

**Statement by Christopher Smith  
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**FY 2016 Appropriations Hearing  
House Committee on Appropriations  
Subcommittee on Energy and Water Development**

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Chairman Simpson, Ranking Member Kaptur and Members of the Subcommittee, it is my pleasure to appear before you today to discuss the Department of Energy's (DOE) Office of Fossil Energy's (FE) programs.

At the end of 2013, policymakers came together on a bipartisan basis to partially reverse sequestration and to pay for higher discretionary funding levels with long-term reforms. We have seen the positive consequences of that bipartisan agreement for our ability to invest in areas ranging from research and manufacturing to strengthening our military. We have also seen the positive consequences for the economy, with an end to mindless austerity and manufactured crises contributing to the fastest job growth since the late 1990s. The President's Budget builds on this progress by reversing sequestration, paid for with a balanced mix of commonsense spending cuts and tax loophole closers, while also proposing additional deficit reduction that would put debt on a downward path as a share of the economy.

Meanwhile, the President has made clear that he will not accept a budget that reverses our progress by locking in sequestration going forward. Locking in sequestration would bring real defense and non-defense funding to the lowest levels in a decade. As the Joint Chiefs and others have outlined, that would damage our national security, ultimately resulting in a military that is too small and equipment that is too old to fully implement the defense strategy. It would also damage our economy, preventing us from making pro-growth investments in areas ranging from basic research to early childhood education. As the President has stated, he will not accept a budget that severs the vital link between our national and economic security, both of which are important to the Nation's safety, international standing, and long-term prosperity.

The Office of Fossil Energy (FE) advances technologies related to the reliable, efficient, affordable, and environmentally sound use of fossil fuels which are essential to our Nation's security and economic prosperity. FE leads Federal research, development, and demonstration efforts on advanced carbon capture, and storage (CCS) technologies to facilitate achievement of

the President's climate goals. FE also develops technological solutions for the prudent and sustainable development of our unconventional domestic resources.

FE also manages the Nation's Strategic Petroleum Reserve (SPR). The SPR, with a capacity of 727 million barrels, serves as the largest stockpile of government-owned emergency crude oil in the world. The SPR helps ensure U.S. energy security by providing protection against disruptions in U.S. oil supplies. It also allows the United States to meet, in combination with commercial stocks, its International Energy Agency (IEA) obligation to maintain strategic oil stocks equal to ninety days of net oil imports.

In addition to the SPR, FE oversees the Northeast Home Heating Oil Reserve, which provides a short-term supplement to commercial home heating oil supplies in the Northeast in the event of a supply interruption. The Office also manages the Naval Petroleum Reserves.

### **Fiscal Year 2016 Budget Request**

President Obama's FY 2016 budget seeks \$842.1 million for the Office of Fossil Energy. The request includes \$560 million for Fossil Energy Research and Development, \$257 million for the Strategic Petroleum Reserve, \$7.6 million for the Northeast Home Heating Oil Reserve and \$17.5 million for the Naval Petroleum Reserves.

The FY 2016 budget request will allow FE to fulfill its mission: to provide the Nation with the best opportunity to tap the full potential of its abundant fossil energy resources in an environmentally sound manner and to ensure America's readiness to respond to short-term energy supply disruptions.

### **Fossil Energy Research and Development**

The President's FY 2016 budget requests \$560 million for the fossil energy research and development (FER&D) portfolio. In FY 2016, Fossil Energy Research and Development will continue to focus on carbon capture and storage and activities that increase the performance, efficiency, and availability of systems integrated with CCS.

The FY 2016 Budget continues crosscutting programs which coordinate across the Department and seek to tap DOE's full capability to effectively and efficiently address the U.S.'s energy, environmental, and national security challenges. These crosscutting initiatives will be discussed further within the programs in which the crosscuts are funded. The FY 2016 Request for FER&D contains the following crosscuts:

- Supercritical CO<sub>2</sub>
- Subsurface Technology and Engineering
- Energy-Water Nexus

## **Carbon Capture & Storage and Power Systems**

The CCS and Power Systems program conducts research to reduce carbon emissions by improving the performance and efficiency of CCS technologies and of fossil energy systems integrated with CCS. The FY 2016 budget request for the program is \$369.4 million. It also includes \$34 million for NETL staff to conduct in-house fossil energy R&D.

***Carbon Capture.*** The President's FY 2016 budget requests \$116.6 million for carbon capture R&D. The Carbon Capture activity is focused on the development of post-combustion and pre-combustion carbon dioxide (CO<sub>2</sub>) capture and compression technologies for new and existing coal and natural gas-fired power plants and industrial sources. Post-combustion CO<sub>2</sub> capture technology R&D is focused on capturing CO<sub>2</sub> from flue gas after the fuel has been consumed/combusted. Pre-combustion CO<sub>2</sub> capture is applicable to systems that capture and separate the CO<sub>2</sub> from mixed gas streams prior to combustion or utilization of the gas.

The FY 2016 Budget request funds a new emphasis on optimizing carbon capture on natural gas systems, funds ongoing laboratory- and bench-scale projects, and proceeds to larger scale pilot tests of capture technologies on both coal and natural gas. These efforts will support the program's commitment to deliver a demonstration project that captures and stores more than 75 percent of the carbon emissions from a natural gas power system of at least 50 MWe capacity by 2020 using what has been determined to be the best available carbon capture technology available for demonstration at the time.

The FY 2016 request includes:

- *Post-combustion CO<sub>2</sub> capture technology* – \$104.6 million will support two large scale pilot projects, one awarded in FY 2015 and at least one additional project selected from a solicitation in FY 2016, for post combustion capture that are applicable to both coal and natural gas power systems.
- *Pre-combustion CO<sub>2</sub> capture technology* – \$12 million will support a small-scale pilot project for advanced pre-combustion capture technologies, as well as continue advanced laboratory scale and small slipstream R&D for pre-combustion capture technologies.

***Carbon Storage.*** The President's FY 2016 budget requests \$108.8 million for carbon storage R&D. The overall goal of the Carbon Storage Program is to develop and validate technologies to ensure safe and permanent geologic storage of captured CO<sub>2</sub>. Development and validation of these technologies is critical to ensure stakeholders have the capability to assess, monitor and mitigate storage risks for CO<sub>2</sub>, and ensure the viability of carbon storage as an effective technology solution that can be implemented on a large-scale to mitigate carbon emissions.

The Carbon Storage Program significantly contributes to the Department's cross-functional SubTER Technical Team activities related to subsurface technologies. Therefore, much of the

work being conducted by the Office of Fossil Energy under the Carbon Storage Program is being coordinated with other DOE offices through the SubTER Technical Team to maximize the value of this research across DOE offices.

The FY 2016 request includes:

- *Storage Infrastructure* – \$63.1 million for continued implementation of large-scale field projects, such as those being conducted by the Regional Carbon Sequestration Partnerships, to evaluate methodologies and validate technologies (system integration) at a large-scale demonstrating safe and permanent storage. Funding also supports existing small-scale field tests, offshore storage site characterization research projects from the FY 2015 solicitation, and ongoing support and/or selection of small or large-scale and fit-for-purpose field projects.
- *Advanced Storage R&D (formerly Geologic Storage Technologies)* – \$17.4 million supports the incorporation of the Monitoring, Verification, Accounting, and Assessment (MVAA) subprogram budget line. This consolidation improves the integration of the technologies developed in these previously separated budget lines. Funding will support existing and new projects on wellbore integrity, new subsurface signals, and stress state of the subsurface in support of DOE’s cross-functional SubTER Technical Team. It will also fund continued development of MVAA tools and technologies to increase efficiency of injecting and monitoring CO<sub>2</sub> in subsurface geologic formations.
- *Carbon Use and Reuse* – No funding is requested for this area of research, which will complete existing applied R&D projects and continue projects funded with prior year obligations.
- *Sub-disciplinary Storage R&D (formerly Focus Area for Carbon Sequestration Science)*– \$28.3 million. The Focus Area for Carbon Sequestration Science was renamed Sub-disciplinary Storage R&D because the activities are more directly focused on applied R&D activities within the overall Carbon Storage Program. Funding will support existing projects that address targeted research needs such as: 1) Reservoir and seal performance; 2) Geologic storage site optimization and operations; 3) Reservoir capacity and storage efficiencies; 4) Reservoir modeling and monitoring technologies; and 5) Resource assessment and geospatial data management; and 6) CO<sub>2</sub> use, re-use and conversion. It also supports the Energy Data Exchange (EDX) and National Risk Assessment Partnership (NRAP). Work accomplished under EDX and NRAP supports the Carbon Storage Program’s goals of addressing data management, technology transfer, and uncertainty associated with risks on stress state and induced seismicity.

***Advanced Energy Systems (AES).*** The President's FY 2016 budget requests \$39.4 million for advanced energy systems R&D. The AES mission is to increase the availability and efficiency of fossil energy systems integrated with CO<sub>2</sub> capture, while maintaining the highest environmental standards at the lowest cost. The program elements focus on advanced combustion technologies, advanced turbines, gasification, and solid oxide fuel cells.

The FY 2016 budget enables the program to continue the development, through design and construction, of pressurized oxy-combustion and chemical looping combustion pilot-scale systems; continued testing of advanced gasification technology component development; development of component technologies for high pressure ratio and high temperature turbine technologies; and continue the Solid Oxide Fuel Cell (SOFC) Program to focus on advanced material development.

The FY 2016 request includes:

- *Advanced Combustion Systems* – \$10.4 million for the development of advanced combustion technologies, such as pressurized oxy-combustion and chemical looping processes.
- *Gasification Systems* – \$11.0 million for continued testing of advanced oxygen production bio-gasification technologies, and development of multiphase reacting flow models development applicable both to commercial gasification systems and exploring completely novel, highly efficient reactor concepts, and refractory development activities.
- *Advanced Turbines* – \$9.0 million for the development of component technologies for high pressure ratio and high temperature turbine technologies.
- *Coal and Coal Biomass to Liquids* – No funding requested. Existing projects will be funded and completed with prior year obligations.
- *Solid Oxide Fuel Cells* – \$9.0 million will accelerate the commercialization of SOFC technology while retaining the program's long term focus on efficient, cost-effective SOFC electricity that minimizes water consumption in central power generation applications and produces a pure, CO<sub>2</sub> exhaust stream to reduce the costs of carbon capture and storage.

***Cross-cutting Research.*** The President's FY 2016 budget requests \$51.2 million for crosscutting research. The Program serves as a bridge between basic and applied research by targeting concepts that offer the potential for transformational breakthroughs and step change benefits in the way energy systems are designed, constructed, and operated. In addition, the Cross-cutting Research Program leads efforts that support University-based energy research including science and engineering education at minority colleges and universities.

The FY 2016 request includes:

- *Plant Optimization Technology* – includes Sensors and Controls, Cross-cutting Materials R&D, Advanced Ultra Supercritical Materials R&D, and Water Management R&D.
- *Sensors and Controls* - \$4.5 million for sensors, controls and other novel concepts.
- *Cross-cutting Materials* – \$1.5 million for modeling and acceleration of new classes of alloys required for advanced power systems.
- *Advanced Ultra-Supercritical* – \$15.5 million to refocus materials development on high-temperature component parts needed for a directly fired-supercritical carbon dioxide fuel cycle. Funding for R&D is focused on enabling the water-limited cooling provided by a directly-heated supercritical CO<sub>2</sub> fuel cycle and will be used to support the Supercritical Transformational Electric Power Generation (STEP) pilot for which a solicitation is to be issued in FY 2016.
- *Water Management R&D* – \$6 million supports research focused on treatment of non-traditional water produced through carbon capture and storage. In FY 2016, the R&D efforts under Water Management within the Office of Fossil Energy will be coordinated with other offices throughout DOE in support of DOE’s Water Energy Tech Team (WETT) crosscut in order to maximize the value of this research across DOE programs.
- *Coal Utilization Science* – \$18.8 million includes \$7 million for Computational System Dynamics to support NRAP modeling projects, and \$11.8 million for Computational Energy Science to support continued high level modeling capabilities.
- *Energy Analyses* – \$850,000 to carry out analyses of options and barriers for incorporating CCS on gas-fueled power plants. The program will be re-scoped to prioritize the analyses expected to provide the greatest insights for future technology development.
- *University Training and Research* – \$3 million for university coal research, historically black colleges and universities education and training.
- *International Activities* – \$1.1 million supports FE’s commitment to the International Energy Agency Clean Coal Center (IEACCC) to enhance the competitiveness and adoption of U.S. Clean Coal Technologies in targeted countries that will help protect the local and global environment. It will also support organization of the 2016 Carbon

Sequestration Leadership Forum (CLSF) Ministerial conference featuring a significant increase in international policy initiatives.

***Supercritical Carbon Dioxide Technology.*** The Supercritical Carbon Dioxide Technology's (sCO<sub>2</sub>) \$19.3 million request supports the Department's sCO<sub>2</sub> crosscut which is focused on technology development for supercritical carbon dioxide-based power conversion cycles. These cycles can be applied to most heat sources, including fossil, nuclear, solar and geothermal applications, while offering significant improvements in efficiency, cost, footprint, and water use. The ultimate goal for FE's R&D is a directly-fired supercritical CO<sub>2</sub> fuel cycle which could also significantly reduce the costs of carbon capture and storage.

The major thrusts of the crosscut are a coordinated R&D effort in high temperature technology development/component validation, and the Supercritical Transformational Electric Power Generation (STEP) initiative to design, construct and operate a 10MW pilot test bed.

***Natural Gas Technologies.*** The mission of the Natural Gas program – with an FY 2016 budget request of \$44 million – is to support DOE missions in energy, environment and national security. The program will focus on continued implementation of priority collaborative research and development, together with Department of the Interior, and Environmental Protection Agency, to ensure that shale gas resource development is conducted in a manner that is environmentally sound and protective of human health and safety.

Within this request, the Natural Gas Technologies program supports two DOE Crosscuts: Subsurface Technology and Engineering research and Water-Energy. The Subsurface Technology and Engineering crosscut will address identified challenges in the subsurface through highly focused and coordinated research in Wellbore Integrity, Stress State and Induced Seismicity, Permeability Manipulation, and New Subsurface Signals leading to the ability, for example, to predict and control hydraulically induced fractures and induced seismicity associated with subsurface energy production, storage and waste disposal applications. This research can help enhance energy security, have a material impact on climate change via CO<sub>2</sub> sequestration, and dramatically mitigate environmental impacts from energy-related activities and operations.

The Natural Gas Technologies program will continue implementation of the multi-agency collaborative research strategy in such areas as water quality and availability including the treatment and use of co-produced water from oil and gas wells, air quality, induced seismicity, and mitigating the impacts of development (e.g. wellbore integrity, reducing surface and subsurface footprint, and reduced water use). The program will initiate a midstream natural gas infrastructure subprogram to improve technologies that detect and mitigate methane emissions from natural gas infrastructure, communicate results to and partner with stakeholders to ensure that new technologies can be implemented, and measure the effectiveness on emission reductions. In addition, the program will initiate a new, emissions quantification from natural

gas infrastructure subprogram focused on better quantifying methane emissions from the natural gas value chain for updating the national Greenhouse Gas Inventory.

### **Petroleum Reserves**

FE's Office of Petroleum Reserves manages programs that provide the United States with strategic and economic protection against disruptions in petroleum supplies.

***Strategic Petroleum Reserve.*** The Strategic Petroleum Reserve (SPR) provides strategic and economic security against foreign and domestic disruptions in oil supplies via an emergency stockpile of crude oil. The program fulfills U.S. obligations under the International Energy Program, which avails the U.S. of International Energy Agency assistance through its coordinated energy emergency response plans, and provides a deterrent against energy supply disruptions. In 2014, the SPR performed an operational Test Sale that completed delivery of 4,998,146 barrels of crude oil over a 47 day period resulting in \$468,564,599 in receipts. This sale helped evaluate how changes in the TEXOMA distribution group impacts SPR's ability to distribute crude oil. A portion of these receipts (\$235,587,000) were the source for all Northeast Gasoline Supply Reserve (NGSR) requirements including 4.5 years of commercial storage, 1MMB of Government-owned, commingled gasoline stocks, third-party quality assurance and inventory certifications and sales platform readiness.

The FY 2016 budget request for SPR is \$257 million which will provide the program with full SPR operational readiness and drawdown capability. The program will continue the degasification of crude oil inventory at the West Hackberry site to ensure its availability. Wellbore testing and cavern remediation will also continue to ensure the availability of caverns for drawdown and to meet regulatory compliance. Major changes from FY 2015 include: an increase in the number of cavern remediations from 6 to 10; the addition of a custody transfer flow metering skid to provide distribution flexibility and reliability; and increased funding for the Major Maintenance construction program for timely replacement of equipment and physical systems and to reduce the deferred maintenance backlog.

***Northeast Home Heating Oil Reserve.*** The Northeast Home Heating Oil Reserve (NEHHOR) provides a short-term supplement to the Northeast systems' commercial supply of heating oil in the event of a supply interruption. In FY 2011, the NEHHOR Program completed the sale of all 2 million barrels of its high sulfur heating oil inventory located in commercial storage. In FY 2012, NEHHOR converted to a 1 million barrel configuration of Ultra Low Sulfur Diesel (ULSD) stored in the Northeast terminals, to meet new Northeast states' emission standards being instituted. The FY 2016 program continues the storage of one million barrels of ultra-low sulfur diesel at locations in New England. The FY 2016 budget request for NEHHOR is \$7.6 million, and focuses on an acceptable and effective transition to the new storage terminal contracts, solicited in FY 2015. The Program will continue oversight and management including quality analysis of the Reserve and support for the sales system.



***Naval Petroleum and Oil Shale Reserves.*** The FY 2016 budget requests \$17.5 million for the Naval Petroleum and Oil Shale Reserves (NPOSR). Following the 1998 sale of the Government's interests in NPR-1 (Elk Hills, CA) environmental cleanup/remediation activities under the Corrective Action Consent Agreement with the State of California Department of Toxic Substances Control (DTSC) began. Of 131 Areas of Concern (AOCs) for which DOE is responsible for environmental cleanup, 13 AOCs have received a DTSC certification of "No Further Action"; 7 AOCs are under DTSC review; 46 AOCs require additional testing; and 65 AOCs are awaiting field investigation or remediation activities. In FY 2016, NPR-1 will continue these assessment and remediation activities.

The account also funds activities at the Naval Petroleum Reserve 3 (NPR-3) in Wyoming (Teapot Dome field), a stripper well oil field. Disposition of NPR-3 through sale to private ownership was finalized in January 2015. , Additional FY 2015 NPR-3 activities include closure of contracts, preparation of field IT and equipment for disposal, records management processing, and disposal of personal property. In FY 2016, work will focus on remediation of the NPR-3 landfill,

## **Conclusion**

The Office of Fossil Energy remains committed to developing the science and technology that will allow the Nation to use its abundant fossil energy resources in a way that balances the energy needs for sustaining a robust economy with environmental responsibility. The FY 2016 budget request will help maintain DOE's leadership role in addressing issues of energy and environmental security. We believe this budget will provide the resources needed to achieve these goals while ensuring maximum benefit to U.S. taxpayers.

Mr. Chairman, and members of the Committee, this completes my prepared statement. I would be happy to answer any questions you may have at this time.