wind (\$49.0M):** Facilitate the development of an estimated 300 megawatts of offshore wind power in the US by building in and expanding on areas currently targeted for deployment by developers. Goal is to stimulate development of over three gigawatts of offshore wind capacity in promising shallow and intermediate depth offshore wind zones.
- **Water Power Development (\$10.5M):** Building on the Recovery Act, initiate a multi-year project to increase the generation of electricity and the availability of pumped storage to support wind and solar renewable energy supply. Goal is to enable up to 500 MW of new capacity and efficiency upgrades to existing dams. The projects will help develop and leverage the third-party developer market.

Base Program Activities

Advanced Fuels and Vehicles - \$545.3M

- **Biomass (\$220.0M)** – Feedstock and conversion R&D, integrated biorefinery demonstration and deployment, and infrastructure and market development, includes Large Scale Biopower at \$50M.
- **Vehicles (\$325.3M)** – PHEVs, batteries, hybrid components, lightweighting, advanced combustion, heavy truck efficiency, and Clean Cities.

Clean Generation - \$657.4M (Includes Demonstration & Deployment Investments)

- **Hydrogen & Fuel Cells (\$137.0M)** – Systems R&D and analysis for multiple applications.
- **Solar (\$302.4M)** – PV & CSP R&D, manufacturing, grid system integration and market transformation, includes CSP deployment at \$50M.
- **Wind (\$122.5M)** – Reliability R&D (turbines, blades, etc), resource modeling and forecasting, grid integration, market transformation, environmental studies, includes offshore wind deployment at \$49M.
- **Geothermal (\$55.0M)** – Enhanced Geothermal Systems (EGS) research and demonstration.
- **Water Power (\$10.5M)** – Market study, includes small water power demonstrations at \$10.5M

Energy Efficiency - \$758.0M

- **Buildings (\$230.7M)** – Net zero energy homes and buildings, solid state lighting, appliance standards, building codes, Energy Star, and Innovation Hub.
- **Industry (\$100.0M)** – Energy efficiency processes and practices, Combined Heat and Power (CHP), data center efficiency, Industrial Assessment Centers and Save Energy Now.
- **FEMP (\$42.3M)** – Financial transaction services, technical assistance, help Federal Agencies meet energy efficiency, renewable energy and carbon reduction goals set forth by public law and Executive Orders.
- **Weatherization/Intergovernmental (\$385.0M)** – Low income home weatherization, State Energy Program, and tribal energy.

Base Program Activities

Education and Outreach - \$50.0M

- **RE-ENERGYSE (\$50.0M)** - Catalyze science, technology, and engineering education and workforce development to support clean energy needs; communications/media campaign to promote energy efficiency to K-12.

Corporate Management - \$344.8M

- **Program Direction (\$200.0M)** – Salaries, benefits, travel, training, IT and administrative support; increase from previous years needed to manage the growth in program and oversight.
- **Program Support (\$87.3M)** – Strategic Planning, Analysis & Evaluation, Commercialization, Technology Advancement and Outreach, and International activities.
- **Facilities and Infrastructure (\$57.5M)** – Facilities and equipment maintenance at NREL; final increment for construction of the Energy Systems Integration Facility.

Crosscutting Activities – DOE

- **Office of Science:** Close collaboration on biological feedstocks including algae. EERE moves basic concepts in bioproduction into commercially viable production methods. Advances in nanotechnology and other new materials developed in the Office of Science are moved to advanced product concepts in areas ranging from photovoltaic devices to solid state lighting. EERE works to ensure that the Office of Science is aware of areas where a fundamental breakthrough would be critical for cutting costs or improving the efficiency of key devices.
- **ARPA-E:** Joint workshops to determine promising new fields for both ARPA-E and EERE. Collaborated in design of the buildings hub. Collaborations on algae and advanced biofuels feedstock development.
- **Office of Electricity:** Close collaboration on utility policy and regulations for

- **Fossil Energy:** Collaboration on design of facilities that burn mixtures of coal and biomass
- **FEMP:** plays a key role supporting all DOE office plans to implement Executive Order 13415
- **RE ENERGYSE:** will work with all DOE education and training programs

Crosscutting (Interagency)

- **EPA:** New MOU clarifies collaboration on Energy Star and other issues. DOE testing provides essential data for E15 rule. Collaboration on advanced fuels/engine research and testing.
- **HUD:** MOU allows DOE to work closely with HUD energy retrofit efforts
- **USDA:** Collaboration on biomass feedstock
- **Interior:** Collaboration on permitting and other regulatory issues associated with siting renewables and transmission lines.
- **DOD:** Key collaborator on meeting Executive Order goals and working to meet DOD goals for non-petroleum fuels
- **FERC:** Key partner for analyzing transmission and other needs associated with rapidly expanding use of wind and solar.



Program Detail Slides

Biomass & Biorefinery Systems R&D

Program Focus: Develop and transform domestic, biomass resources into cost-competitive, high performance biofuels, bioproducts, and biopower, specifically: 1) cellulosic ethanol and advanced biofuel technology in support of RFS2 and 2) accelerating the development of biopower technologies.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Feedstocks	15,092	36,993	26,000
Conversion Technologies	51,993	85,108	80,000
Utilization of Platform Outputs R&D	147,160	97,899	0
Integrated Biorefineries	0	0	54,000
Analysis and Sustainability	0	0	10,000
Large Scale Biopower	0	0	50,000
TOTAL	214,245	220,000	220,000

Key Activities

Feedstocks (\$26.0M): Enable competitive feedstock supply and delivery to biorefineries by: 1) reducing feedstock logistics cost in 2007 from \$54 to \$35 per dry matter ton (in \$2007) in 2012; 2) validating energy crop yields through Regional Feedstock Development Partnership replicated field trials; and 3) initiating algal strain collection and genomic activities.

Conversion Technologies (\$80.0M): Reduce biomass conversion cost to meet 2012 cost target for cellulosic ethanol by: 1) biochemical processes that produce cellulosic ethanol via enzyme cost reductions and pretreatment to overcome recalcitrance (from \$1.62 in 2009 to \$0.92 in 2012); and 2) thermochemical processes that produce advanced biofuels via syngas cleanup cost reductions and pyrolysis oil stabilization (from \$1.31 in 2009 to \$0.86 in 2012).

Integrated Biorefineries (\$54.0M): Operate demonstration and commercial-scale biorefineries to validate techno-economic performance and enable future scale-up or replication in support of RFS2.

Analysis and Sustainability (\$10.0M): Quantify technology progress, projections, and risk through systems analysis. Crosscutting sustainability analysis focuses on developing applications for measuring environmental impacts and barriers of a biofuels industry.

Large Scale Biopower (\$50.0M): Initiate a competitive solicitation for biopower and biochar RD&D, including an assessment of feedstock supplies with the ultimate goal of adding 500MW capacity by 2017.

Building Technologies

Program Focus: Develop and deploy technologies, tools, and standards for making residential and commercial buildings and appliances more energy-efficient, affordable, and better performing.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Residential Buildings Integration	21,900	40,000	39,000
Commercial Buildings Integration	32,057	39,000	39,000
Emerging Technologies	42,896	86,000	92,698
Technology Validation and Market Introduction	21,260	22,000	20,000
Equipment Standards and Analysis	20,000	35,000	40,000
TOTAL	138,113	222,000	230,698

Key Activities

Residential Buildings Integration (\$39.0M): Integrate advanced building technologies to reduce the energy consumption of new buildings 50 – 70 percent by 2018 for existing homes. Provide technical assistance (support through technical specifications; best practices and contractor qualification). Create a building performance label for a residential pilot leading to the national building rating system (NBRP). Develop up-to date information on cost-effective measures and incorporate into our modeling. The goal is to facilitate 1 million retrofits per year.

Commercial Buildings Integration (CBI) (\$39.0M): Support commercial retrofit programs through technical assistance (technical specifications; best practices and contractor qualification). The goal is to facilitate half a million to one million retrofits per year.

Emerging Technologies (\$92.7M): Research fills identified gaps in technical performance and/or cost reduction needed to accelerate market penetration including: Energy Efficiency Hub; study of climate impacts of cool roofs; solid state lighting (123 lumens per Watt); envelope and windows (highly insulating (R5)); heating ventilation and air conditioning (new cooling fluids); solar heating and cooling; and analysis tools and design strategy.

Technology Validation and Market Introduction (\$20.0M): Transform the market through the testing and verification of ENERGY STAR products. Increase the energy efficiency of both the residential code and commercial code by 30%, through high quality technical analysis and partnerships with the International Code Council, ASHRAE and stakeholder groups.

Equipment Standards and Analysis (\$40.0M): DOE is committed to clearing the backlog of delayed actions, while simultaneously meeting all new requirements instituted by EPACK 2005 and EISA 2007. In 2011, BTP will complete energy efficiency standards for 23 products.

Facilities and Infrastructure

Program Focus: EERE is responsible for stewardship of the National Renewable Energy Laboratory (NREL) and funds infrastructure related capital investments. These investments maintain and acquire strategic, supporting, and sustaining capabilities at NREL in support of EERE's mission and maintain safety and security standards.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Operation and Maintenance	22,000	19,000	18,000
Construction	54,000	0	39,500
TOTAL	76,000	19,000	57,500

Key Activities

Operation and Maintenance: General Purpose Equipment/ General Plant Projects (\$18.0M):

- **General Purpose Equipment (\$5.0M):** Annual investment to maintain and replace NREL administrative support and shared research equipment portfolio to EERE's 50% depreciated value standard.
- **General Plant Projects (\$10.0M):** Annual investment for plant improvements and upgrades to maintain the operability and safety of NREL real property assets and contributes towards EERE's 2% replacement value reinvestment commitment.
- **Maintenance and Repair (\$3.0M):** Provides direct operating dollars to fund maintenance and repair of NREL real property assets that cannot be funded through General Plant Projects. This investment contributes to EERE's corporate 2% replacement value commitment.

Construction: Energy Systems Integration Facility (ESIF) (\$39.5M):

ESIF will provide a unique national capability to simulate, model, and optimize energy systems to address the technical, operational, and financial risks that inhibit the widespread incorporation of renewable energy and energy efficiency technologies into these systems. ESIF will test, evaluate and validate cost-effective renewable electricity generation, storage, and distribution components and systems to reduce the financial, technical, and market risk of wide-scale deployment and commercialization within the Nation's existing grid and emerging distributed energy infrastructure. The facility will integrate the effort of multiple renewable energy and energy efficiency technologies. This project was approved and funded by Congress in FY08 and FY09 for a total of \$95.5M of the \$135.0M cost. No funding was appropriated in FY10. The FY11 funding of \$39.5M completes the funding for this project.

Federal Energy Management Program

Program Focus: Facilitates the Federal Government's implementation of sound, cost effective energy management and investment practices to enhance the Nation's energy security and environmental stewardship.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Project Financing	8,000	11,800	12,072
Technical Guidance and Assistance	4,000	8,000	10,000
Planning, Reporting and Evaluation	2,000	3,000	5,000
Federal Fleet	2,000	3,000	3,000
DOE Specific Investment	6,000	6,200	12,200
TOTAL	22,000	32,000	42,272

Key Activities

Project Financing (\$12.1M): Support Federal agency use of third party financing through technical assistance and project facilitation with projects resulting in lifecycle savings of about 30 trillion Btus. These projects will be financed with about \$240 million in investment from private sector and utility sources.

Technical Guidance and Assistance (\$10.0M): Provide unbiased, expert technical assistance in areas such as audits for buildings, new technology deployment or analytical software tools with projects resulting in lifecycle savings of about 14 trillion Btus. Provide site assessments, technical and design assistance, project identification and prioritization, and audit training for Federal facilities.

Planning, Reporting and Evaluation (\$5.0M): Collection, tracking and verification of Federal data as required by Congress, including new requirements for tracking greenhouse gases and progress towards executive and statutory goals of energy efficiency and renewable energy use.

Federal Fleet (\$3.0M): Assist Federal agency with technical assistance and support to meet the goals for reducing petroleum use by 20 percent and to increase alternative fuel consumption by 10 percent between 2005 to 2015 in vehicles as set forth in Executive Order 13423.

DOE Specific Investments (\$12.2M): FEMP provides technical assistance, project transaction services and direct capital investment to help implement Federal environmental, energy, and transportation management goals at DOE sites. These activities support DOE's efforts to meet goals set by public law and Executive Order, helping DOE to be in the forefront of implementing Federal best practices.

Geothermal Technology

Program Focus: Increase the domestic geothermal resource base and reduce the cost of heat and power through development of Enhanced Geothermal Systems technologies.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Enhanced Geothermal Systems demonstrations and component R&D	43,322	44,000	55,000
TOTAL	43,322	44,000	55,000

Key Activities

Enhanced Geothermal Systems (EGS) (\$55.0M)

- **Component R&D:** Conduct critical R&D to create and characterize the underground fracture system that provides surface area for sustainable heat extraction, and reduce cost of operating EGS, including a seismic tool that can operate at 240°C for at least 1,000 hours.
- **Demonstrations:** Demonstrate technical feasibility of EGS in different geological conditions throughout western U. S.; increase the flow rate to 12 kg/s at a domestic EGS well and reduce annual temperature drawdown below 2%.
- **Low Temperature Power Generation:** Demonstrate technical feasibility of power generation from lower temperature fluids including those coproduced with oil & gas, renewable, and geopressured resources. Collect cost and performance data on at least one additional region.
- **Induced Seismicity:** Investigate the causal mechanisms of induced seismicity with the Offices of Science and Fossil Energy. Collaborate in at least two research activities.
- **International:** Collaborate with the International Partnership for

- **Analysis:** Conduct life cycle analysis of geothermal energy including water, environment, and economics. Complete low temp and exploration risk analysis. Create geothermal jobs and economical development model.

Hydrogen and Fuel Cell Technologies

Program Focus: Research and develop hydrogen and fuel cell technologies as a competitive option for clean, efficient, reliable energy.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Fuel Cell Systems R&D	80,068	77,482	67,000
Hydrogen Fuel R&D	67,823	47,000	40,000
Systems Analysis	7,520	5,556	5,000
Market Transformation	4,747	25,865	9,000 ^a
Manufacturing R&D	4,480	5,000	5,000
Technology Validation	0	13,097	11,000 ^b
Total, Hydrogen and Fuel Cell Technologies	164,638	174,000	137,000

^a This budget will fund only Safety, Codes, and Standards activities in FY 2011.

^b This activity along with Safety, Codes, and Standards and Education were funded within the Vehicle Technologies program in FY 2009.

Key Activities

In FY 2011, the Hydrogen and Fuel Cell Technologies (HFCT) Program will focus its R&D on lowering costs and improving performance of hydrogen and fuel cell technologies for transportation, stationary and portable applications.

Fuel Cell Systems R&D (\$67.0M): consolidates the former Distributed Energy, Transportation Fuel Cell Systems, Fuel Cell Stack Component R&D, and Fuel Processor R&D subprograms. Key goals include:

- Reduce costs by increasing PEM fuel cell power output per gram of platinum-group catalyst from 2.8 kW/g (in 2008) to 4.0 kW/g in 2011 and 8.0 kW/g by 2015.
- Enable widespread commercialization by increasing durability of stationary fuel cells from 20,000 hours (2008) to 40,000 hours in 2015.

Hydrogen Fuel R&D (\$40.0M): consolidates the former Hydrogen Production and Delivery R&D and Hydrogen Storage R&D subprograms. Program focus will be long-term production and storage materials R&D to achieve an 80 percent capital-cost reduction for production of hydrogen from renewable resources by 2015 (relative to 2010).

Systems Analysis (\$5.0M): determines technology gaps and life-cycle greenhouse gas (GHG) and criteria pollutants emissions for at least two fuel cell combined heat-and-power (CHP) systems.

Market Transformation (\$9.0M): is restructured to include Safety, Codes, and Standards and Education in addition to early-market deployment activities – but funding for early-market activities and Education is deferred in FY 2011.

Manufacturing R&D (\$5.0M): will enable a robust domestic supply base for fuel cells by developing low-cost, high-volume manufacturing technologies.

Technology Validation (\$11.0M): will collect real-world data on stationary fuel cells, specialty and light-duty vehicles, and complete current commitments.

Industrial Technologies

Program Focus: Reduce the intensity of energy use in the U.S. industrial sector through voluntary partnerships under the Save Energy Now initiative and research, development, and demonstration (RD&D) of next-generation manufacturing technologies.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Industries of the Future (Specific)	15,160	12,121	2,627
Industries of the Future (Crosscutting)	53,469	53,005	55,213
Industrial Technical Assistance	19,567	30,874	32,160
Manufacturing Energy Systems	0	0	10,000
TOTAL	88,196	96,000	100,000

The FY11 budget reflects a streamlined programmatic emphasis to expand partnerships with energy intensive industries and prioritize crosscutting technologies that provide significant energy savings across multiple energy intensive industries.

Key Activities

Chemicals Industry (\$2.1M), Fuel and Feedstock Flexibility (\$3.9M): Conduct critical industry-specific and next generation manufacturing R&D in partnership with energy intensive industries to save 100 trillion Btu/yr and displace 20% of industrial natural gas use by 2030.

Nanomanufacturing (\$4.9M), Industrial Materials of the Future (\$4.3M), Energy-Intensive Process R&D (\$15.3M): Continue R&D efforts in industrial-scale nanomanufacturing, advanced materials, and an ultra-high efficiency industrial boiler to save 82 trillion Btu annually by 2025 and abate 4.9 MMTCE annually by 2030.

Combined Heat and Power Generation (\$26.3M): Develop energy efficient distributed energy generation, combined-heat and power systems, and advanced reciprocating engine systems for industrial plants and high-growth commercial and institutional applications to save 5.3 Quads/yr and 848 MMTCO₂/year by 2030.

Energy Services Development (\$4.1M): Contribute to the Administration's green workforce goal of training more engineers and scientists in the energy field through the Industrial Assessment Centers (IACs) activity, saving 4.3 trillion Btu & 0.43 MMTCO₂ in the last 3 years and training 200 students/year as future energy managers.

Save Energy Now LEADERS Partnerships (\$28.1M): Expand partnership with leading corporations to accelerate the implementation of energy-saving projects by targeting technical assistance to plants with significant opportunities for energy and carbon reduction to save 700 trillion Btu/yr and 48 MMTCO₂/year by 2020. This effort supports the *Energy Policy Act of 2005* which mandated that the U.S. Department of Energy reduce industrial energy intensity by 2.5% a year.

Manufacturing Energy Systems (\$10.0M): Develop MESPes to serve as knowledge development and dissemination centers organized around distinct manufacturing areas with critical technical needs to significantly reduce manufacturing energy intensity and carbon emissions.

Note: Cement (\$.5M) and Desalination (\$.5M) key activities are also included in the programs focus in FY 2011.

Program Focus: Provide executive and technical direction, oversight, for EERE technology programs.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Salaries and Benefits	65,262	84,519	139,285
Travel	3,313	3,697	3,148
Support Services	38,229	32,855	35,700
Other Related Expenses	20,816	18,929	21,875
TOTAL	127,620	140,000	200,008

Key Activities

Salaries and Benefits (\$139.3M): Increase Federal staff from 613 to 1,005 FTE (+392) to provide management and oversight for workload increasing from 4,800 active projects to over 7,700 with a value in excess of \$4 billion.

The significant increase in projects, contracts, grants, cooperative agreements, and administrative activities presents significant oversight challenge for the Department. Staff will provide the technical and business administration expertise necessary to implement, accelerate, and monitor EERE's technology portfolio and supporting programs.

Travel (\$3.1M): Necessary for the coordination and oversight of technical and administrative responsibilities for protecting Federal assets and investments.

Support Services (\$35.7M): Contract support services through 2 field office locations, and 10 DOE laboratories and field offices to assist EERE in implementing and sustaining the increased workload. Enhance business intelligence systems and supports expanded Information Technology due the additional staff such as network and desktop services essential to day-to-day operations.

Other Related Expenses (\$21.9M): Provides for increasing GSA rent and commercial office space for 392 additional employees. Provides for building management, security, mail, office equipment, software and licenses, communications, printing, copy centers, supplies and materials, etc.

Program Focus: Provide executive and technical direction, oversight, analysis, communications outreach, and commercialization for the implementation of EERE programs.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Planning, Analysis and Evaluation	10,078	11,000	12,094
Technology Advancement and Outreach	8,079	11,000	13,000
Strategic Planning and Impact Analysis	0	6,000	27,000
Commercialization	0	7,000	10,213
International	0	10,000	25,000

Key Activities

Planning, Analysis, and Evaluation (\$12.1M): Provide best-in-class analytic insights for decision makers. Support budget planning, formulation, and defense with corporate-level, integrated analysis, including GGPRA benefits modeling. Support corporate and programmatic portfolio planning. Conduct and provide guidance for program evaluation.

Technology Advancement and Outreach (\$13.0M): Lead outreach efforts to consumers, media, partners, stakeholders, Congress, etc. (working with PA, CI, and others) and a lead national efficiency education campaign. Communicate EERE mission and accomplishments. Respond to public, industry, and Congressional inquiries, and manage correspondence, etc.

Strategic Priorities and Impact Analysis (\$27.0M): Deliver EERE technology roadmap to help achieve 80% greenhouse-gas emissions reductions. Conduct cross-cutting legislative and policy analysis and conduct life-cycle and supply-chain analyses to anticipate barriers to broad adoption of EERE technologies. Provide analysis of Low Carbon Energy Systems for Emerging Nations.

Commercialization (\$10.2M): Increase speed and scale of market penetration of EERE technologies. Continue the lab technology commercialization fund, direct commercialization support, and refine the entrepreneur in residence program based on learning from pilots to increase resulting licensing and start ups. Continue expansion of EERE technology portal.

International (\$25.0M): Support bilateral partnerships with China, India, and others. Support international and regional collaboration, focusing on efforts that advance widespread adoption of EERE technologies and practices. Advance U.S. goals for global climate change, energy security, and the economy, and transform EE and RE markets in key developing countries.

RE-ENERGYSE

(Regaining ENERGY Science and Engineering Edge)

Program Focus: Develop the next generation of U.S. scientists, engineers and highly skilled workers to innovate and commercialize affordable, abundant clean energy and accelerate the U.S. transition to a low carbon economy. DOE-wide Initiative

Key Activities

Higher Education (\$35.0M): The Higher Education subprogram will support fellowships, assistantships, post-doctoral opportunities, as well as new interdisciplinary professional masters programs in the area of clean energy; and support hands-on programs, such as the highly-successful Solar Decathlon, to engage students in developing clean energy systems.

Technical Training, Education and Outreach (\$15.0M): The Technical Training, Education and Outreach subprogram will support the development of effective education and training programs at community colleges and other training centers, as well as provide K-12 education and engagement to prepare and inspire thousands of students to enter the new clean energy workforce.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Higher Education ^a	0	0	35,000
Technical Training and K-12 Education	0	0	15,000
TOTAL	0	0	50,000

^a Excludes \$5 million requested in the Office of Nuclear Energy for nuclear energy fellowships.

Program Focus: Enable grid parity by 2015 & high penetration of solar technologies.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request ¹
Photovoltaic R&D	142,793	128,490	152,000
Concentrating Solar Power	29,621	49,720	98,200
Systems Integration	0	23,250	30,698
Market Transformation	0	23,540	21,500
Fuels from Sunlight Hub ^a	0	22,000	0
TOTAL	172,414	247,000	302,398

^a Fuels from the Sunlight Hub is requested by DOE's Office of Science in FY 2011.

Key Activities

Photovoltaic R&D (\$152M):

- Advanced R&D (long-term) to explore transformational concepts and materials in laboratory-scale devices to achieve 3x cost reductions from current levels (\$29.0M)
- Prototype Development (mid-term) focused on commercially-relevant prototype designs which promise disruptive (2x) cost reductions (\$19.0M)
- Product and Process Development (near-term) includes the PV Manufacturing Initiative and other efforts to enhance competitiveness of U.S. industry leading to an increase in the U.S. global market share by 5x (\$78M)
- Measurements & Characterization and Test & Evaluation (\$26M) support.

Concentrating Solar Power (CSP) (\$98.2M):

- CSP Industry R&D to develop next generation components, thermal storage that can provide a up to a 75% capacity factor, and advanced high temperature technologies that will allow CSP to compete in intermediate and baseload power markets (\$28.2M)
- CSP Laboratory R&D to explore advanced concepts (long-term) and support industry efforts in trough, dish, tower, and thermal storage systems and will result in a 2x reduction from current costs (\$20.0M)
- Assist industry deployment by addressing land, water, and transmission issues and launch a Solar Development Zone Initiative to demonstrate 1 GW of new CSP technologies and enable eventually well over 20 GW of projects in the U.S. Southwest (\$50.0M)

Systems Integration (\$30.7M):

- Address the technical barriers that will enable 10-20% solar market penetration by modeling performance and analyzing their effect on the grid, develop new technologies that integrate with the smart grid, measure the solar resource to assess variability, and develop and implement codes and standards.

Market Transformation (\$21.5M):

- Fund a nationwide Solar Instructor Training Network with the potential to support as many as 170,000 installers and other new solar jobs. Support key implementation projects with 25 Solar America Cities and work with states, utilities, local governments and other stakeholders to assess policies and business models that accelerate adoption of solar energy.

Vehicle Technologies

Program Focus: Enable reductions in petroleum use and carbon emissions through R&D to improve the energy efficiency and fuel-diversity of cars and trucks.

Budget Request

Activity	Funding (\$ in thousands)		
	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Batteries and Electric Drive Technology ^a	101,572	101,405	120,637
Vehicle and Systems Simulation and Testing ^a	21,126	44,328	44,328
Advanced Combustion Engine R&D	39,657	57,600	57,600
Materials Technology	38,786	50,723	50,723
Fuels Technology	19,560	24,095	11,000
Outreach, Deployment & Analysis ^a	46,442	33,214	41,014
TOTAL	267,143	311,365	325,302

^a Structure change requested for the noted subprograms.

These activities support the FY 2015 Vehicle Technologies goal of domestic production of more than 500,000 PHEV's.

Key Activities

Battery and Electric Drive Technologies (\$120.6M): Focus on cathode performance, new materials, high voltage, electrolytes, power electronics and electric motors. Reduce Plug-in Hybrid Electric Vehicle (PHEV) battery costs from \$1,000/kWh (2008) to \$300/kWh (2014); Reduce electric drive costs from \$22/kW (2008) to \$12/kW (2015).

Vehicle and Systems Stimulation & Testing (\$44.3M): Conduct systems analysis (PSAT and Autonomie models), PHEV demonstrations and evaluations, assess commercial truck energy loss reduction (aerodynamics, rolling resistance, electrification). Accumulate 112 million miles of plug-in hybrid and electric vehicle testing by 2015.

Advanced Combustion Engine R&D (\$57.6M): R&D on novel combustion regimes, advanced combustion engines, thermoelectrics to increase efficiency of internal combustion engines; to improve passenger vehicle fuel economy by 25% (gasoline) to 40% (diesel), and 20% for commercial vehicles in 2015. Increase the efficiency of directly converting waste heat to electricity by greater than 80% in 2015.

Materials Technology (\$50.7M): Improve cost/performance of carbon fiber manufacturing, fiber alternative precursors, and magnesium alloys. 50% weight reduction at comparable cost validated for midsized body and chassis (2015).

Fuels Technology (\$11.0M): Focus on improving the combustion efficiency of engines running on next generation biofuels.

Outreach, Deployment & Analysis (\$41.0M): Activities include student competitions, state vehicle regulatory program, peer reviews, will also deploy alternative fuel vehicles and infrastructure via Clean Cities, focusing on electric transportation infrastructure (\$35.5M), reducing petroleum consumption by 1 billion gallons per year in 2015.

Program Focus: Research, test, and develop innovative technologies capable of generating renewable, environmentally responsible, and cost-effective electricity from water.

Budget Request

Activity	Funding (\$ in thousands)		
	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Water Power	39,082	50,000	40,488
TOTAL	39,082	50,000	40,488

Key Activities

Water Power (\$40.5M)

Conventional Hydropower

Feasibility Studies and Energy Audits for Capacity and Efficiency Upgrades at Hydroelectric Facilities and Non-Powered Dams

- Conduct feasibility studies to identify quick and cost-effective opportunities to deploy incremental or new hydropower generation through efficiency and capacity upgrades.
- Feasibility studies and audits will lead to supporting the deployment of new and incremental generation at identified sites.

Marine and Hydrokinetic

Marine and Hydrokinetic: Support MHK System Testing

- Collect data from planned tests and develop framework and infrastructure to allow for widescale testing of MHK systems and evaluation of cost and performance across resource classes and device designs.

MHK Device and Component Design and Development

- Continue to support industry-led and National Lab-led projects to design and manufacture MHK devices and components, and to develop innovative tools to reduce costs and improve performance across water power technologies.

Weatherization and Intergovernmental Activities

Program Focus: Accelerate deployment of energy efficiency and renewable energy technologies, policies, and practices by building on Recovery Act initiatives with State and local governments, utilities, and Native American tribal governments

Key Activities

Weatherization Assistance Grants Program (\$300.0M): Formula grants result in reduced national energy consumption and energy costs for low-income families. Benefits include: completion of at least 33,000 residential energy retrofits; preparation of thousands of workers for “green” careers; and testing of innovative weatherization methods utilizing non-traditional providers.

State Energy Program (\$75.0M): Formula grants support innovative State and local energy projects and protects the core capability of energy offices. “Special Projects” competitive grants have a significant energy impact by addressing “policy” and “financial” components of the technology deployment process. The program also supports grantees through outreach and technical assistance and performance management improvements.

Tribal Energy Activities (\$10.0M): The program builds partnerships with tribal governments to address Native American energy needs. Competitive financial support and technical assistance stimulate clean energy project planning and implementation on tribal lands.

Management of FY 2011 programs complement the \$11.5B in State and local energy efficiency and renewable energy projects initiated under the Recovery Act.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Weatherization Assistance Grants	450,000	210,000	300,000
State Energy Program	50,000	50,000	75,000
International Renewable Energy Program ^a	5,000	0	0
Tribal Energy Activities	6,000	10,000	10,000
Renewable Energy Production Incentive	5,000	0	0
TOTAL	516,000	270,000	385,000

^a EERE international energy activities are located in the Program Support section of the FY 2011 Budget Request.

Program Focus: Improve cost, performance, and reliability of large and distributed wind turbine technology; facilitate wind energy's rapid market expansion; and address potential barriers to integrating wind into the electric transmission system.

Budget Request

Funding (\$ in thousands)

Activity	FY 2009 Approp.	FY 2010 Approp.	FY 2011 Request
Technology Viability	31,370	47,090	90,325
Technology Application	23,000	32,910	32,175
TOTAL	54,370	80,000	122,500

- By 2015, facilitate the installation of at least 1,000 MW in at least 15 States, from an estimated baseline of 3 States in 2008.; and
- By 2020, reduce the unsubsidized cost of energy from land based wind energy systems operating in Class 4 wind regimes by 1.6 cents/kWh from a 2009 baseline of 8.0 cents/kWh

Key Activities

Technology Viability (\$90.3M)

Research and Testing (\$22.0M): Targeted research and testing to improve the affordability, reliability, and performance of wind turbines.

- Detailed testing and analysis of wind turbine drivetrains and blades to improve reliability, manufacturing processes and materials, aerodynamics and aeroacoustics.
- Collaborate with National Labs, government organizations, universities, and industry partners to identify, fund, and manage wind turbine related research projects and working groups.

Offshore Wind (\$49.0M): Support and accelerate responsible deployment of the first U.S. offshore wind energy projects.

- Initiate an offshore demonstration program to address specific technical, environmental, commercial, and regulatory challenges facing the industry .
- Prioritize building of a robust national offshore R&D program to support domestic manufacturing and installation infrastructure development.

Technology Application (\$32.2M)

Systems Integration (\$21.0M): Develops operational strategies to mitigate wind variability and supports planning for new transmission facilities to access remote renewable resources by:

- Completing large multi-state studies with utilities in support of 20-30% wind energy penetration scenarios.
- Improving domestic supply chain management to provide reliable equipment at levels required to achieve 20% U.S. electricity from wind by 2030 and to increase domestic content of U.S. plants from 50% up to 75%.

Clean Innovative Energy Paths to Secretarial Goals

Secretarial Goals

Innovation: Lead the world in science, technology, and engineering

Energy: Build a competitive, low-carbon economy and secure America's energy future

Management: Pursue program and institutional management excellence

Activities

Advanced Fuels & Vehicles

- Biofuels
- Vehicles

Clean Energy Generation

- Hydrogen & Fuel Cells
- Solar
- Wind
- Geothermal
- Water Power

Energy Efficiency

- Buildings
- Industry
- FEMP
- Weatherization
- State Energy Programs
- Block Grants

Education & Outreach

- RE ENERGYSE

Corporate Management

- Program Direction
- Program Support
- Facilities and Infrastructure

Rationale

- Advance the research and accelerate the demonstration and deployment of cellulosic biofuels technologies to provide a home grown alternative to imported oil.
- Advance vehicles research and development to stimulate domestic manufacturing of advanced batteries and electric drive-train components to accelerate the large-scale commercial use of plug-in vehicles.
- Accelerate the research, development, demonstration, and deployment of solar, geothermal, wind, and water electricity generation technologies.
- Advance fuel cell technologies to increase the commercial availability of fuel cells.
- Provide technology and assistance to help homeowners, businesses, and industry, as well as state and local governments, take immediate steps toward energy efficiency.
- Improve the efficiency of Federal Government offices and buildings, reducing energy bills and creating jobs.
- Reinvigorate our investment in education at all grade levels to support the next generation of scientists and engineers that will address the country's energy challenges.
- Provide quality information, leverage resources