

STATEMENT OF

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BEFORE THE

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
COMMITTEE ON APPROPRIATIONS
UNITED STATES HOUSE OF REPRESENTATIVES

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Mr. Chairman, Ranking Member Visclosky, Members of the Subcommittee, thank you for the opportunity to testify on the President's Fiscal Year (FY) 2012 budget request for the U.S. Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE). (See Appendix A for FY 2012 budget summary table.)

In his State of the Union speech, President Obama laid out a plan for the United States to win the future by out-innovating, out-educating and out-building the rest of the world, while at the same time addressing the deficit.

EERE supports research, development, demonstration, and deployment (RDD&D) activities on technologies and practices essential for meeting national security goals by reducing dependence on oil, stimulating economic growth and job creation. EERE will achieve these goals by minimizing the cost of energy services, and meeting environmental goals by minimizing the emissions associated with energy production and use.

As the President said, "The first step in winning the future is encouraging American innovation." At EERE, we work to remove the barriers to the rapid conversion of innovative research into commercial products, manufacturing, and jobs. And we work with other federal, state, and local governments to speed the adoption of these American innovations. The new businesses in clean energy production, installation, and operation are playing a key role driving economic growth and job creation. The FY 2012 budget request is aimed at accelerating innovation and change in the Nation's energy economy. The EERE programs that I will outline for you today are fundamental to the President's plan.

In order to win the future, our Nation cannot afford to cede leadership in critical areas. The market for clean energy technology is growing quickly and many countries have mounted aggressive national efforts to capture market share. China, for example, has moved quickly to dominate the development of next generation clean energy products through low-cost production and investments in research infrastructure. As the President said, "this is our generation's Sputnik moment." To show his clear commitment to our future, he has asked for a significant increase in funding for energy efficiency and renewable energy, even in a budget which moves overall domestic discretionary spending to the lowest levels in a generation.

EERE emphasizes work where the potential impact is largest and where Federal funds are most critical. EERE balances its investments between high-risk research and private sector partnerships that speed the transition of innovations into practical business opportunities. The diverse set of technologies supported by EERE's investment portfolio helps ensure the U.S. has many options for meeting its energy goals. To achieve this end, the program management is designed to identify the best opportunities in the country to address these challenges and support work in universities, companies, national laboratories, and consortia.

The President has laid out a number of ambitious energy goals which our

programs directly impact, including:

- Challenging America to put 1 million electric vehicles on the road by 2015;
- Making our commercial buildings 20 percent more efficient by 2020;
- Generating 80 percent of America's electricity from clean sources by 2035;

Evidence shows how small public investments can lay the foundation for a vibrant private sector-led industry. Much of today's rapidly growing clean energy industry directly benefits from past and current EERE successes. These successes have given rise to new U.S. business investments and rewarding new job opportunities in manufacturing and other areas.

For example:

- The batteries in nearly every electric and hybrid car now being produced, and that will be produced in the coming decade, came from work supported by EERE.
- The high efficiency windows that now dominate windows sales because they make homes and offices more comfortable came directly from EERE research.
- The compact fluorescent lights and the solid-state lights on the markets that cut energy use by 75 percent or more came from our research.
- Last year, because of EERE research, U.S. companies produced 14 billion gallons of biofuels (about 8 percent of U.S. gasoline consumption) and about 10 GW of wind power was installed in the U.S., second only to natural gas power in capacity installed.
- And over 1.6 million low-income homes are safer, healthier, and more affordable as a result of EERE energy upgrades.
- (See Appendix B for more specifics on EERE's Track Record).

The challenges we face mean that we have to build on these successes and move with unprecedented speed and scale. Success is measured by private innovation and investment but well-crafted federal programs are essential. Working together we can look forward to:

- New buildings that use a quarter as much energy as today's typical buildings;
- A vigorous and profitable residential and commercial building retrofit industry cost effectively saving 30-50 percent of the energy used in existing buildings;
- Solar energy, offshore wind energy, and geothermal plants fully competitive with conventional sources of electricity;
- Fuels that can be drop-in replacements for gasoline, diesel fuel, or jet fuel priced competitively with products produced from petroleum;
- Large fleets of electric and hybrid cars supported by a network of charging stations to support them; and
- Trucks twice as efficient as those operating today.

While we are proposing investments designed to help bring about a future that includes these achievements, we are reducing or eliminating investment in programs that no longer need substantial DOE support or that are not on a track toward success. Land-based wind, for example, is now a more widely used commercial activity; as a result we are refocusing our RDD&D efforts on offshore wind. We have rebalanced our transportation program, shifting some emphasis from near-term uses of hydrogen for transportation to specialty applications like fork-lifts and stationary power in the near-term.

Our FY 2012 budget request is focused on the following themes:

- Rigorously reviewing our investment priorities to take into account their potential impact and the status of private investments, and identifying key barriers to the expanded adoption of clean energy technology.
- Implementing a clear set of goals for each program. The core goal for energy technologies is increasing efficiency and driving down costs so that they can compete without subsidies.
- Implementing strong research management practices that include rigorous competition and rigorous peer review.
- Increasing transparency and expanding external program reviews, including through the use of our new Energy Efficiency and Renewable Energy Advisory Committee.
- Eliminating duplication and increasing efficiency in areas like training, analysis, international programs, and other areas by combining them into an Office of Strategic Programs.

EERE has been working in close partnership within DOE to achieve national goals. The SunShot Initiative, for example, is designed to make solar energy fully competitive with conventional sources of electricity without subsidies by the end of the decade. EERE's efforts are managed in close collaboration with DOE's Office of Science and the Advanced Research Projects Agency – Energy (ARPA-E). While the Office of Science is tackling basic research and ARPA-E continues to advance extremely high-risk projects that the private sector is not ready to pursue, EERE is constantly working to apply these breakthroughs to the market in order to both save energy and create jobs within the industry.

EERE is also working closely with other federal agencies that can help meet our national energy goals. Examples include our work with the Department of the Interior (DOI) to accelerate the development of offshore wind energy, with Housing and Urban Development (HUD) on residential energy upgrades and improved ways to perform energy retrofits on low-income housing, and with the Department of Defense (DOD) in research collaborations and demonstrating efficient technologies in military facilities. And of course, our work with other federal partners through FEMP continues to be a way to help others reduce energy consumption in the executive branch.

CONCLUSION

This FY 2012 budget request will advance technologies and related practices to help meet the growing demand for clean, reliable, sustainable, and affordable energy while reducing energy consumption. Full funding for EERE programs will continue to enhance American innovation, ensure U.S. competitiveness in the international clean energy economy, generate jobs here at home, enhance national security, and protect the environment.

The Department appreciates the leadership of this committee in providing the resources needed to accomplish our shared goal of creating a secure and efficient clean energy economy.

PROGRAM SUMMARIES FOR FY 2012

Biomass Program – \$340.5 million

The FY 2012 budget focuses RDD&D investments to drive innovation and biofuel production to meet Energy Independence and Security Act of 2007 (EISA) and Renewable Fuel Standard (RFS)¹ targets. Key efforts in the FY 2012 budget include:

- An innovative biofabrication effort that will standardize and scale up fundamental biological component fabrication, allowing for rapid prototyping and testing of innovative biofuel synthesis; and
- Integrated biorefinery projects and cellulosic biofuel reverse auctions that are expected to stimulate direct private sector investment and growth in the domestic biofuels industry.

The programs proposed in our Biomass budget are targeted to the practical steps needed to meet the RFS goals. These include the research and demonstrations needed to drive the delivered price of renewable fuels down to the point where they can compete directly with conventional petroleum fuels, and to find ways to streamline investment in next generation plants. A particularly exciting line of research is technology that can convert cellulose directly into fuels for direct substitutes for gasoline, diesel, and jet fuel. This would eliminate many of the problems faced in getting ethanol into markets at a large scale.

Building Technologies Program – \$470.7 million

Buildings use more than 70 percent of all electricity produced in the U.S. and about 40 percent of all U.S. energy. There is enormous room for improvement in building energy use across the Nation. In this budget the program proposes a balanced portfolio of work in residential and commercial buildings that includes work applicable for new

¹The RFS requires 36 billion gallons of renewable fuel per year by 2022, of which 21 billion gallons is to be advanced biofuels.

construction and the retrofit of existing buildings. It also balances research with programs designed to bring technologies rapidly into the market.

The research includes work on advanced building components such as cutting the cost and improving the performance of solid-state lighting (a technology that can be more efficient and longer lasting than compact fluorescents), highly efficient air conditioners and heat pumps (including the first basic improvement in heat pump technologies in two generations), affordable smart windows that can adjust to daylight and temperature, advanced insulation materials, and inexpensive sensors and controls. However, improving components alone does not necessarily result in buildings that are more efficient and more comfortable. This requires a sophisticated approach to the design of buildings and building operations and controls in order to ensure optimum performance of the building at all times (and diagnosis of problems making repairs quick and efficient). The budget continues funding for an ambitious energy innovation research Hub (a focused research center aimed at greatly accelerating research and development in key areas) in the old Philadelphia Navy Yard that will develop new approaches to whole building design and operations and test approaches in buildings near the Hub and around the country.

During the past few years, EERE has provided funding to jump-start a vigorous residential energy efficiency improvement program that is on track to upgrade more than 600,000 homes, develop business opportunities and new financing models for new retrofit businesses, and create thousands of jobs. This year the Administration is proposing a major new *Better Buildings Initiative* aimed at making commercial buildings 20 percent more energy efficient over the next decade through initiatives that include:

- Supporting a re-design of the current tax deduction for commercial buildings and upgrading to a credit that is more generous and will encourage building owners and real estate investment trusts (REITs) to retrofit their properties;
- Improving financing opportunities for efficiency upgrades through programs including a new *Better Buildings Pilot Loan Guarantee Initiative* for Universities, Schools and Hospitals, for which DOE requests \$100 million in credit subsidy to guarantee up to \$2 billion in loan guarantees for energy efficiency retrofits through the Loan Guarantee Initiative;
- Creating a \$100 million Race to Green competitive grant program for state and municipal governments to implement innovative approaches to building codes, performance standards, and regulations to help make improving commercial building efficiency the common practice across the country;
- And calling on CEOs and university presidents to join DOE and other Federal partners in a *Better Buildings Challenge* to make their organizations the leaders in saving energy.

The *Better Buildings Initiative* builds on our investments through the Recovery Act and our continued commitment to passing “HOMESTAR” legislation.

The Building Technologies Program’s 2012 portfolio will focus on rapid gains in efficient energy use through a balanced set of strategies including:

- Appliance standards that bring additional cost savings to consumers;
- Efforts for accelerated development and adoption of new building codes;
- Development of new information tools for energy-efficient building technology;
- Development of Building Energy Scores to enable consumers to understand how their buildings compare with other similar buildings in their energy use;
- Support for performance contracting (ESPC/UESC) to invest in efficiency improvements that can be repaid through the energy savings stream generated;
- Support for building energy upgrades;
- Other methods to accelerate adoption of new efficiency technologies and practices; and
- Introduction of new materials and new manufacturing methods that can double the energy productivity of U.S. industry by 2020.

Federal Energy Management Program – \$33 million

The Federal government is the single largest consumer of energy in the U.S. Thus, the government holds the opportunity to lead by example by powering its buildings and vehicle fleets with clean energy while making them more energy efficient. Investing taxpayer dollars in Federal energy efficiency saves taxpayers' money.

The Federal Energy Management Program's FY 2012 request will help Federal agencies serve as good stewards of taxpayer dollars while meeting requirements in Executive Orders 13514 and 13423, the Energy Policy Act (EPAAct) of 1992, EPAAct 2005, and EISA 2007. By providing technical expertise, training, reporting tools, and contracting support, EERE helps agencies make cost-effective investments in energy efficiency and renewable energy technologies at Federal facilities and in Federal vehicle fleets. Increased funding for technical assistance will support Federal investments and greenhouse gas (GHG) reduction efforts by developing guidance, technical assistance and GHG reporting protocols.

EERE facilitates performance based service contracts between Federal agencies and the private sector, enabling agencies to quickly install energy efficiency improvements that pay for themselves over time using savings from reduced energy bills. By demonstrating how much energy and money can be saved through clean energy technologies, EERE provides the private sector with examples that these new technologies are working and working well, making financing and widespread deployment more attainable.

Hydrogen and Fuel Cell Technologies Program – \$100.5 million

The FY 2012 request refocuses some aspects of the program to reduce emphasis on near-term hydrogen vehicle applications and goals the Program has reached and increase focus on longer term research and specialized near-term applications. The Fuel Cell Technologies Program's FY 2012 request will fund RDD&D that can reduce petroleum use, greenhouse gas emissions, and contribute to a more diverse energy supply. These efforts include:

- Fuel cell systems R&D (higher performance, lower cost fuel cells);
- Safety, codes and standards development;
- Hydrogen fuel R&D (diverse ways to cost-effectively produce hydrogen from renewable energy);
- Systems analysis;
- Technology validation; and
- Manufacturing R&D.

Fundamental understanding of hydrogen interaction mechanisms could enable breakthroughs in areas such as hydrogen storage, catalysis, and membranes. Applying fuel cells to combined heat and power systems, light-duty highway vehicles, distributed stationary power systems, and lift trucks holds potential to significantly reduce carbon emissions while mitigating oil demand.

Fuel cell vehicles using hydrogen produced from zero-carbon sources have among the lowest CO₂ emissions of all alternative-fuel vehicles. This includes emissions associated with the production, delivery, and storage of hydrogen – “well-to-wheels” emissions. Producing hydrogen from surplus renewable power can also greatly improve the economics of renewable energy generation, as it can provide additional revenue. EERE’s hydrogen and fuel cell R&D continues to drive down costs while advancing these technologies.

Geothermal Technologies Program – \$101.5 million

The Nation’s geothermal resources are enormous and available in many parts of the country. Unlike intermittent renewables, geothermal plants can provide energy continuously and the economics of near-term geothermal look attractive, no plants have been built for a decade. EERE’s program is designed to change this through well focused research and programs designed to mitigate the financial, regulatory, and other problems that have stymied deployment.

Specifically, the FY12 budget will:

- Pursue geothermal resources that are lower temperature, coproduced and geopressed to increase geothermal energy generation;
- Develop innovative exploration technologies to locate undiscovered hydrothermal resources that do not show surface expression (inadequate resource assessment technology means unproductive holes drilled and high costs); and
- Promote the development of naturally permeable sedimentary resources where minimal to no stimulation of the geothermal reservoir is required.

EERE will pursue sustained technology innovation and continued investments in enabling infrastructure to increase geothermal energy generation and expand it to all 50 states. This effort will have significant environmental and economic benefits. Leadership in geothermal technology provides domestic clean energy jobs and export

opportunities in several sectors including engineering and consulting services, drilling systems, and high temperature tools.

Industrial Technologies Program – \$319.8 million

In the U.S., industrial processes consume about one-third of our energy.² Increased productivity – including energy productivity – is essential for growing U.S. manufacturing industries and maintaining manufacturing employment. New technologies can reduce production costs, energy use, and carbon emissions while simultaneously improving product quality. The FY12 budget will also launch a new partnership with NIST's Manufacturing Extension Partnership to help America's manufacturers upgrade existing facilities with energy-efficient technologies.

The FY12 budget supports three major research themes:

1. Next generation materials like titanium, advanced steel alloys, and affordable composites that can increase performance, lower cost, and be produced with far less embodied energy.
2. Next generation manufacturing technologies using approaches like bio-processing, low temperature separation techniques (ionic liquids, membrane separations), and sophisticated sensor and control networks.
3. Support other EERE program areas in driving down the manufacturing cost of key clean energy technologies, including advanced photovoltaics, lighting devices, sensors and controls, batteries, and wind system components.

The FY 2012 request includes support for an *Energy Innovation Hub* on critical materials which will focus on reducing U.S. reliance on materials like the rare earths needed in today's advanced electric motors and the phosphors needed for solid-state lights. The Hub team will focus on finding ways to reduce use of critical materials, identify pathways that do not require critical materials, and decrease the cost of separating critical materials from recycle streams and ores.

The budget strengthens programs that ensure U.S. manufacturers have easy access to state-of-the-art energy technology. It builds on the successes of the Industrial Technical Assistance program that trains engineering students and manufacturing workers to conduct energy management activities, provide technical support and tools for industry to expedite implementation of energy saving projects, and create a credible, transparent, industrial energy management certification program.

Solar Energy Technologies Program – \$457 million

As with President Kennedy's 1962 challenge to win the Space Race, DOE is making a similar effort today – launching the *SunShot Initiative* to drive down the installed cost of solar energy systems by about 75 percent to a dollar-a-watt at the utility scale before the end of the decade. At \$1/watt, solar electricity would cost about \$0.06 per kilowatt-hour

² http://www1.eere.energy.gov/industry/about/pdfs/itp_program_fact_sheet.pdf

and would be cost competitive – without subsidy – with traditional energy resources. This highly-collaborative effort refocuses EERE’s prior solar efforts and involves DOE’s Office of Science, the Advanced Research Projects Agency – Energy (ARPA-E), and input from industry. While the Office of Science is tackling basic research and ARPA-E continues to advance extremely high-risk projects that the private sector is not ready to pursue, EERE is constantly working to apply these breakthroughs to the market in order to both save energy and create jobs within the industry. The U.S. is the world’s largest consumer of electricity and, at the same time, has the largest solar resource of any industrialized country.³ This makes the U.S. better positioned than any other nation to capture significant benefits from the wide-scale use of solar energy. Achieving \$1/watt for utility-scale solar systems would cause a boom in domestic manufacturing. This request enables EERE to further cutting-edge solar technologies.

Through the development of technologies that will allow solar energy systems to achieve grid parity with mature fossil fuels, SunShot will help the U.S. regain leadership in worldwide solar manufacturing and help the U.S. lead the 21st century global economy. Therefore, the solar energy technologies program’s FY 2012 budget request is critical to funding the innovations necessary to achieve grid-parity with already mature fossil fuels.

EERE’s solar program will continue to develop concentrating solar power (CSP) technologies with thermal storage to reach base-load grid parity by 2020. This program maintains a focus on innovative solar photovoltaic (PV) manufacturing and will help stimulate the domestic PV manufacturing base. The solar program also seeks to streamline permitting, inspection, and interconnection and to develop IT-enabled solutions that can help drive down permitting costs for local jurisdictions.

Vehicle Technologies Program – \$588 million

America has the opportunity to lead the world in electric vehicle manufacturing and deployment, which would significantly reduce the Nation’s appetite for oil and increase our energy security. EERE’s activities are focused on increasing electrification and fuel efficiency thereby lowering greenhouse gas emissions, and meeting the following goals:

- Placing one million electric drive vehicles on the road by 2015;
- Developing and deploying advanced battery manufacturing capacity to support 500,000 plug-in hybrid electric vehicles a year by 2015;
- Developing technologies that enable fuel economy increases to achieve a corporate average fuel economy (CAFE) standard of 37.8 miles per gallon for cars and 28.8 mpg for light trucks by 2016; and
- Saving 1.8 million barrels of petroleum per day by 2020.

The FY 2012 request supports these efforts to encourage advanced vehicle manufacturing and adoption, R&D, and a new competitive deployment program to help communities

³ Based on radiation data collected by the National Renewable Energy Laboratory:
http://rredc.nrel.gov/solar/old_data/nsrdb/

across the country become early adopters of electric vehicles. The vehicle technologies developed and manufactured with the support of annual appropriations and Recovery Act funding will help to improve the U.S. vehicle fleet fuel economy to meet strict new corporate average fuel economy (CAFE) requirements. To accelerate the introduction and market acceptance of electric vehicles, EERE is greatly expanding its emphasis on developing new generations of hybrid electric vehicles, plug-in hybrids, and electric vehicles. Coupling targeted R&D on batteries and power electronics and electric drive systems with supporting electric vehicle infrastructure deployment will help communities across the nation move from point A to point B safely, reliably, and comfortably in electric vehicles. The program has set the goal of reducing the cost of a high energy battery from \$1,000/kWh in 2008 to \$300/kWh by 2015 to enable cost-competitive market entry of plug-in hybrid electric vehicles (PHEV's).

Water Power Program – \$38.5 million

Conventional hydropower (CH) technologies generate approximately 67 percent of the Nation's renewable energy supply. Improving existing CH systems represents one of the fastest and most cost-effective options for increasing clean and renewable energy generation in the U.S. and represents significant renewable generation potential in a wide variety of geographic regions. The FY 2012 budget supports hydroelectric feasibility studies to assess the potential for incremental or new hydropower generation through equipment additions and upgrades to increase generation, and powering existing non-powered dams. These studies will identify projects that can most quickly and cost effectively increase water electricity generation.

Along with investing in CH advances, the FY 2012 budget will invest in R&D and testing of innovative technologies capable of generating renewable, environmentally responsible, and cost-effective electricity from water. This is done by investing in cost-shared partnerships with wave, tidal, ocean current, river in-stream and ocean thermal technology developers. These partnerships will help create technology and manufacturing sectors that lead to further economic development in maritime and coastal communities.

Wind Power Program – \$126.9 million

Wind has become one of the fastest growing sources of new electric generation in the U.S. The FY 2012 budget focuses the program on offshore wind. Offshore wind is attractive since some of the nation's best wind resources (strong and steady winds) are located off our coasts – including the Great Lakes - and many of these resources are close to major population centers. The key problem is that the costs of offshore facilities are much higher than land-based wind. Therefore, cost reduction is the core of the Wind Power Program's investment portfolio. A variety of highly innovative concepts has been proposed and will be explored with the programs proposed. Reliability is particularly important for offshore wind since maintenance costs are very high. Thus projects have been proposed that can cut part counts and increase reliability. Onshore wind will

continue to benefit from investments in wind turbine testing facilities, new manufacturing methods, innovative components, and wind resource characterization.

The program also supports work to facilitate the deployment of onshore and offshore wind technologies that will address problems like radar interference, reducing bird strikes, streamlining permitting, and other programs. The Wind Program is making these advancements possible by closely working with industry while simultaneously collaborating with other agencies and countries, as well as both state and local governments.

Weatherization and Intergovernmental Program – \$393.8 million

The Weatherization and Intergovernmental Program's FY 2012 budget request will significantly accelerate the deployment of clean energy technologies and practices by supporting a network of governmental, community and business stakeholders. By facilitating clean energy investments, the State Energy Program (SEP) and the Weatherization Assistance Program (WAP) help increase supply and reduce demand of energy. A combination of financial and technical assistance to state, local, U.S. territory, and tribal governments empowers communities to design programs that meet their local energy needs.

Under SEP, states develop strategic plans and energy priorities that target both near-term clean energy deployment and long-term market transformation. States may also implement financing programs, such as revolving loan funds, which leverage Federal investments and increase access to private capital, thus leading the way in addressing one of the biggest market barriers to clean energy implementation. Every \$50 million in SEP funding:

- Leverages \$585 million for energy related economic development;
- Produces \$333 million in sustained, annual energy cost savings for families, businesses, and state and local governments;
- Supports energy retrofits of 153 million square feet of state/local government buildings; and
- Provides 300,000 energy efficiency technical assistance contacts with consumers and small businesses to aid them in implementing cost-effective energy efficiency actions.

Through WAP, DOE provides funding to make energy efficiency upgrades for low-income households, creating safer, healthier, and more affordable homes for hundreds of thousands of Americans. Using the most tried and true advanced technologies and testing protocols available in the housing industry to enhance home energy performance, WAP supports the growth of a home energy upgrade industry. WAP funding is instrumental in building a trained workforce that supports a growing industry that will generate jobs while saving homes and businesses money. The FY 2012 request complements DOE's \$11.3 billion in funding for WAP, SEP and EECBG under the Recovery Act, enabling EERE to build on lessons learned and continue to deploy clean energy at speed and scale.

Program Direction – \$176.6 million

The Program Direction FY 2012 budget request supports the workforce needed to effectively administer a \$3.2 billion base appropriation, and execute \$2.3 billion of prior year projects. The FY 2012 staffing requirement is based on a workload assessment of more than 7,000 contracts, grants, agreements, and Congressionally-Directed Projects in various stages of the budget execution process. This funding provides for the executive direction, technical expertise, and business management necessary to accelerate the scale and pace at which activities are implemented, executed and closed out. It provides for contract support at headquarters and field offices to implement and execute EERE technology development programs. The funding supports the operation, maintenance, upgrade of DOE business intelligence systems, EERE Corporate Planning System, Performance Dashboards, and the local area network. Funding also covers GSA rent, commercial office spaces, security, and the Working Capital Fund common administrative services.

Strategic Programs – \$53 million

EERE's strategic programs cover a wide range of responsibilities and activities. The program conducts crosscutting technology and policy analysis, evaluates RDD&D activities and impacts, coordinates strategy across the technology portfolio, analyzes EERE-specific legislation, strengthens research management, obtains effective external advice, uses modern communication tools to facilitate information accessibility to the public, ensures coordination and efficiency through training programs in EERE programs, and collaborates with foreign partners to advance clean energy RDD&D. The FY 2012 budget request enables EERE to maintain a strategic framework for its clean energy investments.

APPENDIX A – EERE Budget Summary

Thousands of dollars

Program	FY 2010 Current Approp [*]	FY 2011 CR	FY 2012 Request
Biomass	216,225	0	340,500
Building Technologies	219,046	0	470,700
Federal Energy Management	32,000	0	33,072
Fuel Cell Technologies	170,297	0	100,450
Geothermal Technology	43,120	0	101,535
Industrial Technologies	94,270	0	319,784
Solar Energy	243,396	0	457,000
Vehicle Technologies	304,223	0	588,003
Water Power	48,669	0	38,500
Weatherization and Intergovernmental Activities	270,000	0	393,798
Wind Energy	79,011	0	126,859
Program Direction	140,000	0	176,605
Strategic Programs	45,000	0	53,204
Facilities and Infrastructure	19,000	0	26,407
Congressionally Directed	292,135	0	0
Subtotal	2,216,392	2,242,500	3,226,417
Use Of Prior Year Balances	0	0	-26,364
Total	2,216,392	2,242,500	3,200,053

* SBIR/STTR funding transferred in FY 2010 was \$23,310,200 for the SBIR program and \$2,797,220 for the STTR program.

APPENDIX B – EERE Track Record of Success

Recent examples of noteworthy EERE accomplishments follow.

Biomass Program

- Validated sustained operations at a cellulosic ethanol biorefinery with 1.4 million gallons per year (MGY) capacity
- Brought cellulosic ethanol biorefinery with 2.5 MGY capacity online
- Completed the National Environmental Policy Act compliance process for over 75% of EERE's integrated biorefinery projects
- Completed ethanol blend testing for vehicle model years 2001 and newer, supporting U.S. Environmental Protection Agency waiver decisions on E15 in 2010 (for model years 2007 and newer) and 2011 (for model years 2001 – 2006)
- Improved biochemical conversion efficiency, demonstrating greater than 85% intermediate-sugars production from the conversion of oligomers to simple sugars (e.g., xylan to xylose)
- Achieved greater than 90% efficiency in a thermochemical conversion of methane to syngas
- Reduced feedstock logistics costs from \$46 per dry ton to \$38 per dry ton (on an oil-equivalent basis, about a \$10 – 15 per barrel reduction in feedstock costs)

Building Technologies Program

- Issued eight appliance standards since January 2009 that will save consumers a projected \$250-300 billion in electricity costs by 2030
- Published five final rules establishing amended energy conservation standards and four final rules establishing amended test procedures.
- Developed one of the largest gains in energy efficiency within a single code cycle. Working with American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) and the International Code Council, developed ASHRAE Standard 90.1-2010, representing a 25% improvement over the previous version and finalized proposals to the 2009 International Energy Conservation Code (IECC) with 30% improvement
- Engaged more than 20 commercial building partners to design new building prototypes that use 50% less energy, and retrofit existing buildings for at least 30% energy savings
- Worked with DOE Commercial Building Energy Alliances to develop new performance criteria for 10-ton capacity commercial air conditioners (rooftop units). These high-efficiency rooftop units are expected to reduce energy up to 50-60% compared with current equipment.
- Working with the private sector, produced a laboratory package Lighting Emitting Diode (LED) device that delivers 139 lumens per watt, exceeding EERE's 2010 target
- Working with EPA, completed a prioritized list for updating and reviewing test procedures for existing and new ENERGY STAR products
- Building America demonstrated 40% savings over IECC 2006 in both cold and mixed humid climate by working with key leading builders

- Completed a cool roof design guide and an advanced roof guide with over 50% energy savings
- Heating, ventilation, and cooling (HVAC) R&D activities resulted in an electric heat pump water heater that exceeds the 2009 DOE ENERGY STAR standards for electric water heaters while providing the same amenity as conventional electric storage water heaters

Federal Energy Management Program

- Catalyzed an all-time Federal record by facilitating \$589 million in energy savings performance contracts (ESPCs) that are estimated to save taxpayers more than \$1.1 billion during the contract term
- Funded 119 technical assistance projects resulting in \$122 million in project work in Federal facilities
- Assisted DOE in:
 - Reducing energy intensity by 23% (exceeding 2010 15% targeted reduction from 2003);
 - Reducing water by 12% since 2007 (exceeded 6% target); and
 - Obtaining 9% of electricity from renewables (exceeded 5% goal)
- Expanded capabilities to provide web-based training including over 10,000 participants

Geothermal Technologies Program

- Partnered with industry to demonstrate the extraction of lithium, a strategic mineral, from geothermal brines for use in electric vehicles and batteries
- Collaborated with DOE Office of Fossil Energy to demonstrate the production of 1,104 megawatt hours from 6.4 million barrels of wastewater coproduced with oil at the first facility of its kind in the U.S.
- Continued reducing geothermal development costs by designing and testing electrical insulation material capable of performing at temperatures up to 250°C and demonstrating a threefold increase in rate of drilling penetration at lab-scale using hydrothermal spallation drilling

Industrial Technologies Program

- World record in efficiency by partnering with industry to build 35-47% efficient small to medium gas engines for distributed power generation
- Partnered with 100 LEADER companies that committed to achieving 25% improvement in energy intensity over the next 10 years

Solar Energy Technologies Program

- Set a world record by producing a 27% efficient single junction solar cell
- PV Incubator program leveraged \$1.2 billion in private capital with \$59 million of DOE funds since 2007

Vehicle Technologies Program

- Reduced the cost of plug-in hybrid electric vehicle lithium-ion batteries to \$800 per kilowatt-hour (kWh), a 20% reduction from 2008 baseline of \$1,000/kWh
- EERE is on track to reduce cost to \$300/kWh by 2015

Water Power Program

- Launched seven new hydroelectric facility upgrades, the first in 20 years
- Awarded 27 cost-shared grants to marine and hydrokinetic technology developers to advance commercial readiness of this emerging technology sector
- Conducting resource assessments to more precisely quantify the energy generation potential of all U.S. water resources, including conventional hydroelectric supplies as well as new resources derived from waves, ocean/tidal/river currents, and ocean thermal power
- Completed the initial model of a redesigned Francis hydropower turbine that significantly improves environmental performance of hydropower turbines
- Executed a Memorandum of Understanding (MOU) between DOE, the Department of Interior, and the Army Corps of Engineers focusing on increasing energy generation at federally-owned facilities and explore opportunities for new development of low-impact hydropower

Weatherization and Intergovernmental Program

- Weatherized 330,000 homes under Recovery Act
- Weatherizing low-income homes at a rate of 25,000 homes per month
- States upgraded an additional 15,750 buildings (14,500 residential) and thousands of renewable energy systems were installed through Q4 2010, including;
 - Nearly 2,500 solar photovoltaic systems installed with 25.5 megawatts of capacity
 - Over 1,100 solar thermal systems with nearly 38,000 square feet of capacity
 - Over 200 wind turbines installed with over 8.5 MW of capacity
 - Over 580 geothermal systems installed with over 2,800 tons of capacity

Wind Energy Program

- Completed advanced computer designs of three highly innovative deep offshore wind designs