

THE U.S. DEPARTMENT OF ENERGY'S OFFICE OF FOSSIL ENERGY BUDGET IN BRIEF FY 15

The Office of Fossil Energy (FE) programs are focused on activities 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 manages DOE's Fossil Energy Research and Development Program, which includes the CCS Demonstration Programs; Carbon Capture and Storage and Power Systems Program; and Natural Gas Technologies R&D program. In addition, FE operates the Strategic Petroleum Reserve, the Northeast Home Heating Oil Reserve and the Naval Petroleum and Oil Shale Reserves. Each of these activities is in a separate appropriations account. A description of major programs, highlights and a synopsis of requested funding in the FY 2015 budget follows.

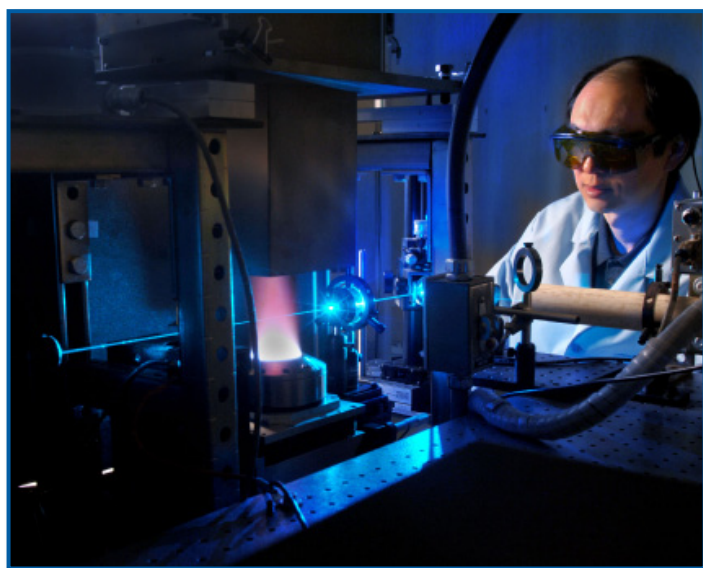
FOSSIL ENERGY RESEARCH AND DEVELOPMENT

Secure, affordable and environmentally acceptable energy sources are essential to the Nation's security and economic prosperity. The [Fossil Energy Research and Development](#) (FER&D) program leads Federal research, development, and demonstration efforts on advanced carbon capture and storage (CCS) technologies to facilitate achievement of the President's climate goals. FER&D also develops technological solutions for the prudent and sustainable development of our unconventional domestic resources.

The Fossil Energy Research and Development programs create public benefits by:

- Performing and managing research that reduces market barriers to the environmentally sound use of fossil fuels;
- Partnering with industry and others to advance fossil energy technologies toward commercialization; and,
- Supporting the development of information and policy options that benefit the public.

Within the FER&D Appropriation, FE funds the [Office of Clean Coal](#), focused on advancing CCS, and the [Office of Oil and Natural Gas](#), focused on unconventional gas.



Joe Yip, a researcher at the National Energy Technology Laboratory, utilizes laser-based Rayleigh light scattering to measure flame density and speed over a flat flame burner. Oxy-fuel combustion, using oxygen in place of air with diluents such as steam or carbon dioxide, can reduce pollutant emissions in advanced power cycles using gas turbines.

Fossil Energy Research and Development

FER&D manages the Clean Coal Power Initiative program along with two American Recovery and Reinvestment Act CCS demonstration programs: FutureGen 2.0 and the Industrial Carbon Capture and Storage program under the [CCS Demos program](#).

The [CCS and Power Systems program](#) conducts research to reduce carbon emissions by improving the performance and efficiency of fossil energy systems and CCS technologies.

► The [Carbon Capture](#) activity is focused on the development of post-combustion and pre-combustion CO₂ capture and compression technologies for new and existing fossil fuel-fired power plants and industrial sources. Post-combustion CO₂ capture technology R&D is focused on capturing CO₂ from flue gas after the fuel has been consumed/combusted. Pre-combustion CO₂ capture is applicable to systems that capture and separate the CO₂ from mixed gas streams prior to combustion or utilization of the gas.

► The overall goal of the [Carbon Storage](#) program is to develop and validate technologies to ensure safe and permanent geologic storage of captured CO₂. Development and validation of these technologies is critical to ensure industry and regulatory agencies have the capability to assess, monitor and mitigate storage risks for CO₂ onshore and offshore storage and ensure the viability of carbon storage as an effective technology solution that can be implemented on a large-scale to mitigate carbon emissions. Technologies developed and validated through this program will improve storage efficiency and reduce the overall cost of CCS with a goal of ensuring the cost effective ability to measure and account for 99 percent of injected CO₂ in all storage types while minimizing the environmental footprint of carbon storage activities.

► The [Advanced Energy Systems](#) (AES) are integral parts of FE's CCS and Power Systems R&D activities. The AES mission is to increase the availability and efficiency of fossil energy systems integrated with CO₂ capture, while maintaining the highest environmental standards at the lowest cost. The program elements focus on gasification, oxy-combustion, advanced turbines, and other energy systems. While the primary focus is on coal-based power systems, improvements to many of these technologies will result in positive spillover benefits that also reduce the cost of converting other carbon-based materials, such as biomass, petcoke or natural gas, into power and value-added products in an environmentally-acceptable manner.

► The [Cross-cutting Research](#) activity fosters the development of innovative systems for improving availability, efficiency, and environmental performance of advanced energy systems with carbon capture and storage. 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 mission of FE [Natural Gas Technology](#) activity is to support DOE missions in energy, environment and national security. The Natural Gas Technologies program will focus on technologies to reduce the carbon footprint, emissions, and water use in order to enable safe and responsible development of unconventional domestic natural gas resources. The Department of Energy, Department of the Interior, and Environmental Protection Agency developed a focused, collaborative research effort to address high-priority challenges to safe and prudent development of unconventional resources. FER&D research includes advancements in technology, methodology, risk assessment, and mitigation consistent with the multiagency effort.

Petroleum Reserves

The [Strategic Petroleum Reserve](#) (SPR) protects the U.S. from future disruptions in critical petroleum supplies and meets the U.S. obligations under the International Energy Program. The most recent draw-down of the SPR was 30 million barrels in FE 2011 as the U.S. obligation under the International Energy Agency Libya Collective Action. The remaining 696 million barrels of inventory provided 112 days of net import protection in 2013.

Protecting the nation against interruptions in its critical heating oil supplies, the [Northeast Home Heating Oil Reserve](#) provides protection from severe heating oil supply disruptions throughout the Northeast. The NEHHOR provides a short-term supplement to the Northeast systems' commercial supply of heating oil in the event of a supply interruption. The heating oil reserve has been designed to augment commercial supplies during an emergency. The reserve is not designed to displace the private market but to provide a buffer to assist the heating oil industry in mitigating short-term supply interruptions.

The [National Petroleum and Oil Shale Reserves](#) program manages a number of legal agreements that were executed as part of the 1998 sale of Naval Petroleum Reserve No. 1 (NPR-1) in California. These agreements direct post-sale work including environmental restoration and remediation, contract closeout and records disposition. The NPR-1 program continues to work towards closing out the remaining environmental findings, as required by the 2008 agreement between DOE and California.

DOE also operates NPR-3 and the Rocky Mountain Oilfield Testing Center (RMOTC), co-located near Casper, Wyoming. NPR-3/RMOTC will implement the approved disposition plan with final disposition of the property estimated to occur December 2015. Prior to disposition, NPR-3 will be maximizing the value obtained by the U.S. Government and minimizing the cost of remediation to DOE. A three-phased implementation plan for selling the facility and closing out the office has been developed. Over the course of the three phases, DOE will mitigate any adverse issues identified; comply with relevant laws and regulations; and protect the safety and health of the NPR-3 staff, contractors, and visitors.

The [Elk Hills School Lands Fund](#), subject to appropriation, provides a source of compensation for the California State Teachers' Retirement System as a result of a settlement with the State of California with respect to its longstanding claim to title of two sections of land within NPR-1. In 2011, the Department and the State of California agreed on the final, last payment of \$15.6 million.

Program Budget Highlights

Fossil Energy R&D

CCS Demonstrations

(FY 2015 Request: \$25.0M)

► *Natural Gas Carbon Capture and Storage* (FY 2015 Request: \$25.0M). In FY 2015, FER&D will establish a new program, Natural Gas Carbon Capture and Storage, to support projects to capture and store carbon emissions from natural gas power systems with the goal of leading to a Natural Gas demonstration.

Carbon Capture & Storage and Power Systems

(FY 2015 Request: \$277.4M)

► *Carbon Capture* (FY 2015 Request: \$77.0M) – Funding is requested to maintain priority on post-combustion and pre-combustion capture for fossil fuel-fired plants. The requested funding for post-combustion capture continues to support the transition and scale-up of multiple, advanced CO₂ capture technologies up through large-scale pilot projects to validate performance and operation.

► *Carbon Storage* (FY 2015 Request: \$80.1M) – Funding for Carbon Storage activities are decreased (-\$28.7M) while continuing the Storage Infrastructure activities on large-scale injection operation and monitoring activities and supporting small-scale field projects for other geologic storage formation classes. Funding for Geologic Storage Technologies is decreased while continuing to focus on understanding risks and addressing geo-mechanical impacts such as induced seismicity.

► *Advanced Energy Systems* (FY 2015 Request: \$51.0M) – In FY 2015, the funding request (-\$48.5M) enables the program to continue the development, through design and construction, of pressurized oxycombustion and chemical looping combustion pilot-scale systems; continue development of materials engineering design for hydrogen turbines; continue advanced gasification technology component development such as oxygen membranes, warm gas cleanup and hydrogen separation at bench through pilot-scale; and continue the SOFC Program to focus on durable SOFC materials.

► *Cross-cutting Research* (FY 2015 Request: \$35.3M) – In FY 2015, Cross-cutting Research supports fundamental work that supports or “cuts across” divisions such as fundamental modeling and simulation work, materials, water-energy nexus, grid technologies, sensors and controls, and university research that serves as the scientific foundation for RD&D of second generation and transformational technologies. The request increases the amount for Coal Utilization Science (+\$4.6M), including Computational System Dynamics and the Focus Area for Computational Energy Science. This funding level will support the Carbon Capture Simulation Initiative to facilitate; more rapid development and commercialization of capture technologies, and Grid Tech to enable fossil-based facilities to better integrate with advanced grid technologies (i.e., smart grid).

► *NETL Coal R&D* (FY 2015 Request: \$34.0M) – The FY 2015 request supports the National Energy Technology Laboratory staff directly associated with conducting in-house research activities for the Coal Research and Development programs.

Natural Gas Technologies (FY 2015 Request: \$35.0M)

In FY 2015, the Natural Gas program will focus on continued implementation of priority collaborative research and development, together with EPA and DOI, to ensure that shale gas development is conducted in a manner that is environmentally sound and protective of human health and safety. The program will focus on continued implementation of the collaborative research plan in such areas as water quality, water availability, air quality, induced seismicity, and mitigating the impacts of development (e.g. wellbore integrity, improve environmental footprint, and reduce water use). The funding request includes \$15.3M for Environmentally Prudent Development, \$4.7M for Emissions Mitigation from Midstream Infrastructure, and \$15.0M for Gas Hydrates.

Petroleum Reserves

Strategic Petroleum Reserve (FY 2015 Request: \$205.0M)

The FY 2015 funding will provide the program with full SPR operational readiness and drawdown capability. The funding increase (+\$15.6M) includes support for a larger Major Maintenance program required to reduce the backlog of deferred maintenance projects. The program will continue the degasification of crude oil inventory to ensure its availability; testing and cavern remediation; a cavern maintenance program to slow the loss of cavern storage capacity; and repair the crude oil tank at Bryan Mound that will restore the program’s maximum drawdown rate.

Northeast Home Heating Oil Reserve (FY 2015 Request: \$1.6M)

The decrease (-\$6.4M) reflects the use of prior year balances and new budget authority to maintain the minimum anticipated funding level required to solicit follow-on commercial storage contracts for 1 million barrels of Ultra Low Sulphur Diesel.

Naval Petroleum & Oil Shale Reserves (FY 2015 Request: \$20.0M)

NPR-1 will continue ongoing activities to attain release from the remaining environmental findings related to the sale of NPR-1 Elk Hills. Phase II of the Disposition Plan will continue with the sale of NPR-3. Production Operations will remain operating to return revenue to the U.S. Treasury until transfer is completed to new owners.

Elk Hills School Land Fund (FY 2015 Request: \$15.6M)

For necessary expenses in fulfilling the final payment under the Settlement Agreement between the United States and the State of California.

Fossil Energy Budget

Area	Program	Request (Thousand \$)
Research & Development	CCS Demonstrations (Natural Gas Carbon Capture & Storage)	\$25,000
	CCS & Power Systems	
	Carbon Capture	\$77,000
	Carbon Storage	\$80,084
	Advanced Energy Systems	\$51,000
	Cross-cutting Research	\$35,292
	NETL Coal R&D	\$34,031
	Total CCS & Power Systems	\$302,407
	Natural Gas Technologies	\$35,000
	Other R&D Programs, Dir. Mgmt. Support	\$138,093
	Total, Research and Development	\$475,500
	Rescission of CCT Prior Year Funds	(\$6,600)
Petroleum Reserves	Strategic Petroleum Reserve	\$205,000
	Northeast Home Heating Oil Reserve	\$1,600
	Rescission of CCT Prior Year Funds	(\$6,600)
	Naval Petroleum Reserves/RMOTC	\$19,950
	Elk Hills School Lands Fund	\$15,580
Total Fossil Energy Budget		\$711,030