EERE FY 2016 Budget Request

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

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February 2, 2015

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 Barriers to Market Entry**

Sustainable
TRANSPORTATION

Renewable
ELECTRICITY GENERATION

Energy Saving
HOMES, BUILDINGS, & MANUFACTURING

Mission-Critical Support
OPERATIONS

EERE's Guiding Principles

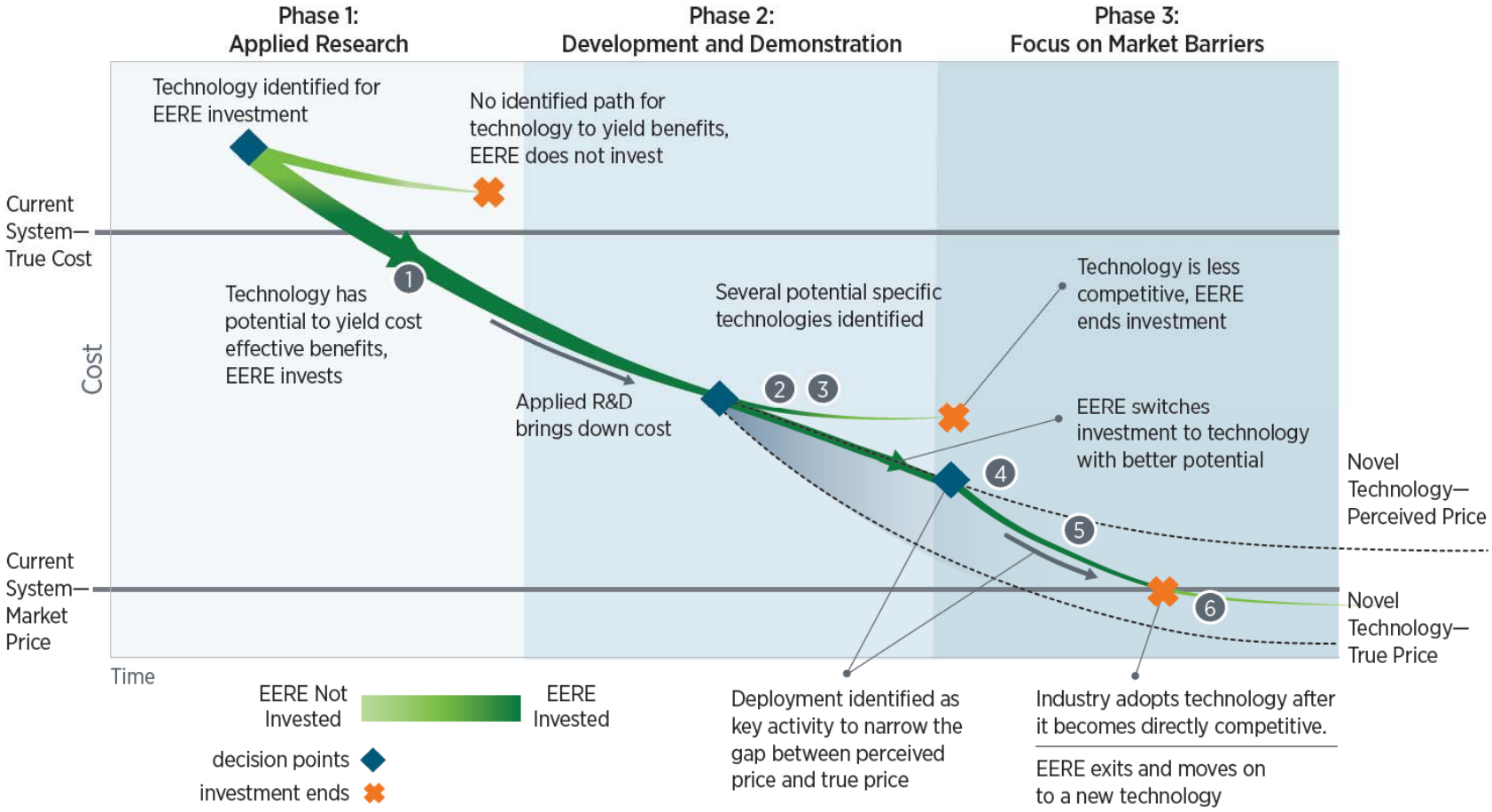
The 5 EERE Core Questions

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?

Applying Impact Assessments to All of Our Activities

EERE Approach

EERE identifies high-impact opportunity areas, creates aggressive long-term cost-reduction goals, develops and implements targeted multi-year program plans/roadmaps, and updates them on a regular basis.



Select Recent EERE Accomplishments

Sustainable TRANSPORTATION

- $300/kWh Modeled Li-Ion Modeled Battery Cost Achieved
- SuperTruck – exceeded goal of 50% improvement in freight efficiency
- 3 Pioneering Commercial Cellulosic Ethanol Plants have come online
- Fuel cells - 50% cost reduction, 5 x platinum reduction since 2006

Renewable ELECTRICITY GENERATION

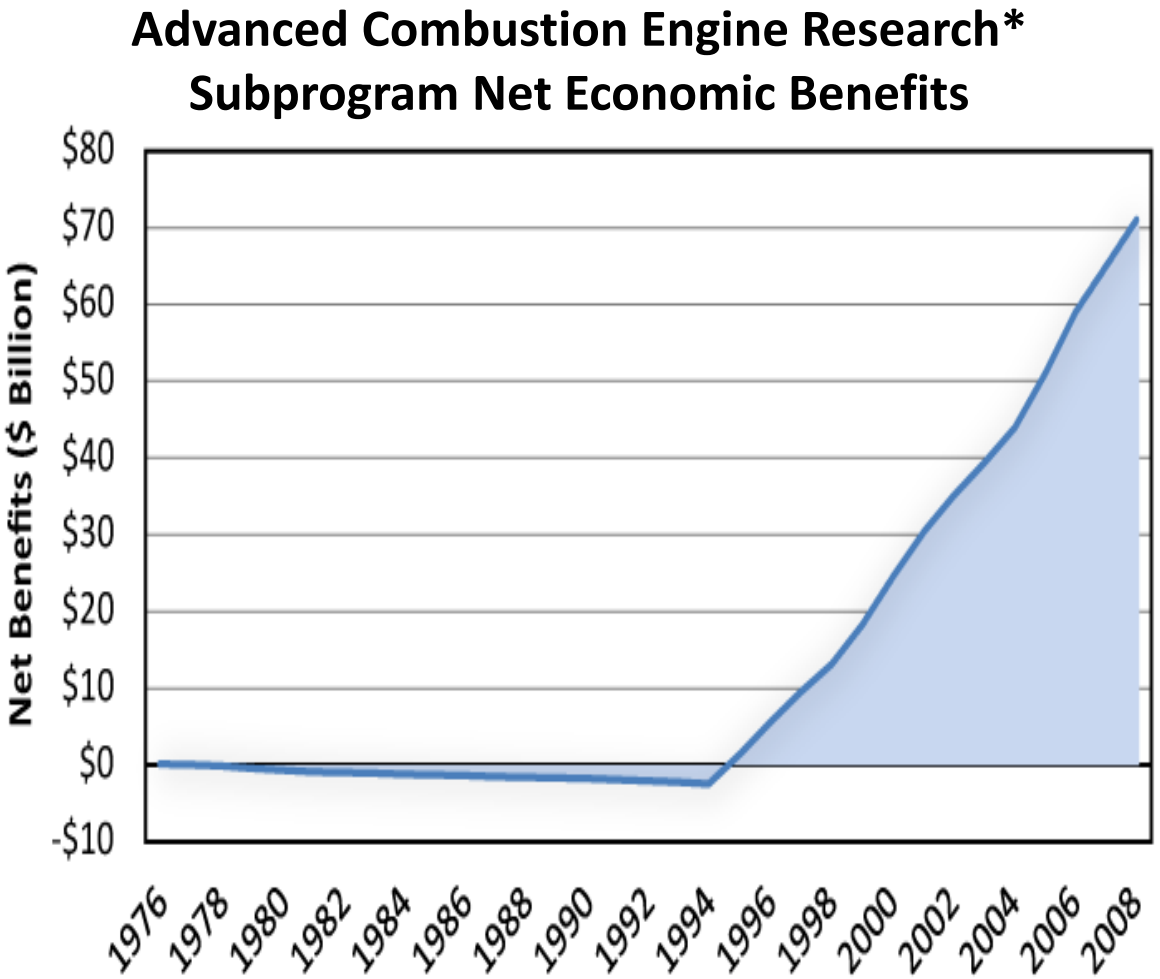
- Achieved more than 60% progress toward SunShot solar PV cost reduction in just first 4 years of 10 year initiative
- Cost of U.S. wind energy decreased by more than one-third in last 5 years to 4.6c/kWh
- First grid connected tidal power plant in US
- First grid connected near-field EGS plant increased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

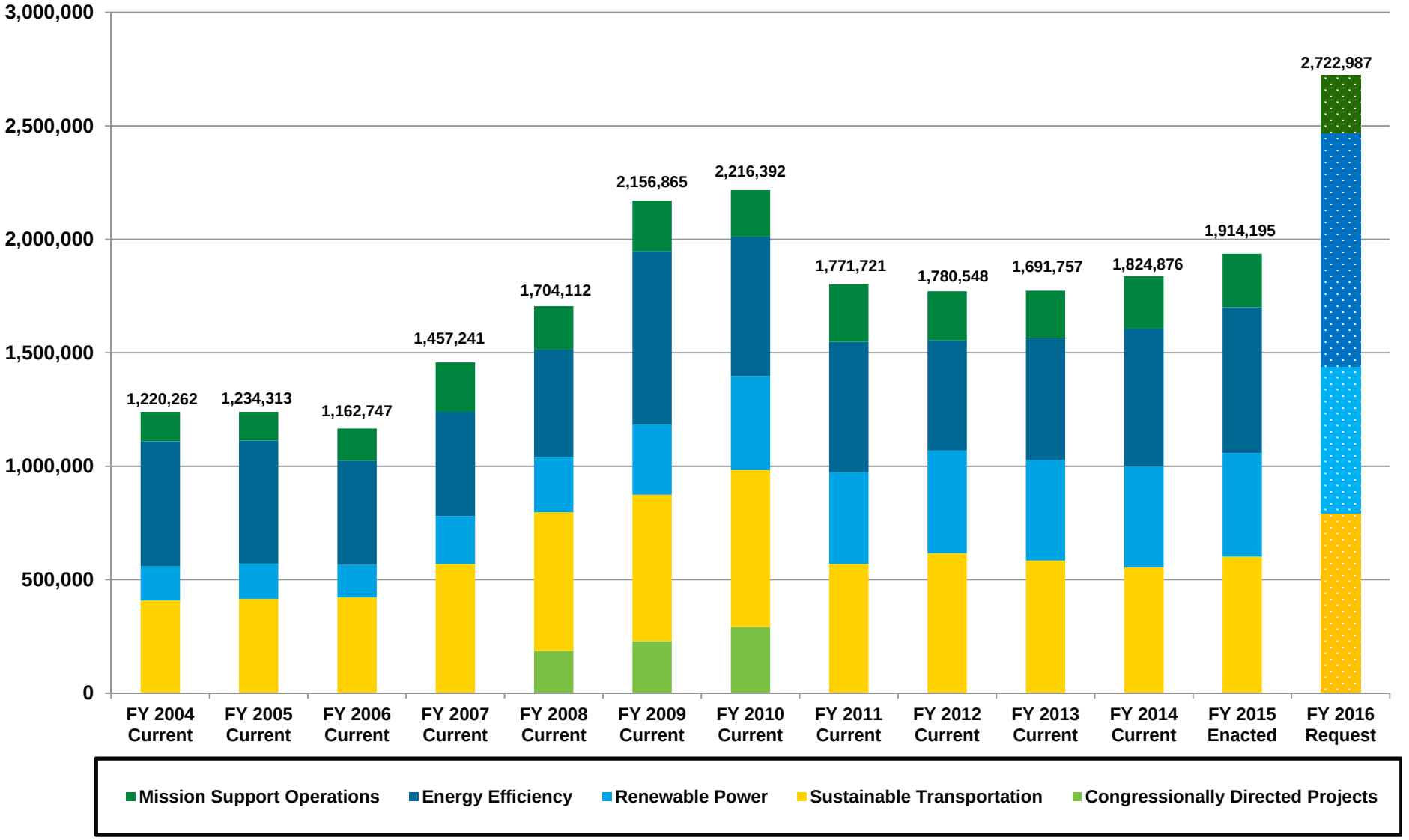
An Example of EERE ROI

Combustion R&D ROI: 70 to 1 Benefit-to-Cost Ratio



*Vehicle Technologies

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



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

Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy

Vehicle Technologies

Fiscal Year 2016 Priority Activities

- ***EV Everywhere* ($253.2M):** A DOE Grand Challenge to enable the U.S. to be the first to produce a wide array of plug-in vehicle models that are as affordable and convenient as gasoline vehicles by 2022.
- **SuperTruck II ($40M):** Through competitively-awarded, cost-shared projects with industry, develop and demonstrate technologies to increase the freight efficiency of class 8 trucks by 100% in 2020, compared to a 2009 baseline vehicle.
- **Manufacturing/Materials Genome: ($30M):** Supports DOE's Clean Energy Manufacturing Initiative and Administration's Materials Genome Initiative. High-performance computing and high-throughput experimentation to accelerate the development of high-strength, high-formability, corrosion-resistant, and low-cost magnesium sheet alloys for vehicle light weighting from discovery through qualification, capturing the effects of processing and end-use performance.
- **New Fuels and Vehicle Systems Optima ($17M):** Establishes a link early in the R&D cycle of both fuels and engines for a systems-based approach and to create optimized solutions for fuels and engines. Involves collaboration with Bioenergy Technologies.
- **Alternative Fuel Vehicle Community Partner Projects ($25M):** Competitively-awarded, cost-shared projects that highly-leverage private-sector investments to accelerate widespread introduction and adoption of commercially-available advanced vehicle technologies to reduce petroleum.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Batteries and Electric Drive	108,935	103,701	144,400	+40,699
Vehicle Systems (formerly Vehicle and Systems Simulation and Testing)	43,474	40,393	68,100	+27,707
Advanced Combustion Engines	49,970	49,000	64,500	+15,500
Materials Technology	38,137	35,602	70,500	+34,898
Fuels and Lubricant Technologies	15,990	20,000	37,000	+17,000
Outreach, Deployment and Analysis	31,231	28,304	56,500	+28,196
NREL Site Wide Facility Support	2,000	3,000	3,000	0
Total, Vehicle Technologies	**289,737**	**280,000**	**444,000**	**+164,000**

Bioenergy Technologies

Fiscal Year 2016 Priority Activities

- **Algae ($21M):** Pursue new research in advanced biology and carbon dioxide utilization to address yield, productivity, and integration of downstream logistics at the pre-pilot scale.
- **Conversion ($99.1M):** Select and complete preparation of at least two pathways for validation at integrated bench or pilot scale in FY 2017 of modeled mature $3/gge gasoline/diesel blendstock price and progress toward FY 2022 price goals ($3/gge).
- **Feedstock Supply ($17.8M)** : Focus on feedstock supply and logistics technologies to help meet biomass feedstock price targets of $80/Dry Matter Ton in 2017.
- **New Fuels and Vehicle Systems Optima ($10M):** Establishes a link early in the R&D cycle of both fuels and engines for a systems-based approach and to create optimized solutions for fuels and engines. Collaboration with Vehicles Technologies
- **New Investments in the Integrated Production and Scale-Up of Drop-in Hydrocarbon Fuels ($32.5M):** New competitive awards (up to three pilot projects or one demonstration project) to scale-up integrated production systems of drop-in hydrocarbon biofuels to accelerate advanced biofuel manufacturing
- **DPA ($45M):** Support the military-specification jet fuel in collaboration with DOD and USDA through the Defense Production Act

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Feedstocks	46,972	32,000	38,800	+6,800
Conversion Technologies	101,384	95,800	99,186	+3,386
Demonstration and Market Transformation	64,790	79,700	87,514	+7,814
Strategic Analysis and Cross-Cutting Sustainability	12,146	11,000	14,000	+3,000
Biopower	1,998	0	0	0
NREL Site-Wide Facility Support	5,000	6,500	6,500	0
Total, Bioenergy Technologies	**232,290**	**225,000**	**246,000**	**+21,000**

Hydrogen and Fuel Cell Technologies

Fiscal Year 2016 Priority Activities

- **Fuel Cell R&D ($36M):** Develop innovative technologies to reduce cost and improve durability: Increasing PEM fuel cell power output per gram of platinum-group metal catalyst to 6.9kW/g (from 2.8kW/g in 2008). Accelerate non-PGM catalyst, electrode, and MEA development through high-throughput combinatorial approach, aligned with Materials Genome Initiative. (2020 goal: 8 kW/g PGM)
    - **Manufacturing/Materials Genome ($8M):** Supports DOE's Clean Energy Manufacturing Initiative and Administration's Materials Genome Initiative. Next generation advanced materials manufacturing R&D effort focused on high throughput combinatorial approaches capturing the effects of processing and end-use performance to develop non-PGM catalysts and electrodes and interface and MEA optimization
- **Hydrogen Fuel R&D ($41.2M):** Advance pioneering technologies in materials, components, and processes to reduce the cost of hydrogen from renewable resources to $6.80/gge (dispensed and untaxed) from $8.00/gge in 2011; and the cost of hydrogen storage systems by 25% compared to the 2013 baseline of $17/kWh. (2020 goals: $4/gge, $10/kWh)

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Fuel Cell R&D	33,383	33,000	36,000	+3,000
Hydrogen Fuel R&D	36,545	35,200	41,200	+6,000
Manufacturing R&D	3,000	3,000	4,000	+1,000
Systems Analysis	3,000	3,000	3,000	0
Technology Validation	6,000	11,000	7,000	-4,000
Safety, Codes and Standards	7,000	7,000	7,000	0
Market Transformation	3,000	3,000	3,000	0
NREL Site Wide Facility Support	1,000	1,800	1,800	0
Total, Hydrogen and Fuel Cell Technologies	**92,928**	**97,000**	**103,000**	**+6,000**

Renewable ELECTRICITY GENERATION

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Solar Energy Technologies

Fiscal Year 2016 Priority Activities

- **Integrated Best-in-Class Concentrating Solar Power Innovations at 1-10 MW Scale ($40M):** Leveraging component level research developed for sub-systems in prior years, CSP Systems Integration will validate the technologies at the 1-10 MW scale.
- **Solar Power Manufacturing Innovation ($44.6M):** Increase America's market share for manufacturing value added commensurate with domestic market demand through focused investments in advanced manufacturing R&D such as low CAPEX and high throughput manufacturing technologies.
- **Next Generation PV Innovations Beyond the 2020 DOE SunShot Targets ($30.6M):** Investigate new concepts for Photovoltaic R&D (PV) cells and module as well as cost reductions that have the potential to disrupt the PV market beyond the DOE SunShot Initiative.
- **Soft Cost Reduction Innovation for Commercial Scale Solar PV ($16.1M):** Collaborative multi-stakeholder partnership to reduce soft costs for commercial scale PV.
- **Manufacturing/Materials Genome ($10M):** Supports DOE's Clean Energy Manufacturing Initiative and Administration's Materials Genome Initiative. Massively Parallel Combinatorial Process Development will use high performance computing and high throughput combinatorial synthesis to accelerate the development of materials from the point of discovery to qualification.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Concentrating Solar Power	48,571	46,400	48,400	+2,000
Photovoltaic R&D	56,641	35,300	62,000	+26,700
System Integration	52,816	43,700	76,500	+32,800
Balance of Systems Soft Cost Reduction	42,558	40,700	67,300	+26,600
Innovations in Manufacturing Competitiveness	44,472	57,800	73,400	+15,600
NREL Site-Wide Facility Support	12,000	9,100	9,100	0
Total, Solar Energy Technologies Office	**257,058**	**233,000**	**336,700**	**+103,700**

Wind Power Technologies

Fiscal Year 2016 Priority Activities

- **Offshore Wind Demonstration Projects ($40M):** Year five of a six fiscal-year Offshore Wind Advanced Technology Demonstration program to support the establishment of a competitive U.S. offshore wind industry through offshore system development and demonstration.
- **Wind Plant Optimization (Atmosphere to Electrons Initiative) ($26.7M):** This initiative approaches wind plant optimization R&D holistically – identifying and assessing the underlying performance barriers and adopting innovative component and system technology options to improve cost and performance of utility-scale wind plants.
- **Advanced Components R&D ($12.2M):** A new generation of rotor designs incorporating higher tip speeds and new innovative drivetrain concepts.
- **Advanced Grid Integration ($12.0M):** Supports DOE Grid Modernization Crosscut Team efforts to evaluate regional flexibility capabilities, and will conduct next generation integration studies utilizing newly developed 10-year wind data sets, and further develop wind-based transmission line planning tool architecture.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Technology RD&T and Resource Characterization	0	34,658	58,160	+23,502
Technology Validation and Market Transformation	0	46,250	41,990	-4,260
Mitigate Market Barriers	0	11,207	28,062	+16,855
Modeling and Analysis	0	10,185	12,588	+2,403
NREL Site Wide Facility Support	9,000	4,700	4,700	0
Technology Development and Testing	61,145	0	0	0
Technology Application	17,981	0	0	0
Total, Wind Power Technologies	**88,126**	**107,000**	**145,500**	**+38,500**

Water Power Technologies

Fiscal Year 2016 Priority Activities

- **Open Water Test Facility ($5M):** Complete front-end engineering and design for a potential full-scale, grid-connected open water wave test facility; results of the engineering and design will be used to support a programmatic go/no-go decision on further facility construction funding.
- **Wave Energy Conversion RDD&D ($25M):** In FY 2016, the MHK subprogram will focus on demonstrating and validating the performance of current MHK devices and encouraging innovations in advanced controls, power take offs, and optimized structures as key components necessary to achieve significant cost and performance improvements in WEC devices.
- **HydroNEXT - Non-Powered Dams (NPD) and Low-Impact New Development ($15M):** The Hydropower subprogram will initiate activities aimed at developing low cost, modular technologies for hydroelectric generation at non-powered dams. In addition, the Hydropower subprogram will also invest in Low-Impact New Development (LIND) at Undeveloped Streams through development of powertrain and component technologies with low-impact, low-cost potential; balance of plant component cost reduction; and tools for environmental performance validation.
- **HydroNEXT - Pumped Storage Hydropower and Grid Integration ($3M):** The Hydropower subprogram will continue to investigate the benefits of modular pumped storage hydropower (PSH) as a means to integrate variable renewables onto the electric grid.
- **Water Power Market Acceleration and Deployment ($9M):** The program will continue to invest in MA&D activities in FY 2016 that will help lower the barriers to deployment of innovative water power technologies, including monitoring instrumentation for MHK devices and biological design tools for engineering more sustainable hydropower turbines.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Hydropower Technologies	17,290	19,200	25,500	+6,300
Marine and Hydrokinetic Technologies	41,275	41,100	40,800	-300
NREL Site Wide Facility Support	0	700	700	0
Total, Water Power Technologies	**58,565**	**61,000**	**67,000**	**+6,000**

Geothermal Technologies

Fiscal Year 2016 Priority Activities

- **Subsurface Technology and Engineering RD&D crosscut (SubTER) ($71M):** SubTER provides a collaborative structure to identify scientific and technology challenges, efficiently leverage funding and expertise through multi-office collaborations, and avoid redundancy of duplicative efforts.
    - **Frontier Observatory for Research in Geothermal Energy ($35M):** As part of the ongoing subsurface-related R&D, Geothermal technologies will launch and fully implement phase 3 of the Frontier Observatory for Research in Geothermal Energy (FORGE)
    - **New Subsurface Signals, Permeability Manipulation, and Stress and Induced Seismicity R&D and other Ongoing Subsurface Related R&D ($36M):** Improve technologies for imaging wellbores and subsurface in early stage development, develop new tools and methodologies to measure and manipulate subsurface stress, and reduce risk associated with permeability of the subsurface.
- **Play Fairway Validation ($8M):** Initiate the Phase II drilling portion of the Play Fairway Analysis program, which is an assessment of exploration risk and the probability of finding new resources on a regional scale.
- **Low Temperature Mineral Recovery ($5M):** A new FOA to bridge the gap between R&D and commercial adoption of geothermal mining technologies with cost-shared development of pilot scale extraction technologies at geothermal mining and power production sites.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Enhanced Geothermal Systems	27,084	32,100	45,000	+12,900
Hydrothermal	10,285	12,500	36,500	+24,000
Low Temperature and Coproduced Resources	4,708	6,000	9,000	+3,000
Systems Analysis	3,698	3,900	5,000	+1,100
NREL Site-Wide Facility Support	0	500	500	0
Total, Geothermal Technologies	**45,775**	**55,000**	**96,000**	**+41,000**

Energy Saving
HOMES, BUILDINGS, & MANUFACTURING

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U.S. Department of Energy

Building Technologies

Fiscal Year 2016 Priority Activities

- **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.
- **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 in less than three years.
- **Appliance Standards: ($53M):** Will continue to meet all of its mandated deadlines for covered products and enforce its existing standards; Develop 10 Energy Conservation Standard Final Rules.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Emerging Technologies (ET)	55,862	55,740	112,500	+56,760
Commercial Buildings Integration (CBI)	30,782	27,643	32,000	+4,357
Penn State Consortium for Building Energy Innovation	9,994	10,000	0	-10,000
Residential Buildings Integration (RBI)	24,390	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	**177,868**	**172,000**	**264,000**	**+92,000**

Advanced Manufacturing Technologies

Fiscal Year 2016 Priority Activities

- **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.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Advanced Manufacturing R&D Projects	76,971	84,000	133,000	+49,000
Advanced Manufacturing R&D Facilities	81,500	92,500	241,000	+148,500
Industrial Technical Assistance	22,000	23,500	30,000	+6,500
Total, Advanced Manufacturing	**180,471**	**200,000**	**404,000**	**+204,000**

Federal Energy Management Program

Fiscal Year 2016 Priority Activities

- **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.
- **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.
- **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.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Federal Energy Management	0	0	27,288	+27,288
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
Federal Energy Efficiency Fund	3,000	2,850	15,000	+12,150
Total, Federal Energy Management Program	**28,248**	**27,000**	**43,088**	**+16,088**

Weatherization and Intergovernmental Program

Fiscal Year 2016 Priority Activities

- **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 ($14.7M):** 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.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
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 appropriation included the transfer of the EERE Tribal Energy Program activities and responsibilities to the Office of Indian Energy.

Mission-Critical Support
OPERATIONS

Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy



Strategic Programs, Facilities, and Program Direction

Fiscal Year 2016 Priority Activities

Strategic Programs:

- Philanthropy Initiative ($2M): Launch a new effort to accelerate investment by philanthropic organizations in clean technology development and commercialization.
- Lab-Corps ($1M): Scale up from the pilot conducted in FY 2014 and 2015 to provide commercialization and technology acceleration training to researchers at all National Laboratories.

Facilities & Infrastructure:

- Energy Systems Integration Facility (ESIF) ($36M): Enable full utilization of ESIF by doubling NREL's high performance computing capacity and expanding ESIF's capacity to simulate energy systems.

Program Direction:

- Continue to support Active Project Management approach across the full EERE portfolio, including creation and enforcement of rigorous "Go/No-Go" milestones, regular in-depth project site visits and reviews, and termination of under-performing projects.
- Build on previous efforts to maximize the efficient and effective use of resources by continually re-engineering operations to reduce expenses and improve service delivery.

(Dollars in Thousands)	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs. FY 2015
Strategic Programs	23,540	21,000	27,870	+6,870
Facilities & Infrastructure	45,973	56,000	62,000	+6,000
Program Direction	162,000	160,000	165,330	+5,330
Total, Corporate Support	**231,513**	**237,000**	**255,200**	**+18,200**

DOE Crosscutting Initiatives

Clean Energy Manufacturing Initiative

Collaboration Across DOE

Additive Manufacturing for Energy	Materials Genome for Clean Energy
Leverage additive manufacturing innovation and infrastructure to accelerate application to specific R&D barriers faced by clean energy sectors across DOE	Enduring public-private partnership that accelerates material development for energy from discovery through deployment twice as fast as today, building capabilities to focus on processing and end use performance

EERE R&D Focus ($97.9M)

AMO ($15M): Platform development for foundational capabilities and interface with applications	VTO ($30M): Lightweight automotive materials FCTO ($8M): Functional material interfaces BTO ($30M): Envelope and refrigeration materials AMO ($4.9M): Computational and experimental platforms SETO ($10M): Massively parallel combinatorial process development

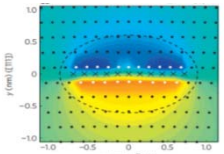
Continued Focus Across EERE

Manufacturing technologies to accelerate progress toward energy goals in many offices
Establishment of NNMI Institutes in AMO
Development of foundational advanced manufacturing technologies for energy in AMO
Technical assistance in energy efficiency for manufacturers in AMO

Jan. 2014: Novel additive process with ***Cincinnati, Inc***. - 100X increase in deposition rate

Sept. 2014: Use to print electric car in a record 44 hours with ***Local Motors***

First Principles

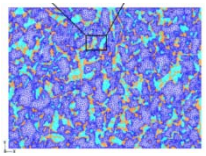


G.P.M. Leyson et al., *Nature Mat.*, 9, 750-755, 2010

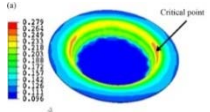
Crystal/Grain Deformation

D. Weygand et al., *Mat. Sci. Eng. A.*, 483-484, 188-190, 2008

Microstructure Performance



Effects of Processing



M. Yang et al., *Mat. Sci. Eng. A*, 527, 6607-6613, 2010

Integrated validated computational tools to accelerate development

End Use Performance

http://www.ncac.gwu.edu/research/pubs/NCAC-2012-W-002.pdf

Grid Modernization: Pillars and Themes

Institutional Alignment ($2.6M)

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Investigate distributed wind, energy storage, and electric vehicles to determine the *cost* (i.e. infrastructure) and the *benefits* they provide to the grid.

Technology Innovation ($149.9M)

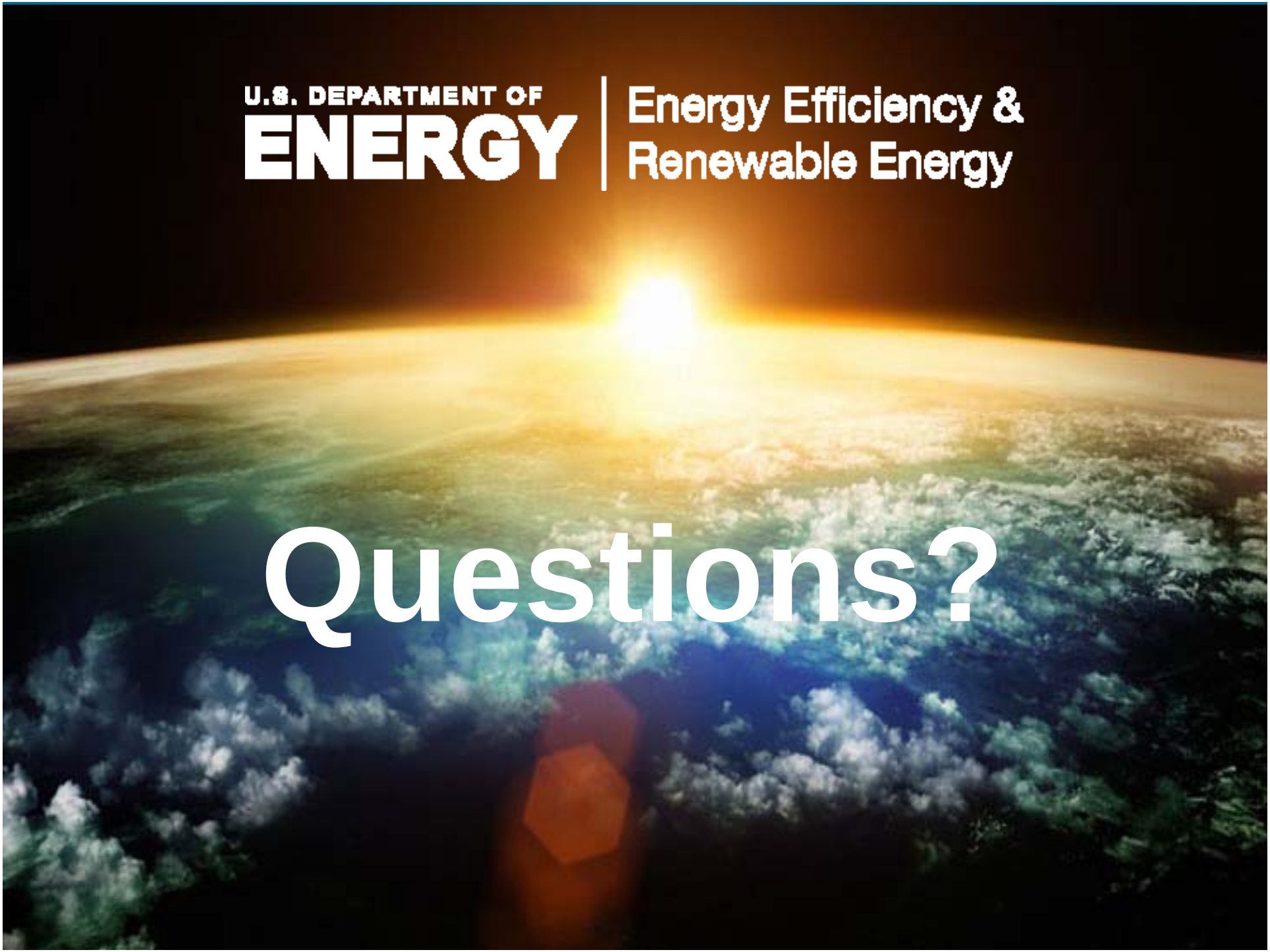
Design and Planning Tools ($10.2M)
- Determine how system flexibility can increase the hosting capacity of clean energy technologies
- Determine the lowest cost strategies for enhancing that capacity on a regional basis

System Control and Power Flow ($23.7M)
- Incorporate probabilistic forecasts into the next-generation energy management

Sensing and Measurements ($18.5M)
- Develop low-cost power, vehicle, and building sensors
- Provide visibility and understanding to grid operators

Devices and Integrated Testing ($97.5M)
- Investigate behind-the-meter storage to mitigate variable renewables like wind and solar technologies
- Partner with OE to incorporate the successes in equipment characterization; communication, information, and computation infrastructure; and developing holistic grid services to make them work in the next-generation distribution management system.
- Partner with a national laboratory consortium to design, simulate, and demonstrate a transactional energy ecosystem as the basis for accomplishing grid integration and realizing the full potential of energy and grid related opportunities

Grid Modernization ($152.5M)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Questions?