

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY**

HEARING CHARTER

An Overview of the Department of Energy's Budget Proposal for Fiscal Year 2016

Wednesday, February 25, 2015

10:00 a.m. – 12:00 p.m.

2318 Rayburn House Office Building

PURPOSE

The Committee on Science, Space, and Technology will hold a hearing titled *An Overview of the Department of Energy's Budget Proposal for Fiscal Year 2016* on Wednesday, February 25, 2015, at 10:00 a.m. in Room 2318 of the Rayburn House Office Building. With the release of the President's budget request for fiscal year (FY) 2016, the purpose of the hearing is to examine the Department of Energy's science and technology priorities and their impact on the allocation of funding within the Department's research, development, demonstration, and commercialization activities.

WITNESS LIST

- **The Honorable Ernest Moniz**, *Secretary of Energy, U.S. Department of Energy*

BACKGROUND

The Department of Energy (DOE) funds a wide range of research, development, demonstration, and commercial application activities. DOE's primary mission is to "ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions."¹ A system of 17 national laboratories, overseen by the Department, is DOE's core resource for carrying out this mission.

The President's FY 2016 budget request for DOE is \$29.9 billion, which represents an increase of \$2.5 billion or 9.2 percent over FY 2015 enacted levels.² Approximately one-third of this amount is dedicated to science and energy programs within the Committee on Science, Space, and Technology's jurisdiction. The remainder of DOE's funding is allocated to the National Nuclear Security Administration (NNSA) to maintain a stockpile of nuclear materials and ongoing Defense and Non-Defense Environmental Management (EM) programs.

¹ Department of Energy Mission Statement. Available at <http://energy.gov/mission>.

² Department of Energy *FY 2016 Congressional Budget Request: Budget in Brief*, February 2, 2015, Available at <http://www.energy.gov/sites/prod/files/2015/02/f19/FY2016BudgetinBrief.pdf>

The following table provides a breakdown of the DOE budget request within the Science Committee’s jurisdiction:³

Department of Energy (DOE) Science and Technology Spending (dollars in millions)				
Program	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	FY 2016 vs FY 2015 (% Change)
Office of Science (SC)	5,066.4	5,067.7	5,339.8	5.4%
Advanced Scientific Computing Research	478.1	541.0	621.0	14.8%
Basic Energy Sciences	1,711.9	1,733.2	1,849.3	6.7%
Biological and Environmental Research	609.7	592.0	612.4	3.4%
Fusion Energy Sciences	504.7	467.5	420.0	-10.2%
High Energy Physics	796.5	766.0	788.0	2.9%
Nuclear Physics	569.1	595.5	624.6	4.9%
Workforce Development for Teachers and Scientists	26.5	19.5	20.5	5.1%
Science Laboratories Infrastructure	97.8	79.6	113.6	42.7%
Safeguards and Security	87.0	93.0	103.0	10.8%
Science Program Direction	185.0	183.7	187.4	2.0%
Energy Efficiency and Renewable Energy (EERE)	1,900.6	1,914.2	2,723.0	42.3%
Electricity Delivery and Energy Reliability (OE)	147.2	147.0	270.1	83.8%
Nuclear Energy (NE)	888.4	833.4	907.6	8.9%
Fossil Energy R&D (FER&D)	561.9	560.6	560.0	-0.1%
Advanced Research Projects Agency - Energy (ARPA-E)	280.0	280.0	325.0	16.1%
Total	8,844.6	8,802.9	10,125.5	15.0%

This budget request claims to meet the Administration’s goals of funding technological solutions to further energy and nuclear security research and development. While endorsing an all-of-the-above energy strategy, the President’s budget seeks to “innovate across a diverse portfolio of clean energy technologies to enhance economic competitiveness and secure America’s long-term energy security and infrastructure,” and continues to reference the President’s Climate Action Plan (CAP) as the guide for emphasizing clean energy research, development, and deployment.⁴

In addition to continuing the reorganization of the Department into three Under Secretariats (Energy and Science, Nuclear Security, and Management and Performance) as

³ Department of Energy *FY 2016 Congressional Budget Request: Budget in Brief*, February 2, 2015, Available at <http://www.energy.gov/sites/prod/files/2015/02/f19/FY2016BudgetinBrief.pdf>

⁴ Ibid.

proposed in the FY 2015 budget request, the FY 2016 request includes over \$1.2 billion in crosscutting initiatives funded across the Science and Energy programs in the Department, advancing technology areas with multiple energy resource applications and institutionalizing coordination between program offices and the National labs. Initiatives include exascale computing, grid modernization, subsurface technology and engineering, supercritical CO₂, cybersecurity, and the energy-water nexus.⁵

Important questions and key issues to be discussed at the hearing include:

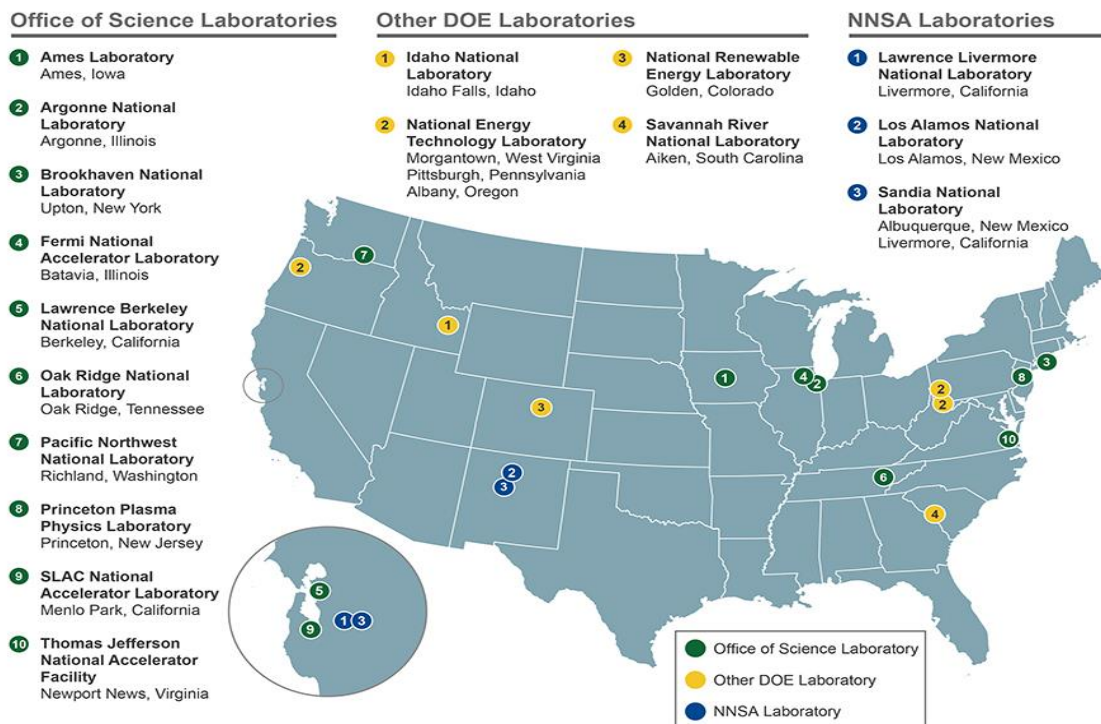
- How effectively does fundamental research and development within the Department of Energy's Office of Science lead to transformative scientific breakthroughs?
- Given the emphasis on renewable energy development within the Department compared to fossil and nuclear energy, are the strategic goals of the DOE's energy research programs aligned to the long-term energy needs of the American economy?
- How will key management, structure, and policy changes outlined in the request to Congress more efficiently and effectively advance the science and energy research and development conducted throughout DOE?
- The broader role of government in research and development, particularly the balance of investments between basic research versus applied energy development and demonstration.

⁵ Department of Energy *FY 2016 Congressional Budget Request: Volume 2*, p. 209, February 2, 2015, Available at <http://www.energy.gov/sites/prod/files/2015/02/f19/FY2016BudgetVolume2.pdf>

ADDITIONAL BACKGROUND: DOE R&D PROGRAMS AND OFFICES

Office of Science (SC)

The Office of Science is the “largest federal sponsor of basic research in the physical sciences, supporting 22,000 researchers at 17 National Laboratories and more than 300 universities.”⁶ The FY 2016 budget request for the Office of Science (SC) is \$5.34 billion, an increase of \$272 million or 5.4 percent over the FY 2015 enacted levels.



The Office of Science budget is divided into six major program areas:⁷

- **Basic Energy Sciences (BES)** supports fundamental research to understand, predict, and ultimately control matter and energy, to provide the foundations for new energy technologies, to mitigate the environmental impacts of energy use, and to support DOE missions in energy, environment, and national security. Funding for this program includes support for Energy Frontier Research Centers (EFRCs), the Batteries and Energy Storage Energy Innovation Hub, and Computational Materials Sciences activities. BES is funded at \$1.85 billion, \$116 million above the FY 2015 enacted levels.

⁶ Department of Energy *FY 2016 Congressional Budget Request: Budget in Brief*, p. 3, February 2, 2015, Available at <http://www.energy.gov/sites/prod/files/2015/02/f19/FY2016BudgetinBrief.pdf>

⁷ Department of Energy *FY 2016 Congressional Budget Request: Volume 4*, February 2, 2015, Available at http://www.energy.gov/sites/prod/files/2015/02/f19/FY2016BudgetVolume4_5.pdf

- **Biological and Environmental Research (BER)** supports research on complex biological, climatic, and environmental systems, core research in genomic science, and efforts to advance understanding of the role of atmospheric, terrestrial, ocean, and subsurface interactions in determining climate dynamics to predict future climate change and plan for future energy and resource needs. Funding for this program supports three DOE Bioenergy Research Centers (BRC). BER is funded at \$612 million, \$20 million above the FY 2015 enacted levels.
- **Advanced Scientific Computing Research (ASCR)** supports advanced computational research, applied mathematics, computer science, and networking and the development and operation of high performance computing facilities. Funding is specifically included to accelerate development of capable exascale computing systems, with ASCR serving as the lead office in the supercomputing crosscut identified within the budget request. ASCR is funded at \$621 million, \$80 million above the FY 2015 enacted levels.
- **Fusion Energy Sciences (FES)** supports research to understand the behavior of matter at high temperatures and densities and continue to develop fusion as a future energy source. Funding is also included for the U.S. contribution to the International Thermonuclear Experimental Reactor (ITER) project. FES is funded at \$420 million, \$48 million below the FY 2015 enacted levels.
- **High Energy Physics (HEP)** supports research to understand how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, their interactions, and the basic nature of space and time. Funding for this program supports activities and projects based on the strategic plan issued by the High Energy Physics Advisory Panel (HEPAP) in May 2014, including design support for reconfigured international Long Baseline Neutrino Facility hosted at Fermilab. HEP is funded at \$788 million, \$22 million above the FY 2015 enacted levels.
- **Nuclear Physics (NP)** supports research to discover, explore, and understand nuclear matter in a variety of different forms. Funding for this program includes continued construction of the Facility for Rare Isotope Beams (FRIB) at Michigan State University. NP is funded at \$625 million, \$29 million above the FY 2015 enacted levels.

Energy Efficiency and Renewable Energy (EERE)

The Office of Energy Efficiency and Renewable Energy (EERE) is “the U.S. Government’s primary clean energy technology organization”⁸ and supports applied research, development, demonstration, and deployment (RDD&D) activities in transportation, renewable power, and energy efficiency. EERE’s primary goals include reducing U.S. reliance on fossil fuels reducing the cost of energy, reducing energy emissions, and promoting American manufacturing of clean energy technologies.⁹ The FY 2016 budget request for EERE is \$2.72 billion, an increase of \$809 million or 42.3 percent over FY 2015 enacted levels.

⁸ Department of Energy *FY 2016 Congressional Budget Request: Volume 3*, p. 9, February 2, 2015, Available at http://www.energy.gov/sites/prod/files/2015/02/f19/FY2016BudgetVolume3_7.pdf

⁹ Ibid.

EERE RDD&D is organized into three primary program areas: sustainable transportation (\$793 million, an increase of 31.7 percent), renewable power (\$645.2 million, an increase of 41.5 percent), and energy efficiency in buildings and manufacturing (\$1.03 billion, an increase of 60.4 percent). EERE programs are also major contributors for five out of six cross-cutting initiatives in the budget proposal, including Energy-Water Nexus, Grid Modernization, Subsurface Technology and Engineering, Supercritical CO₂, and Cybersecurity.

The Advanced Research Projects Agency –Energy (ARPA-E)

ARPA-E was established in 2007 by the America COMPETES Act (P.L.110-69), and is charged with developing energy technologies that result in “(i) reductions of imports of energy from foreign sources; (ii) reductions of energy-related emissions, including greenhouse gases; and (iii) improvement in the energy efficiency of all economic sectors.”¹⁰ ARPA-E was established to fund high-risk, high-impact projects that explore the development of transformational technologies that enhance economic and energy security, reduce energy imports, improve energy efficiency, and reduce emissions. The FY 2016 budget request for ARPA-E is \$325 million, an increase of \$45 million or 16.1 percent above FY 2015 enacted levels.

Fossil Energy R&D (FE)

The DOE Office of Fossil Energy (FE) supports R&D focused on coal, oil, and gas, as well as the Federal Government’s Strategic Petroleum Reserve. The FY 2016 budget request for Fossil Energy R&D (FER&D) activities is \$560 million, a decrease of \$587,000 or 0.1 percent from FY 2015 enacted levels.

Fossil Energy Research and Development (FER&D) “advances technologies related to the reliable, efficient, affordable, and environmentally sound use of fossil fuels,”¹¹ leading federal research, development, and demonstration efforts to ensure “secure, reasonably priced and environmentally sound fossil energy supplies.”¹²

FER&D includes coal R&D focusing on carbon capture and storage (CCS) and power systems (\$369 million, a decrease of 7.7 percent) and natural gas technologies R&D focused on reducing emissions and water use of shale gas development (\$44 million, an increase of 75.2 percent). The Natural Gas Technologies program also includes intergovernmental collaborative research with the Department of the Interior and Environmental Protection Agency focused on environmentally sound development of unconventional resources. FER&D programs are also major contributors to four cross-cutting initiatives in the budget proposal, including Energy-Water Nexus, Subsurface Technology and Engineering, Supercritical CO₂, and Cybersecurity.

¹⁰ ARPA-E Statutory Authority Available at <http://arpa-e.energy.gov/arpa-e-site-page/authorization>

¹¹ Department of Energy *FY 2016 Congressional Budget Request: Budget in Brief*, p. 35, February 2, 2015, Available at <http://www.energy.gov/sites/prod/files/2015/02/f19/FY2016BudgetinBrief.pdf>

¹² FE Mission Statement. Available at <http://energy.gov/fe/mission>.

Nuclear Energy (NE)

The Office of Nuclear Energy (NE) supports the diverse civilian nuclear energy programs of the U.S. Government, including federal research, development, and demonstration efforts to “advance nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers.”¹³ The FY 2016 request for Nuclear Energy RD&D is \$480 million, a decrease of \$15.7 million or 3.2 percent from FY 2015 enacted levels.

Nuclear energy R&D is primarily divided into four subprograms: SMR Licensing Technical Support (\$62.5 million, an increase of 14.7 percent), Supercritical Transformational Electric Power Generation (\$5 million, equal to the FY 2015 request), Reactor Concepts Research, Development and Demonstration (\$108.1 million, a decrease of 18.7 percent), Fuel Cycle Research and Development (\$217 million, an increase of 10.5 percent), and Nuclear Energy Enabling Technologies (\$86.3 million, a decrease of 14.5 percent). NE R&D programs are also major contributors to three cross-cutting initiatives in the budget proposal, including Subsurface Technology and Engineering, Supercritical CO₂, and Cybersecurity.

Electricity Delivery and Energy Reliability (OE)

The mission of the Office of Electricity Delivery and Energy Reliability is driving “electric grid modernization and resiliency in the energy infrastructure” and leading efforts to “ensure a resilient, reliable, and flexible electricity system.”¹⁴ OE is also the federal government's energy sector-specific lead in responding to both physical and cyber emergencies to energy infrastructure. The FY 2016 budget request for OE is \$270.1 million, an increase of \$123.1 million or 83.8 percent from FY 2015 enacted levels.

OE R&D is primarily divided between four program areas: Clean Energy Transmission and Reliability (\$40 million, an increase of 16.7 percent), Smart Grid Research and Development (\$30 million, an increase of 94.3 percent), Cybersecurity and Energy Delivery Systems (\$52 million, an increase of 13 percent), and Energy Storage (\$21 million, an increase of 75 percent). OE R&D programs are also major contributors to two cross-cutting initiatives in the budget proposal, including Grid Modernization, and Cybersecurity.

¹³ NE Mission Statement. Available at <http://energy.gov/ne/mission>.

¹⁴ OE Mission Statement. Available at <http://energy.gov/oe/mission>.